Inpatient management of HFrEF 2024: A "whole"istic approach

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Disclosures

None

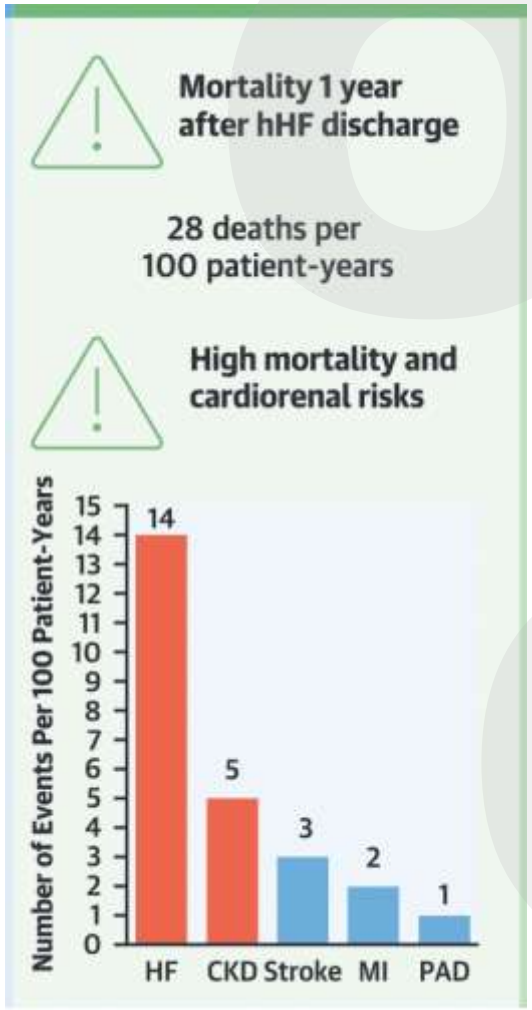
Inpatient heart failure themes by year…

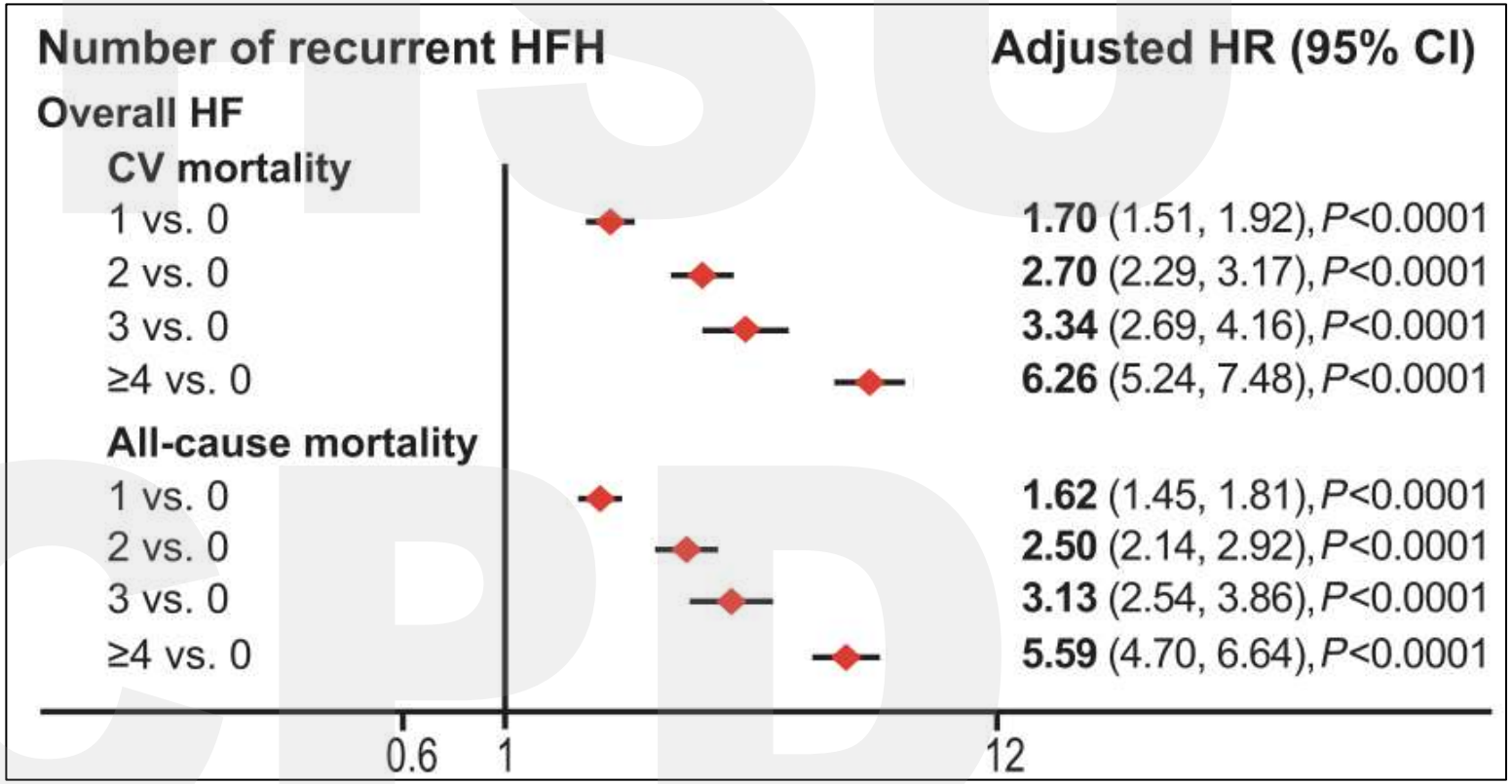
2021: Quad therapy?

2023: Decongest fully!

2024: ???

HF hospitalization (and re-hospitalization) is a high risk event





Biykem Bozkurt et al. *J Am Coll Cardiol HF* 2023
Lindmark et al. *ESC HF* 2021

Inpatient heart failure themes by year…

2021: Quad therapy?

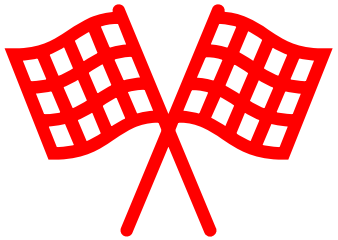
2023: Decongest fully!

2024: Decongest fully, start quad therapy by discharge, assess trajectory frequently, escalate care or determine GOC when appropriate

Case example 1:

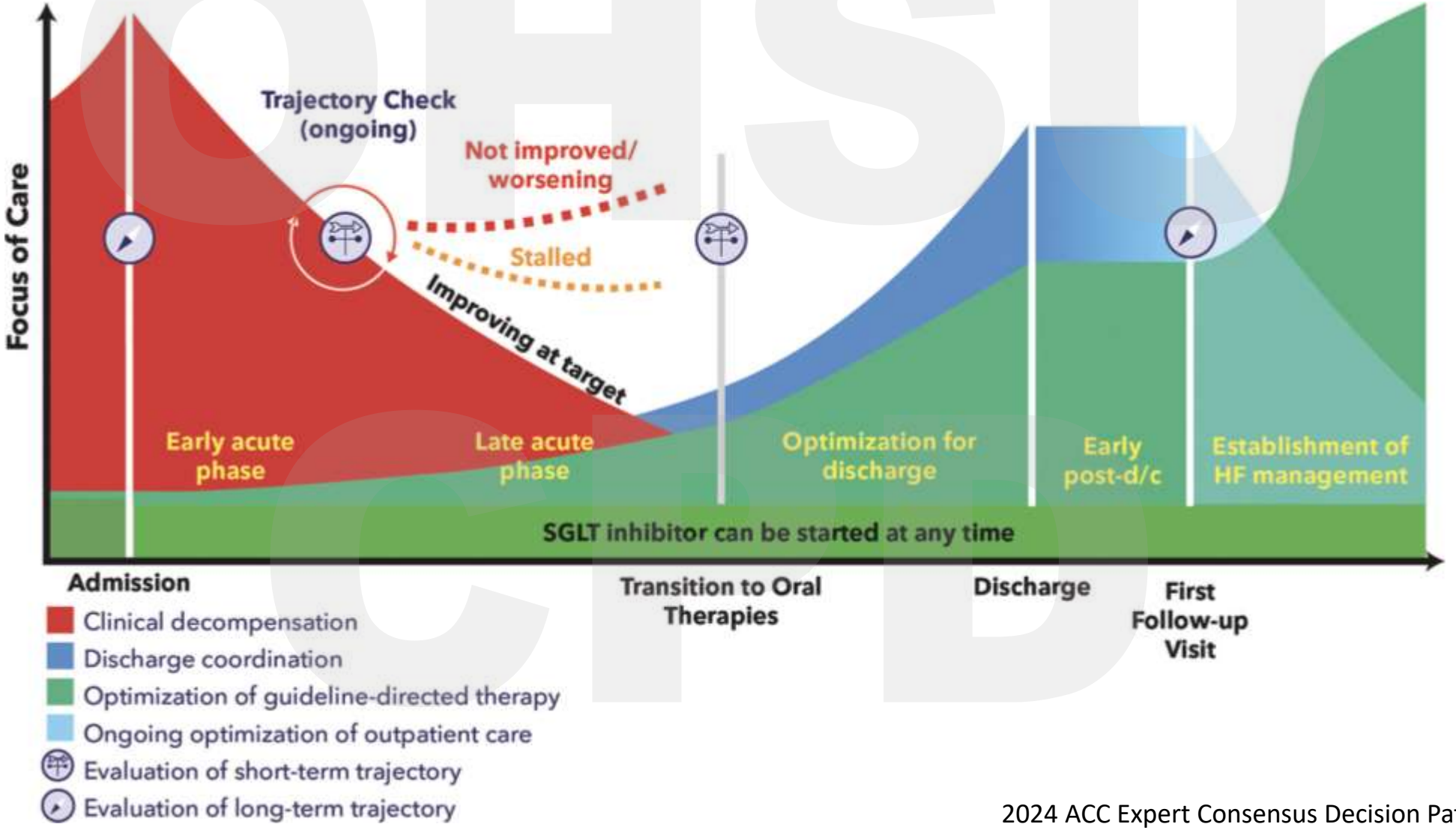
- 64yoF with a history of remote breast CA treated with doxorubicin, presents with progressive shortness of breath, weight gain, LE swelling, and “panic attacks” at night
- Vitals: HR 102, BP 110/72, Sat 92% on RA
- Labs: BUN 38 / Cr 1.3 (baseline 0.9), normal LFTs, normal lactate
- Workup: NT-proBNP of 1700 and TTE with EF 25-30%, dilated LV (7cm) normal RV function, mild MR, mild TR, dilated non-collapsing IVC
- Admitted to the hospital for management of new onset HF

Case example 2:

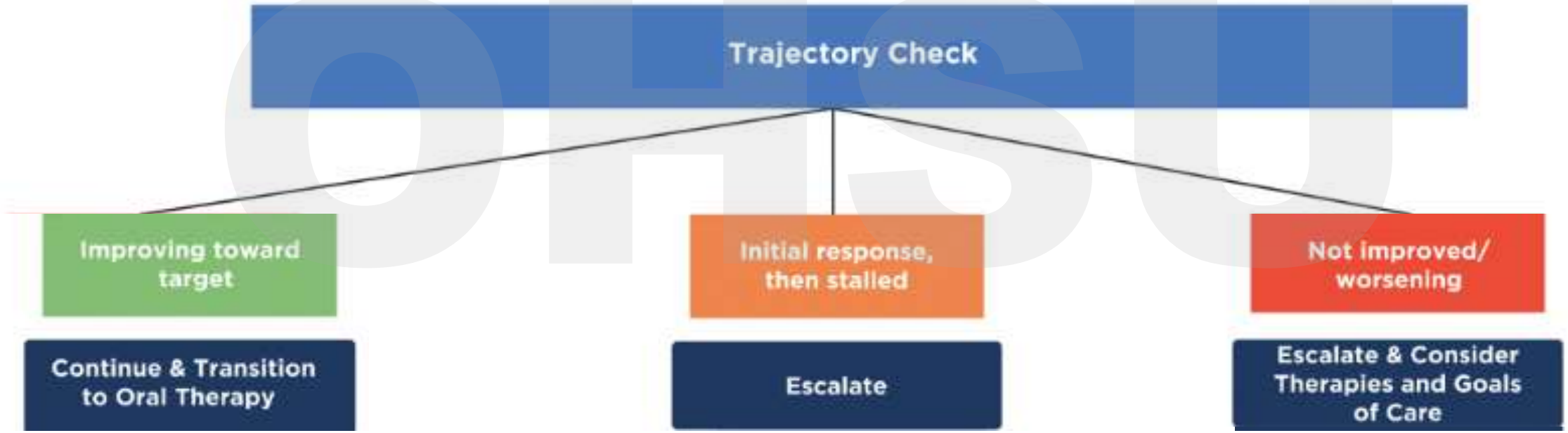


- 27yoM with familial cardiomyopathy (EF < 20%), recently admitted with ADHF requiring ICU stay for IV inotropes. Discharged 9 days ago on lisinopril 2.5mg qd, spironolactone 12.5mg qd, furosemide 80mg BID. Now presenting with severe dyspnea, 10 pound weight gain, LE edema.
- Vitals: HR 123 (sinus), BP 100/82, Sat 96% on RA
- Labs: BUN 54 / Cr 1.7 (baseline 1.1), normal AST/ALT, T.Bili 2.1, Lactate 1.9
- Admitted to the hospital for ongoing management of acute on chronic decompensated HF

Timeline of an inpatient HF admission

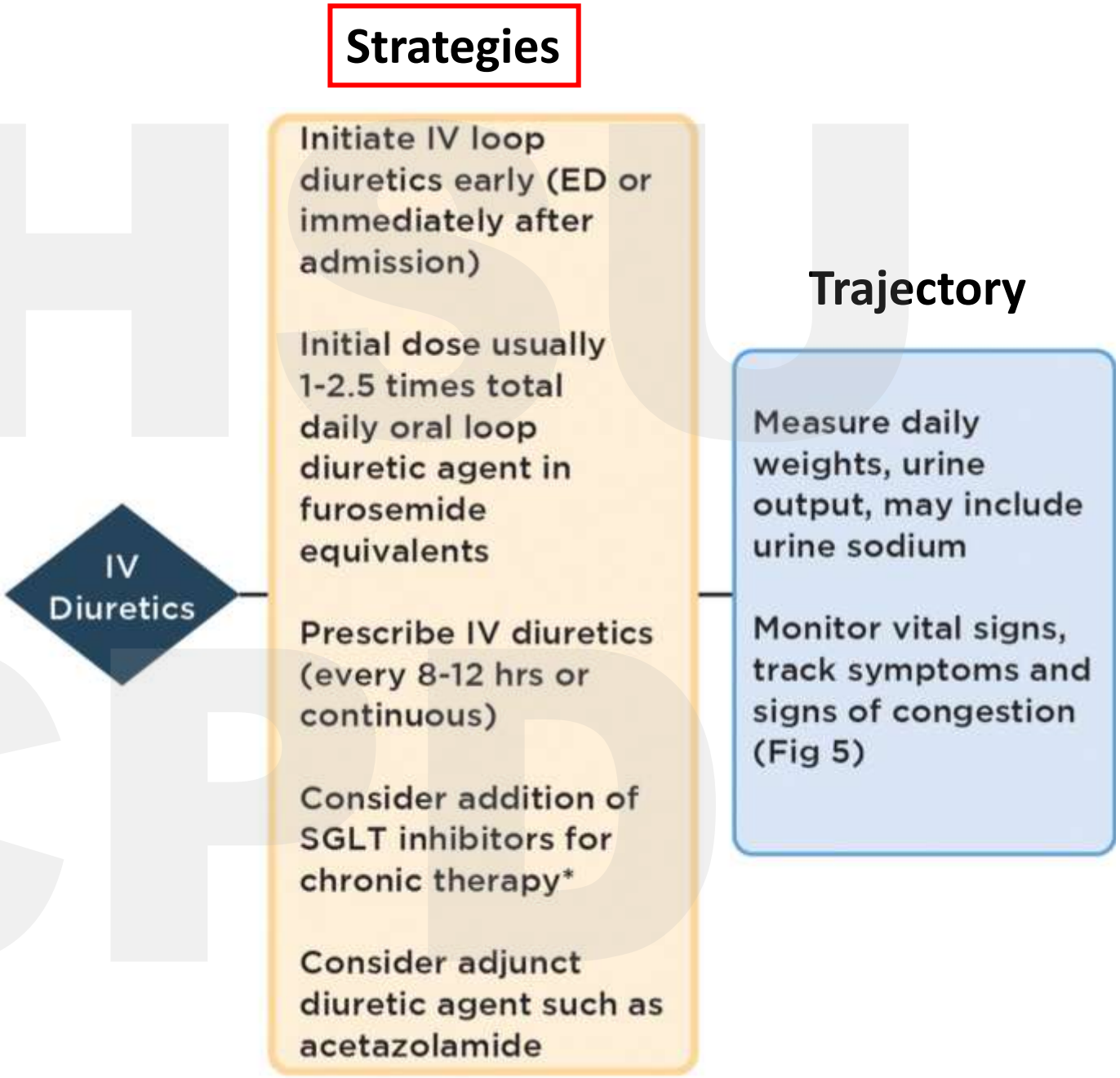


2024 ACC Expert Consensus Decision Pathway *JACC* 2024



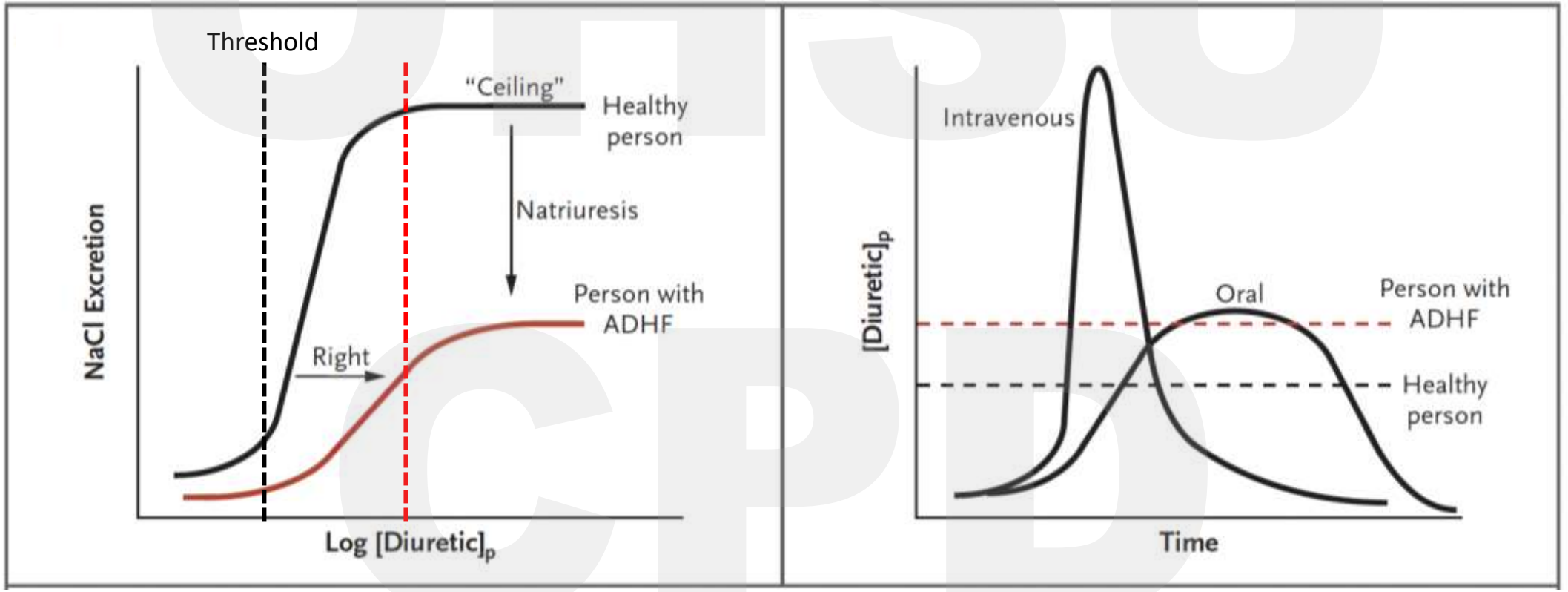
2024 ACC Expert Consensus Decision Pathway *JACC* 2024

Inpatient Decongestion



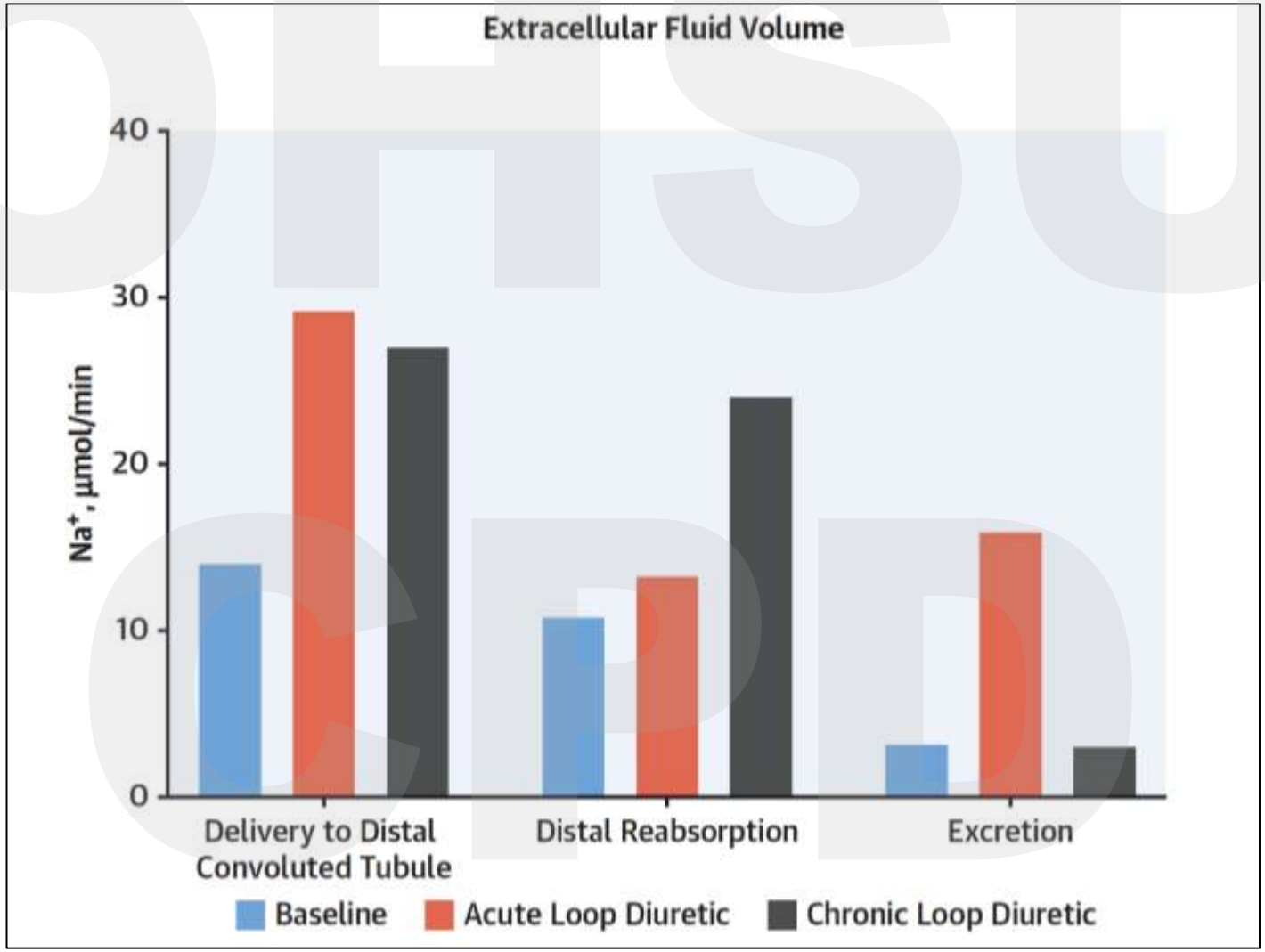
2024 ACC Expert Consensus Decision Pathway *JACC* 2024

Acute phase diuretics: high dose and IV



Ellison and Felker *NEJM* 2017

The “Braking” phenomenon (or why we need sequential nephron blockade)



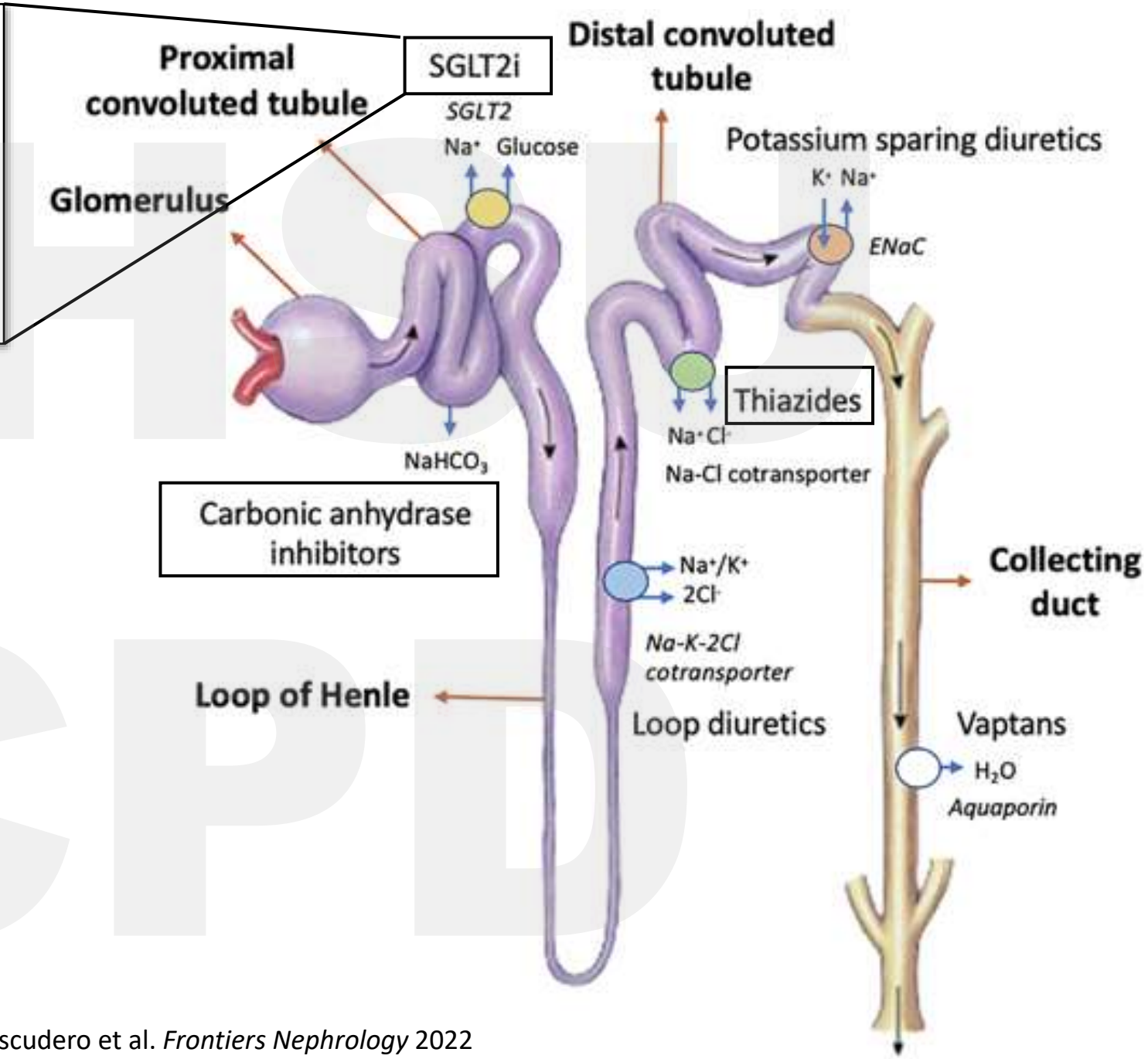
Felker et al. *J Am Coll Cardiol* 2020

Location of diuretic targets

SGLT2i

SGLT2i: Inhibits SGLT2 (sodium-glucose transporter and *possibly* Na-H+ cotransporter as well

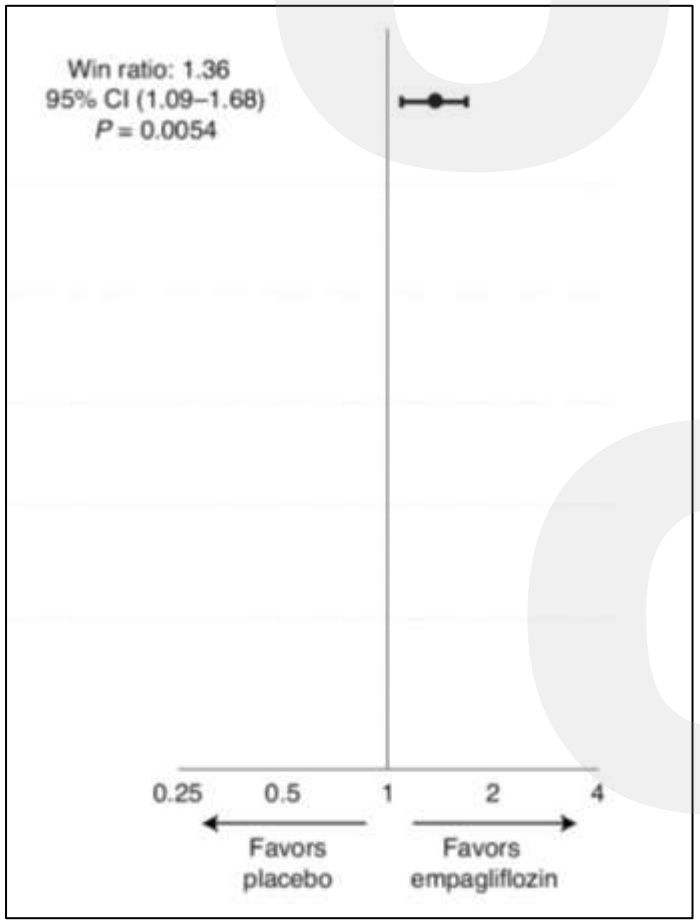
- minimal effect on BP
- eGFR > 20-25 mL/min/1.73m2



Escudero et al. *Frontiers Nephrology* 2022

SGLT2i initiation during ADHF: safe and efficacious

EMPULSE-HF: Initiation of empagliflozin during admission for acute decompensated HF



Who: Patients hospitalized for ADHF (24 hrs – 5 days from admission). Stability required (SBP > 100, no inotropes x 24 hrs, no IV diuretic escalation x 6 hrs), eGFR > 20 mL/min/1.73m^2

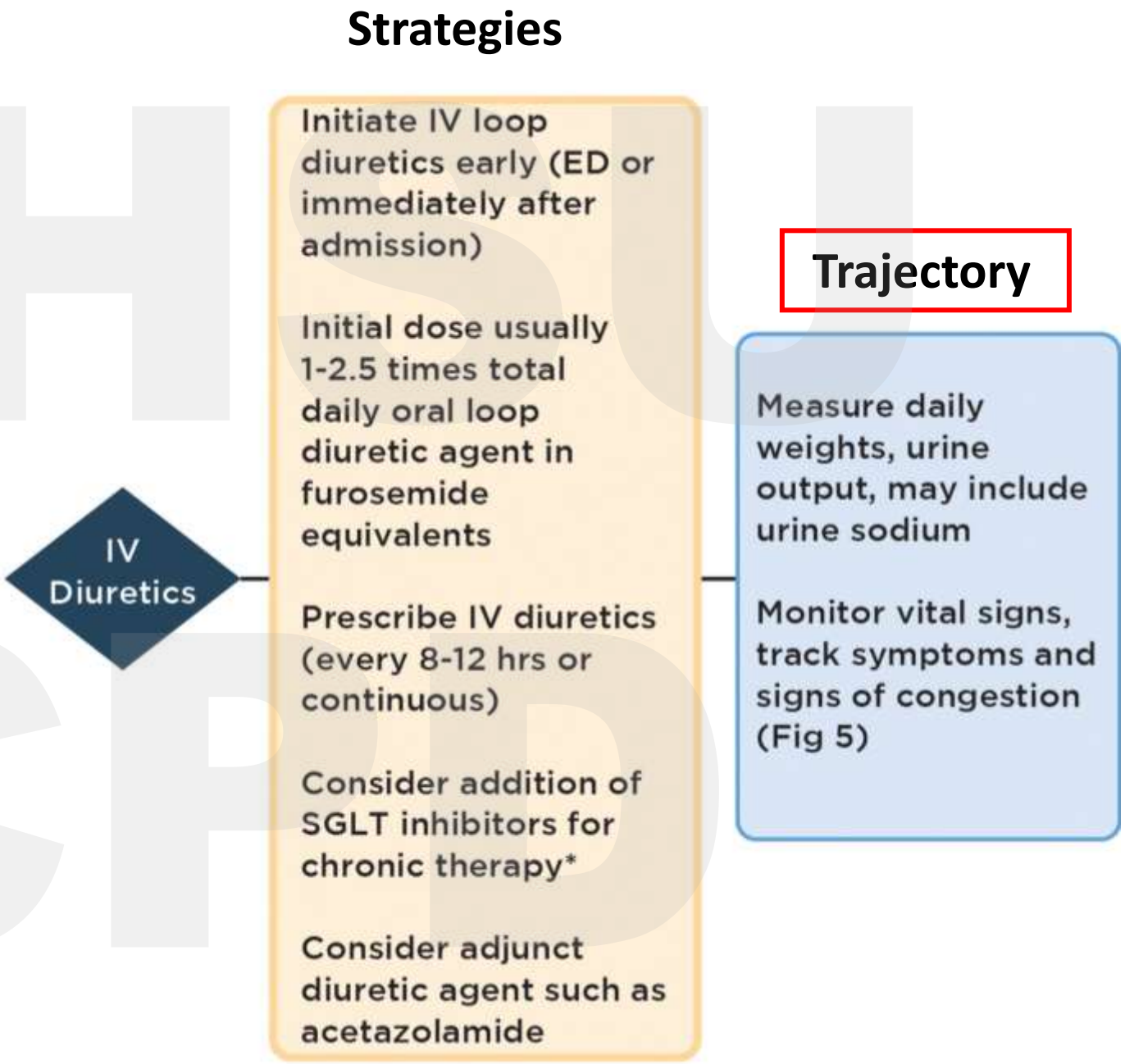
Primary outcome:
Clinical benefit at 90 days (composite "win" of all-cause mortality, HF hospitalization events, time to rehospitalization, KCCQ score change)

Secondary outcomes:

- Death: 4.2% in the empagliflozin group vs. 8.3% in the placebo group
- Heart failure event: 10.6% in the empagliflozin group vs. 14.7% in the placebo group
- Acute renal failure: 7.7% in the empagliflozin group vs. 12.1% in the placebo group
- Body weight change: -1.5 kg for the empagliflozin group vs. the placebo group (p = 0.014)

Voors et al *Nature Med* 2022

Inpatient Decongestion



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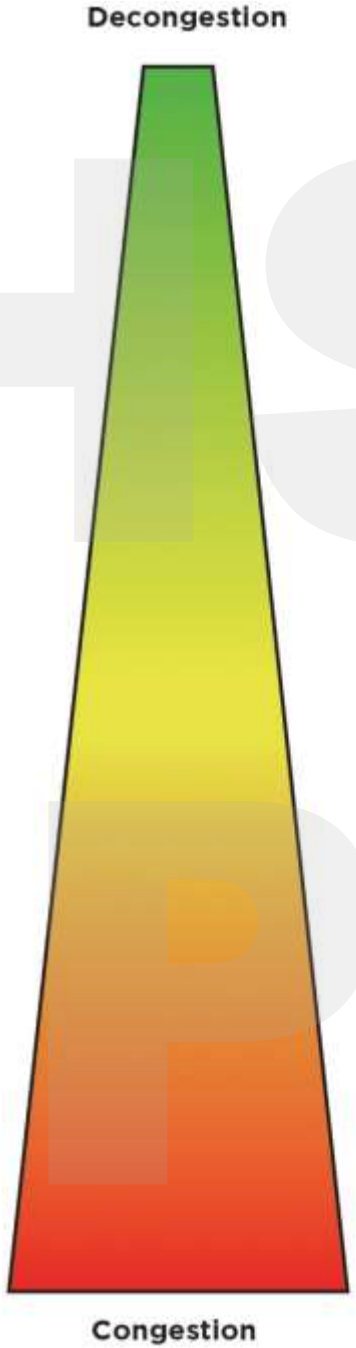
Trajectory check: Are you achieving decongestion?



Freedom from clinical congestion

No peripheral edema

No rales

No dyspnea on minimal exertion

No hepatomegaly or congestive GI symptoms

No orthopnea or bendopnea

Jugular venous pressure ≤ 6-8 mm Hg

No hepatojugular reflex

Common Reasons for Residual Congestion

Low cardiac output state

Dominant right heart failure

Advanced kidney disease

Symptomatic hypotension

Limitations to patient engagement in self-care

Lack of improvement in signs/symptoms of HF

Lack of decrease in natriuretic peptide levels

Lack of decrease in weight

2024 ACC Expert Consensus Decision Pathway *JACC* 2024

Case example 1:

- 64yoF with a history of remote breast CA treated with doxorubicin, presents with shortness of breath with activity, weight gain, LE swelling, and “panic attacks” at night. Found to have an EF of 25-30%. Admitted to the hospital for management of new onset heart failure

➢ Diuresed 12 pounds in 4 days with IV Lasix 80mg BID

➢ Dapagliflozin 10mg started

➢ Symptomatic improvement, euvolemic on exam.

Case example 2:

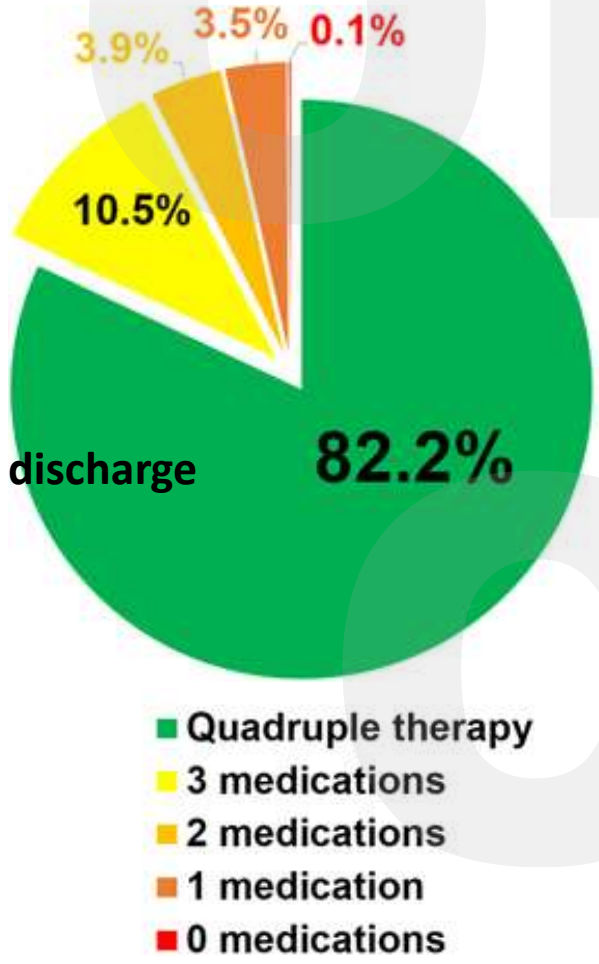
- 27yoM with familial cardiomyopathy (EF < 20%), recently admitted with ADHF requiring ICU stay for IV inotropes. Discharged 9 days ago on lisinopril 2.5 qd, spironolactone 12.5mg qd, furosemide 80mg BID. Now readmitted with progressive symptoms, worsening edema, AKI.

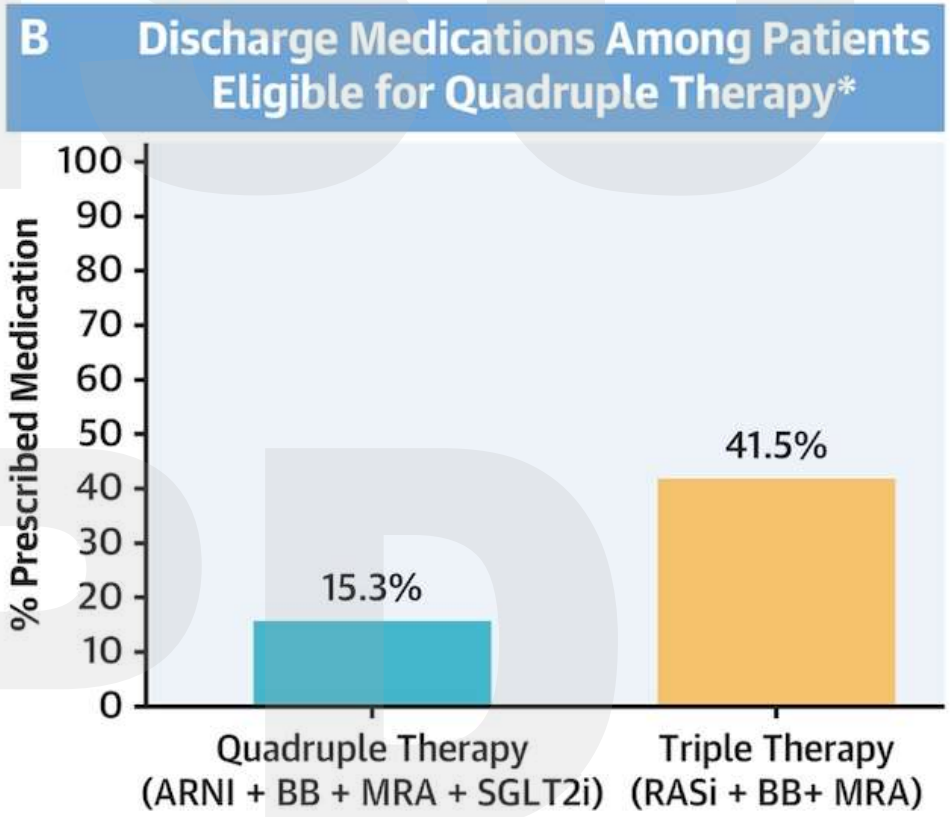
➢ ACEi and MRA held. Minimal response to 120mg IV Lasix BID. Diuril 500mg IV BID added with subsequent 8 pound weight loss and improvement in JVP. Moderate improvement in BUN/Cr with ongoing sinus tachycardia. Continues to have class III symptoms.

GDMT initiation during ADHF: safe, efficacious, and beneficial

Majority of patients *eligible* for quadruple therapy are not discharged on quadruple therapy

Eligibility on discharge

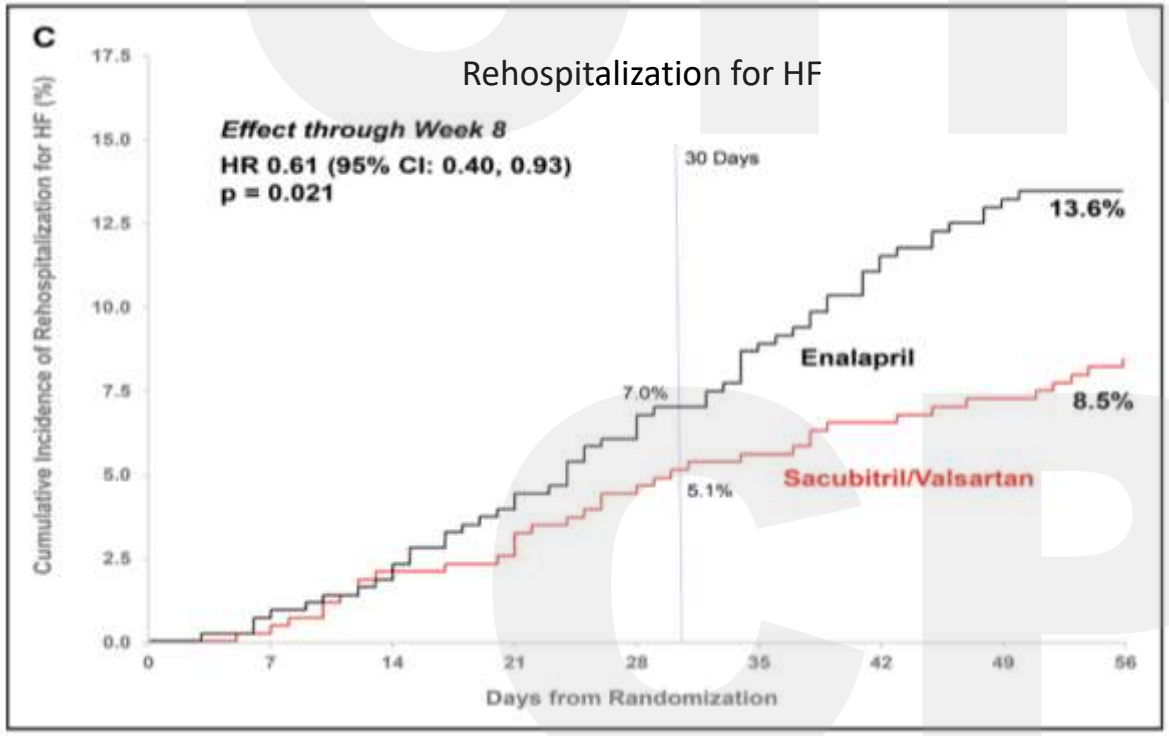




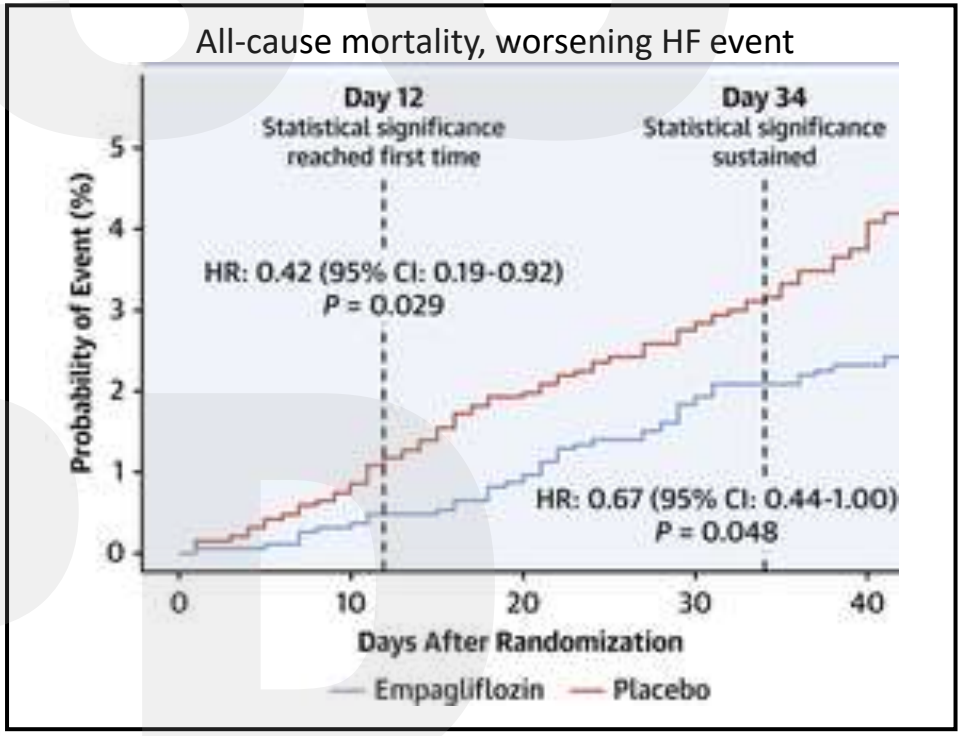
Greene et al. *J Am Coll Cardiol HF* 2024.

Rapid reduction in readmission risk with GDMT initiation

Pioneer HF (ARNI) (30 days)

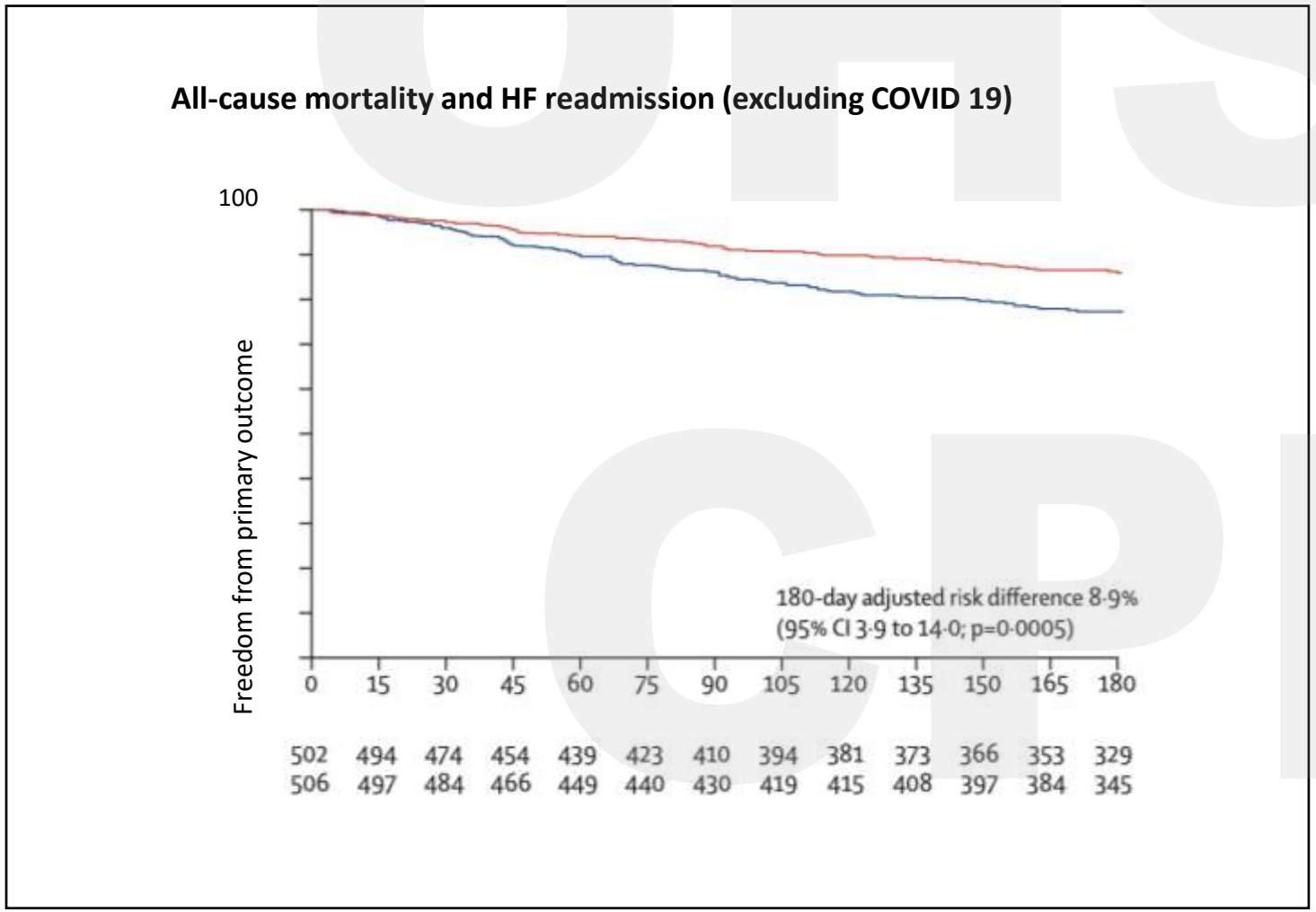


EMPORER-Reduced (Empagliflozin) (12 days)



Vishal N. Rao et al. *JACC* 2021; 78:2004-2012.

STRONG-HF: *Rapid uptitration to full dose GDMT of BB, MRA, ACEi/ARB/ARNI within 2 weeks of discharge leads to improved clinical outcomes over SOC*



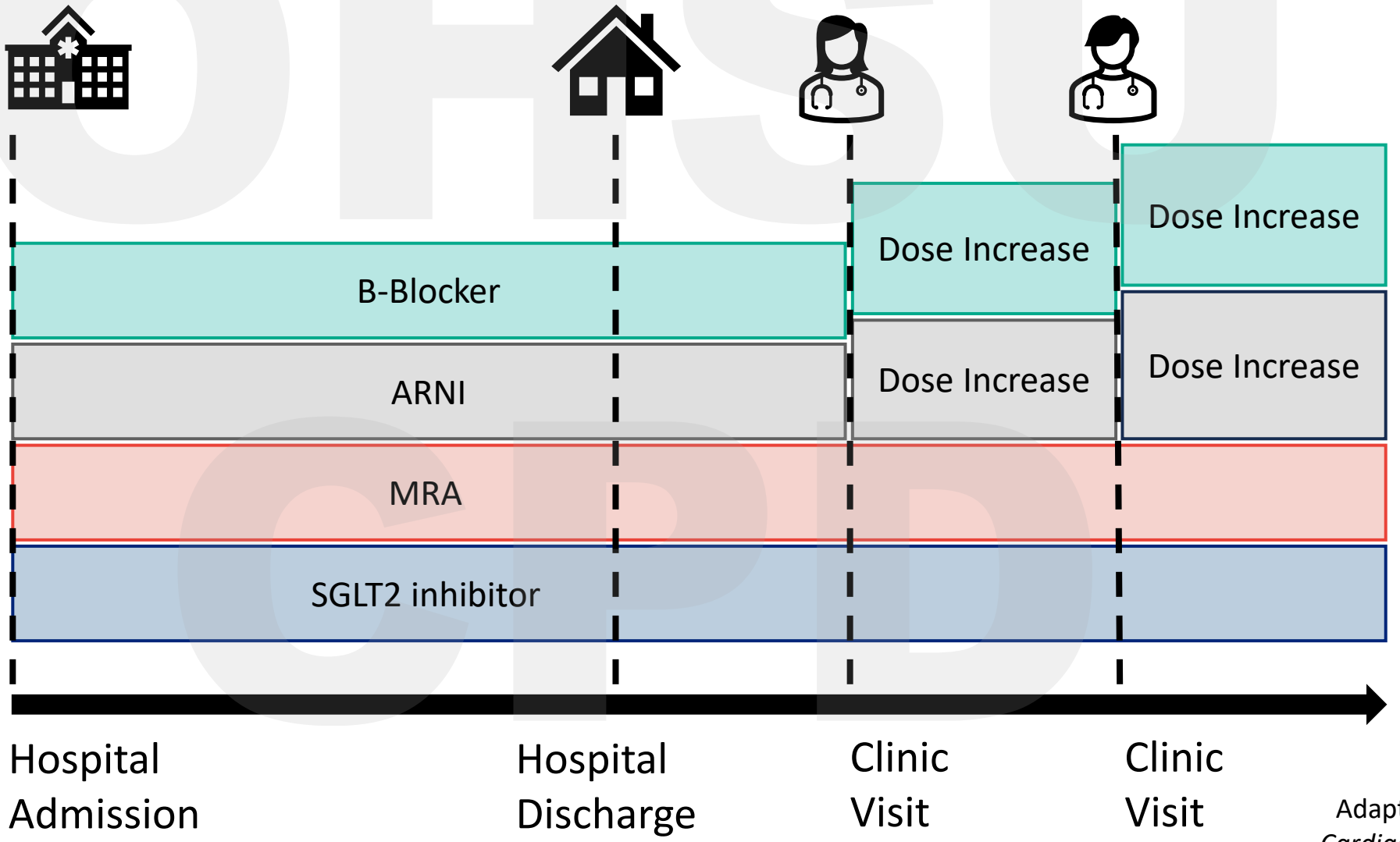
- 43% vs. 0.7% achieve goal dose GDMT at 90 days
- 43% relative risk reduction in HF hospitalization at 180 days
- No significant difference in *serious* adverse events
- Trial stopped early for benefit

Mebazaa et al *Lancet* 2022

So how do we implement GDMT in 2024?

Prioritize *initiation* of all 4 medications with outpatient dose titration

Goal GDMT titration

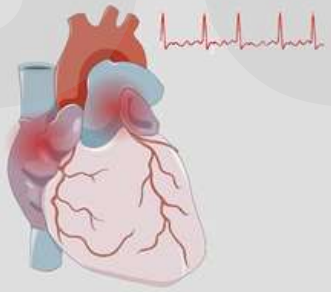


Adapted from Cox et al *Cardiac Failure Rev*. 2022

There remains a significant evidence gap…

- Is there a preferential order to how medications should be started?
- Is it safe to start multiple medications at once?
- Should the length of hospitalization be increased solely to initiate medications?

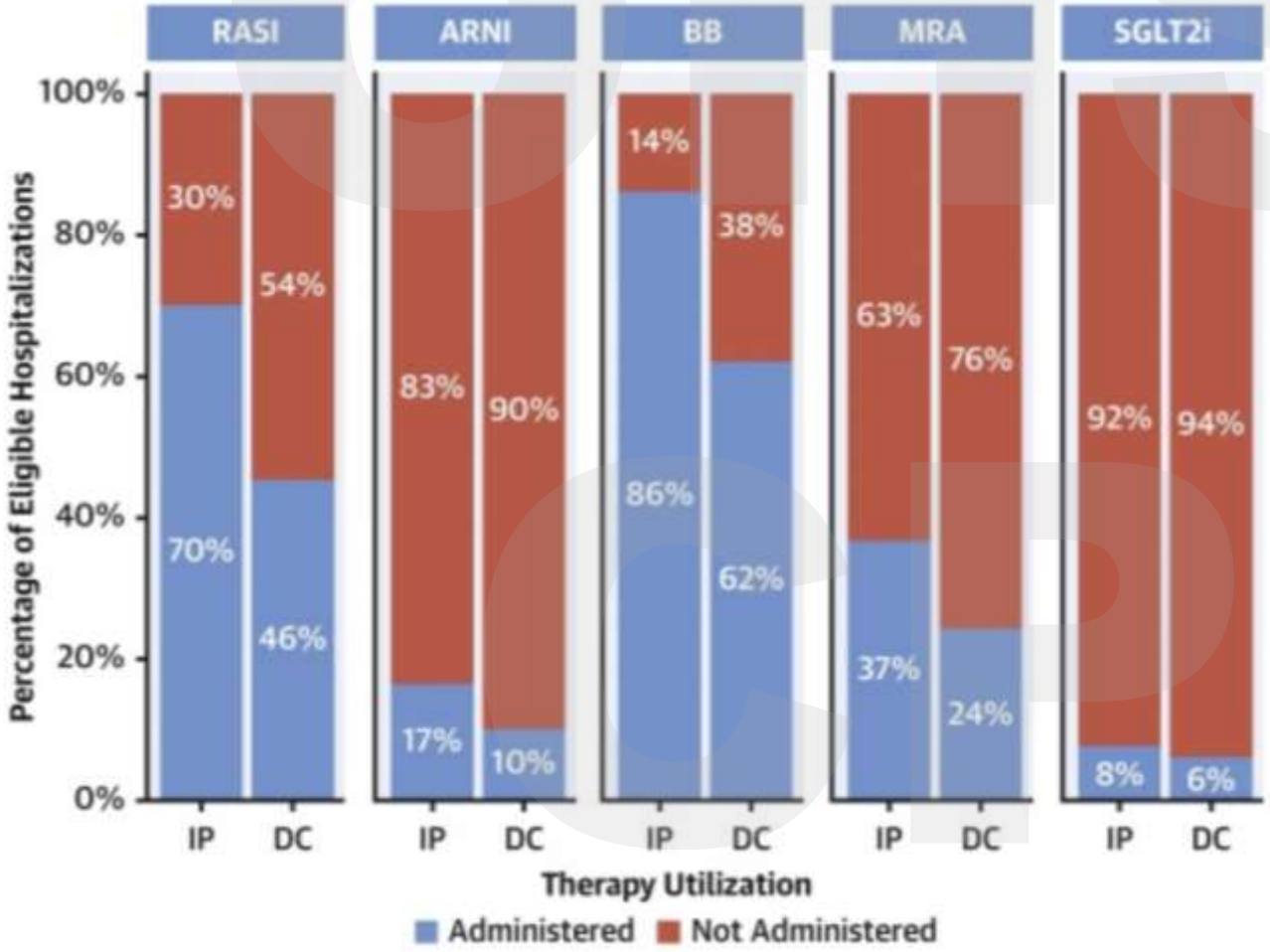
Use patient specific characteristics to guide implementation

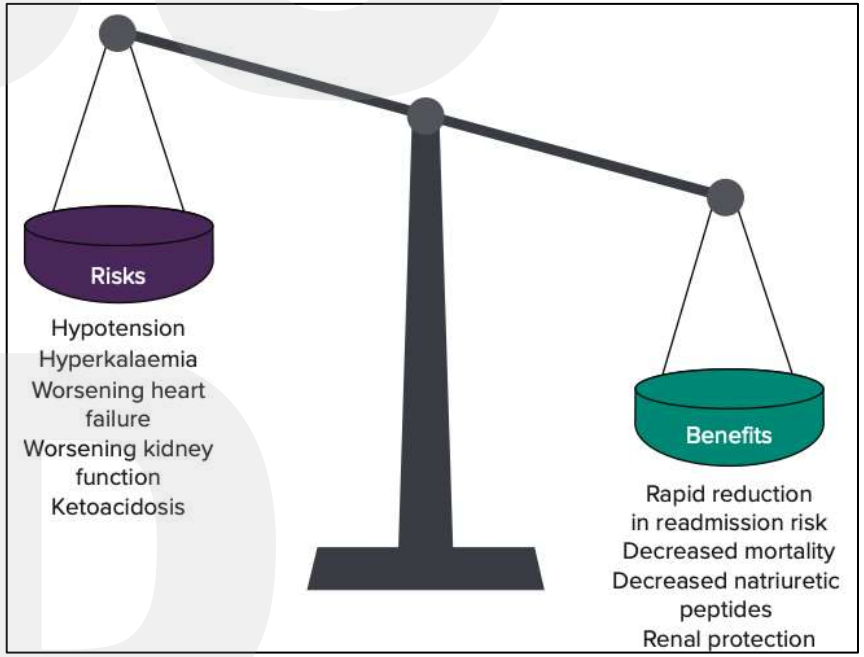
Hypotension	Renal dysfunction	Electrolyte imbalance	Arrhythmias	Low cardiac output
				
SGLT2i	β-blocker	β-blocker	β-blocker	SGLT2i
MRA	SGLT2i	SGLT2i	SGLT2i	MRA
β-blocker	ARNI	ARNI	ARNI	ARNI
ARNI	MRA	MRA	MRA	β-blocker

Zhang et al. *American J of Cardiovascular Drugs* 2024

How do we also limit *discontinuation* of GDMT during hospitalization

2016-2022 Registry Data





Zheng et al *JACC HF* 2024

Strategies to promote/enable *continuation* of GDMT

Admission	Hypotension	Renal dysfunction	Hyperkalemia
			
Continue BB unless hypotensive or concern for low output	Titrate to *symptoms* Target asymptomatic SBP > 90 Stagger meds Avoid non-GDMT meds Carvedilol -> metoprolol	Initial 30% increase in Cr is *expected* with ARNI and SGLT2i Assess volume status Temporary hold of GDMT may be necessary (or switch to hydral/isordil) but should **retrial** if able	Add SGLT2i Switch ACEi/ARB to ARNI Assess volume status *Low K+ Diet* K+ binders (chronic tx)

Case example 1:

- 64yoF with a history of remote breast CA treated with doxorubicin, presents with shortness of breath with activity, weight gain, LE swelling, and “panic attacks” at night. EF found to be 25-30% and patient admitted for management of new onset heart failure.
- Diuresed 12 pounds in 4 days with IV Lasix 80mg BID, dapagliflozin 10mg started. Symptomatic improvement, transitioned to oral torsemide 40mg daily with stable weights.

➢ Started entresto 24/26mg BID, spironolactone 25mg qd, coreg 6.25mg BID. NT-proBNP decreased from 1700 to 320.

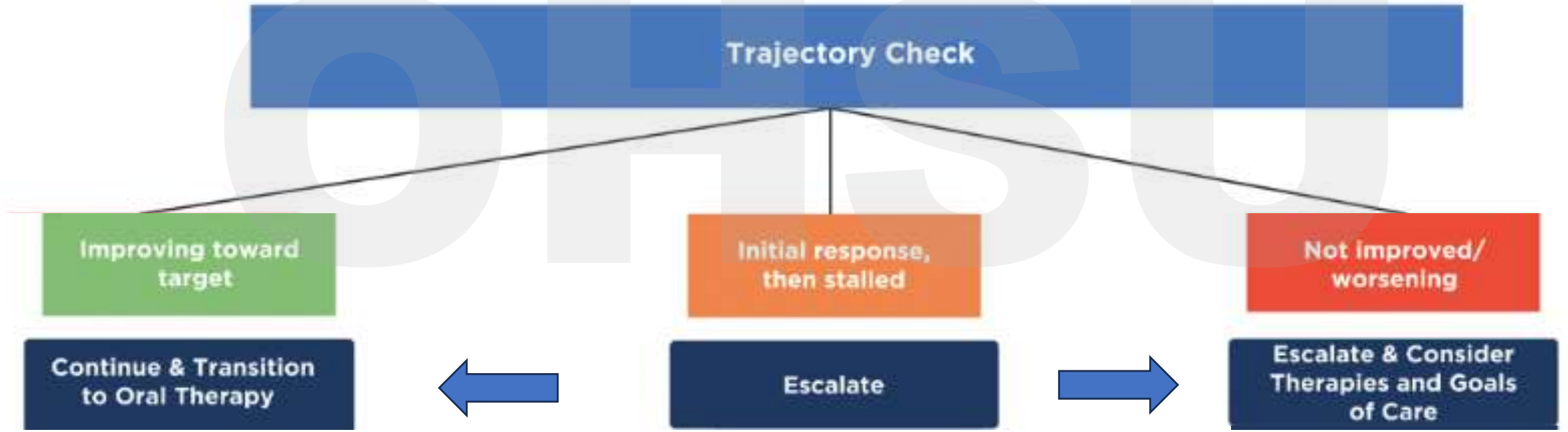
➢ Discharged home with guidance re: monitoring daily weights, low Na diet, outpatient f/u scheduled with PCP within 1 week and cardiology within 2 weeks

Case example 2:

- 27yoM with familial cardiomyopathy (EF < 20%), recently admitted with ADHF requiring ICU stay for IV inotropes. Discharged 9 days ago on lisinopril 2.5 qd, spironolactone 12.5mg qd, furosemide 80mg BID. Now readmitted with progressive symptoms, worsening edema, AKI.

- ACEi and MRA held. Minimal response to 120mg IV Lasix BID. Diuril 500mg IV BID added with subsequent 8 pound weight loss and improvement in JVP. Mild improvement in Cr, but with ongoing sinus tachycardia. Persistent class III symptoms.

➢ Entresto 12/13mg BID and dapagliflozin 10mg started. 2 days later, metoprolol 12.5mg qd started -> patient becomes hypotensive, with Cr rise to 2.9, weight gain of 3 pounds overnight.



Oral diuretic plan
Optimize GDMT
HF education
Discharge coordination

Escalate diuretics
Consider vasodilator addition
Reconsider comorbidities/diagnoses
Cardiology / HF consult
Invasive hemodynamics

Cardiology / HF consult
Invasive hemodynamics
Inotropic support
Dialysis
Temporary MCS
Advanced therapies evaluation
Palliative care / Hospice

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- Entresto 12/13mg BID and dapagliflozin 10mg started. Metoprolol 12.5mg qd started -> patient becomes hypotensive, with Cr rise to 2.9, weight gain of 3 pounds overnight.

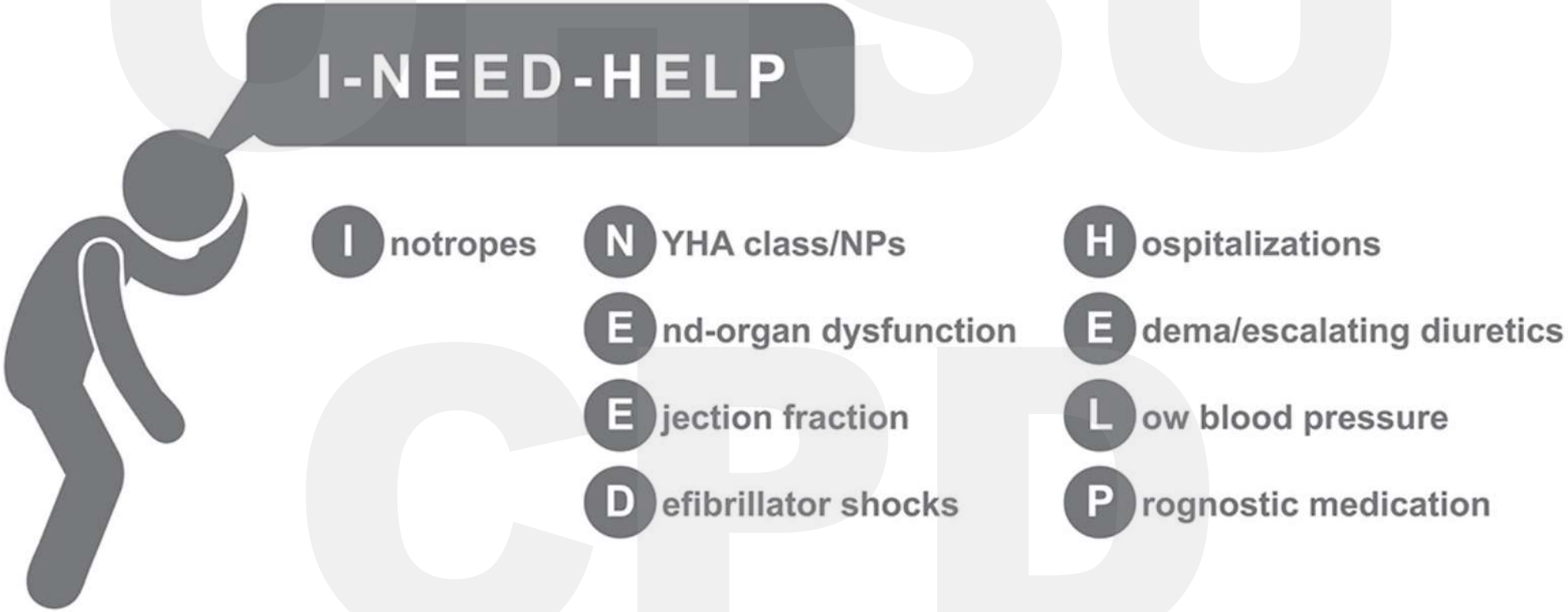
➢ Additional labs checked: Lactate 2.3, AST 279, ALT 232

➢ RHC performed: RAP 10mmHg, PA 65/30, PAWP 29, Cardiac output 3.2 mL/min, Cardiac Index 1.3 mL/min/m2.

What is ”advanced” heart failure?

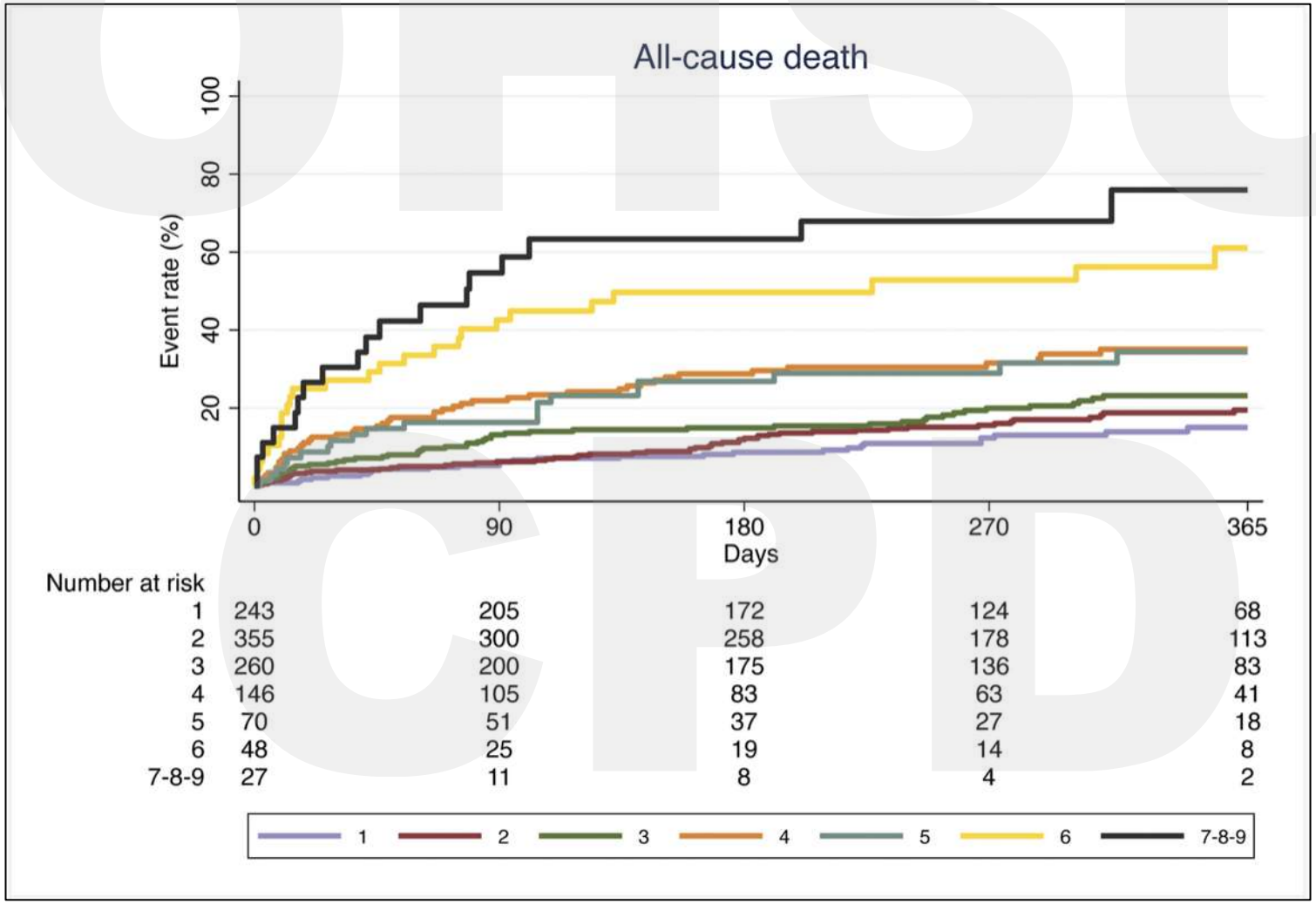
Impaired quality of life and poor prognosis despite conventional HF treatments, with an estimated median time from advanced HF diagnosis to death of ≈1 year

Markers of advanced heart failure



Rao et al *Hosp Practice* 20

Prognostic implications of the 9 I-NEED-HELP components in a real world registry



Pagnesi et al. *Circ HF* 2023

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8/9 I-NEED-HELP Criteria met!

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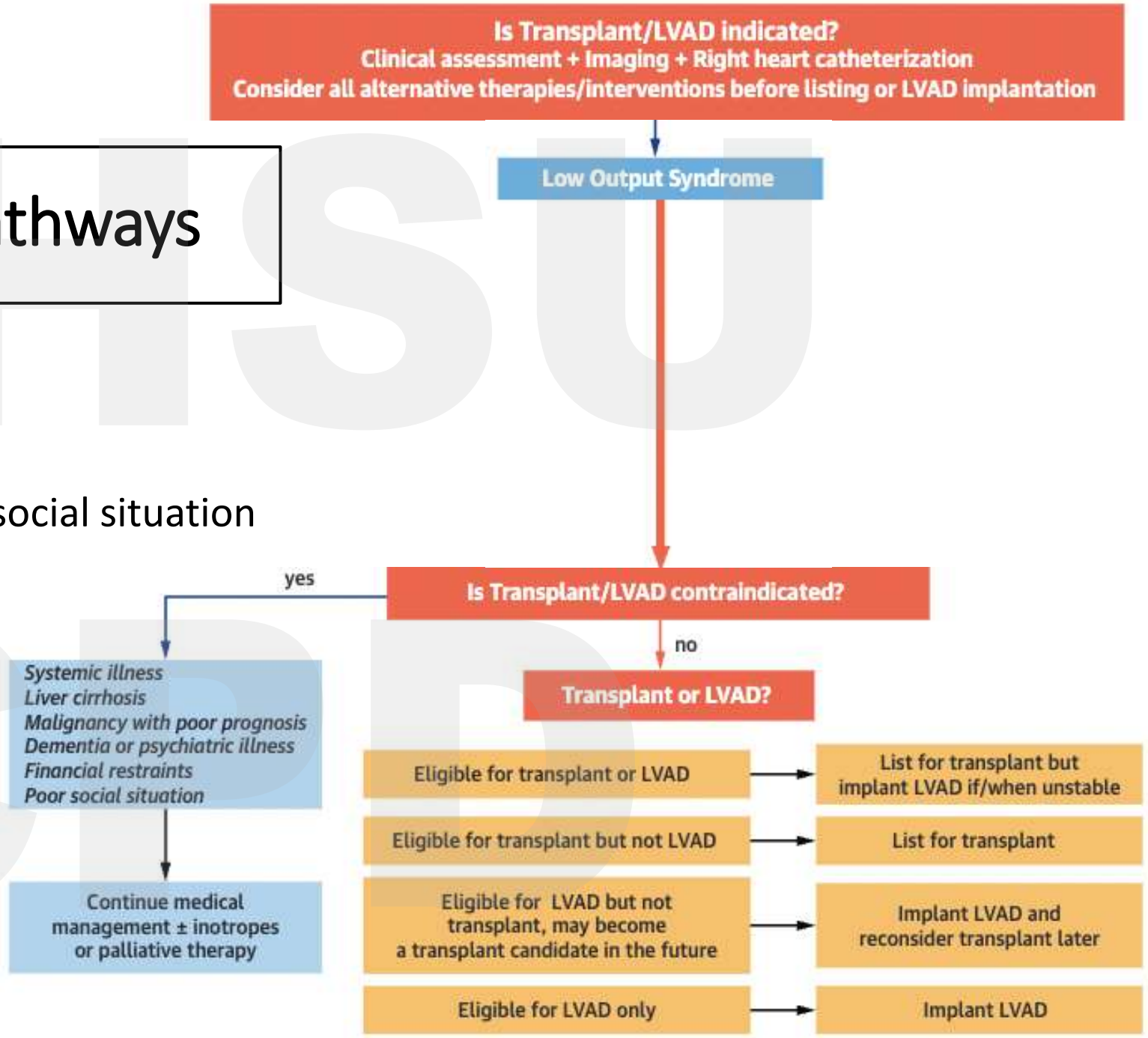
- RHC performed: RAP 10mmHg, PA 65/30, PAWP 29, Cardiac output 3.2 mL/min, Cardiac Index 1.3 mL/min/m2.

➢ Patient transferred to the ICU for initiation of milrinone, and an urgent transfer to a tertiary care center is initiated.

Advanced therapies pathways

Refer/consult early
Prehab is critical
Finances can be overcome
Drug use is only one part of a patient's social situation



Guglin et al *JACC* 2020

Conclusions

- HF hospitalization represents a high risk event. We need to do everything we can to optimize these patients for a good outcome.
- IV diuresis should be initiated immediately. Diuretic response should be *closely* monitored with UOP and/or urine Na in addition to daily weights. SGLT2i can generally be safely started during the IV diuresis period given minimal acute hemodynamic effects.
- All 4 GDMT pillars should be started prior to discharge. In the absence of a large body of evidence, patient specific factors should dictate initiation and titration order of medications. Look for opportunities to maintain these medications once they are on board
- The I-NEED-HELP criteria suggest a patient with advanced heart failure. These patients should be considered for early outpatient referral (or inpatient transfer) to a tertiary care center.

Thank you!

2024 ACC Expert Consensus Guideline for management of hospitalized patients with heart failure

1. This update emphasizes SGLT inhibitor therapy throughout hospitalization regardless of LVEF, and places a greater emphasis on initiation of the other pillars of therapy for HFrEF after stabilization.
2. Hospital admission from the ED is generally indicated for a new diagnosis of HF with rapidly progressive symptoms, severe congestion, or higher complexity of disease; some low-risk patients may potentially receive care in an observation unit or Hospital at Home (HaH) setting.
3. The typical routes to HF admission include newly diagnosed HF, chronic HF with previous therapy, or advanced HF with chronic Class IV symptoms despite previous recommended therapies.
4. Daily review of the hospital trajectory often shows continuing progress toward effective decongestion and stabilization for initiation of guideline-directed neurohormonal therapies.
5. Daily trajectory review may also show stalling after initial response, failure to respond, or worsening HF, which may warrant adjunctive diuretic agent therapies, reconsideration of etiology, physiology and comorbidities, possible escalation to other therapies, and re-evaluation of goals of care.
6. SGLT inhibitors and mineralocorticoid antagonists have little effect to reduce blood pressure and in the absence of contraindications, can be initiated at any time during hospitalization and continued at discharge if feasible.
7. Strategies for optimization of guideline-directed neurohormonal therapies of beta-adrenergic blocking agents and ARNI/ACE inhibitor/ARB should consider previous tolerance of these therapies, current hemodynamics, and kidney function.
8. Selection of ARNI/ACE inhibitor/ARB or switch from ACE inhibitor/ARB to ARNI are indicated for HFrEF, and in combination with beta-blockers can generally be initiated after clinical stabilization to optimal volume status, with careful titration to avoid hypotension or kidney dysfunction during hospitalization and early after discharge.
9. Detailed information regarding diagnoses, discharge regimen and plans should be provided to patients and referring providers and used as a reference for the follow-up phone calls and first postdischarge visits, including those conducted via telehealth.
10. Palliative care plays an increasingly important role in helping patients recognize progressive disease and re-evaluate goals of care, with benefit shown for palliative care referral tools and palliative care consultation to increase completion of advance directives and reduce hospital readmission rates.