EIGHTEEN SHADES OF HEART FAILURE AN OVERVIEW OF THE TRANSITION

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DISCLOSURES

- None

OBJECTIVES

- Explore stages of chronic compensated heart failure
- Explore characteristics that determine transition to advanced heart failure
- Explore stages of advanced heart failure
- Determine guideline based management aimed at each stages explored

PARADIGM SHIFTS IN HEART FAILURE

Period	Clinical Endpoint	Pathophysiology	Therapy
Pre-1970	Edema	Na+ retention	Diuretics
1970-1985	Symptoms	Hemodynamics	Inotropes Vasodilators Diuretics
1985-1995	Survival	Neurohormonal activation	ACE inhibitors/ARBs β-Blockers Spironolactone NO donors
Since 1995	Cellular Mechanics	Apoptosis	Antioxidants* Cytokine antagonists* NO-regulators*
Since 2001	Symptoms and Survival	Replacement	Assist devices or TAH

* Ongoing

DOES HE NEED A TRANSPLANT?

- 54 year old man referred with 4 years of HF from DCM. NYHA III-IV, 3 ADHF admissions in 9 months
- Echo EF 15%, EDD 7.4, Mod MR, Mod TR, Mod RV dysfunction
- Cr 1.6, Na 136

- Comfortable

BP 100/75, HR 94, JVD 12, clear lungs, +S3, +S4 , P2, Palpable liver, Cool ext. 2+ edema

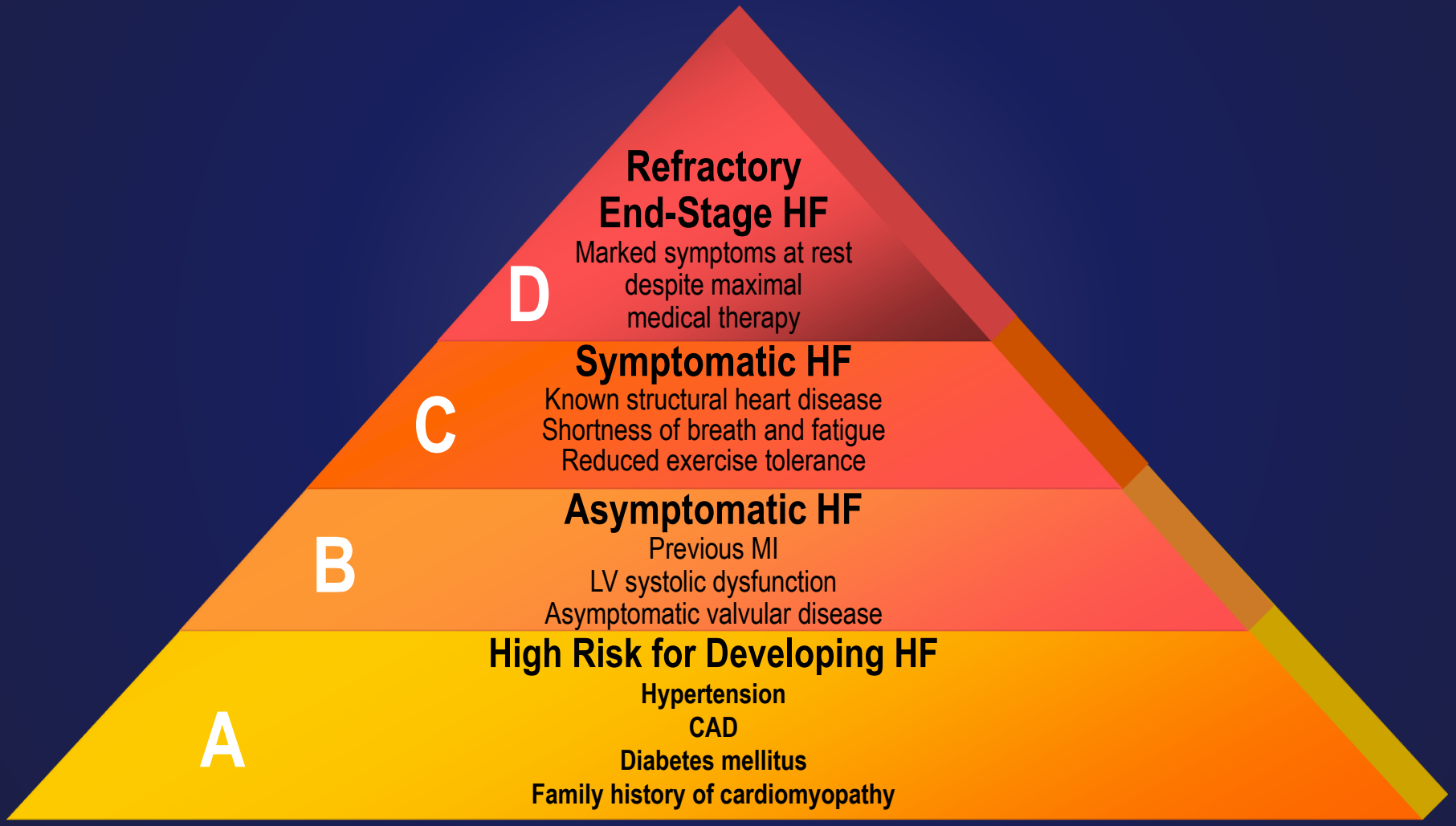
- Meds:

Carvedilol, Lisinopril, Aldactone, Digoxin, Lasix

HEART TRANSPLANT IN ADVANCED HF IS CONSIDERED BECAUSE IT OFFERS:

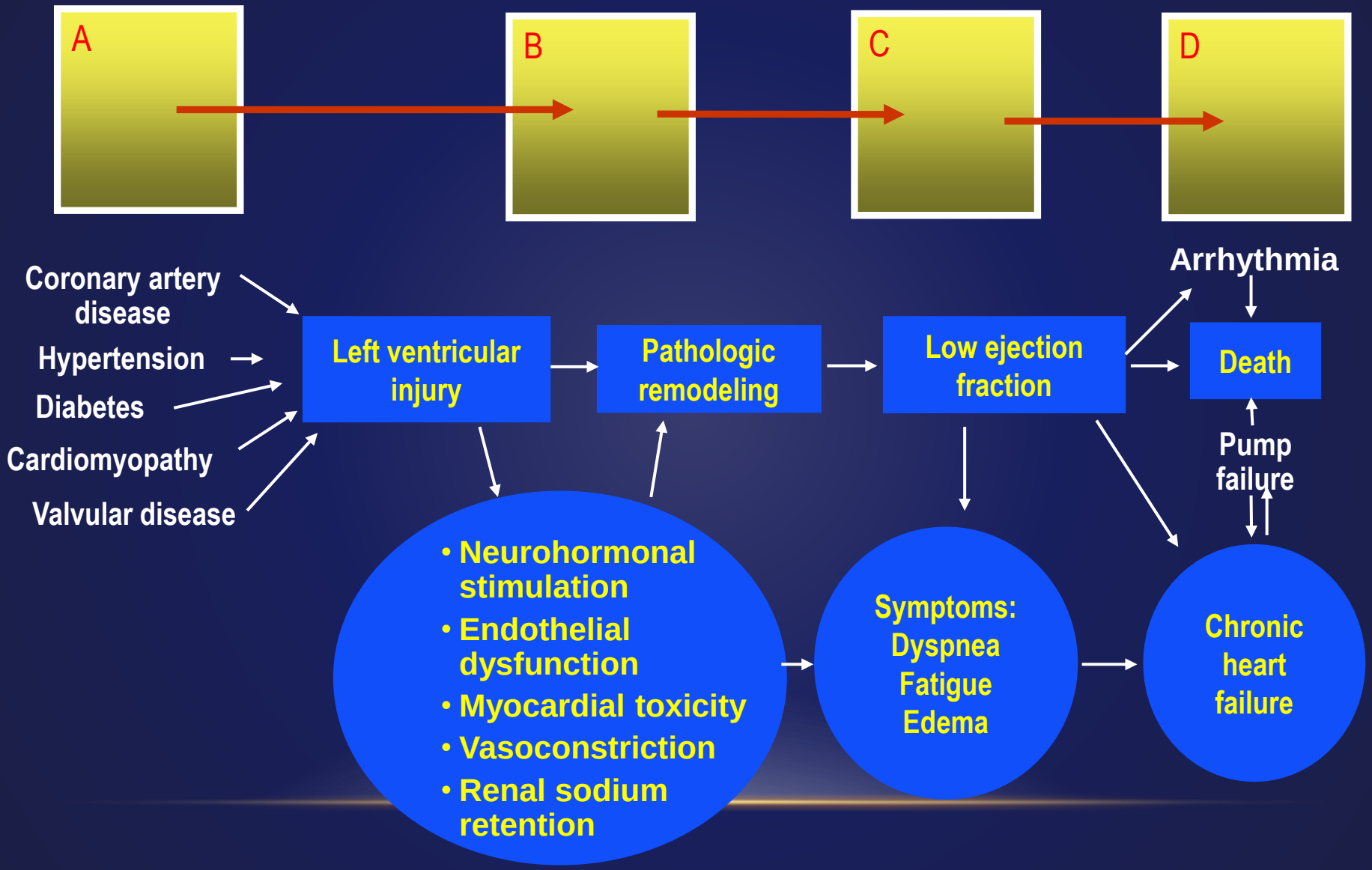
- A) Improved quality of life
- B) Improved functional capacity
- C) Improved neuro-humoral milieu
- D) Improved survival benefit
- E) All of the above

HF ACC/AHA STAGES



Hunt SA et al. *J Am Coll Cardiol.* 2001;38:2101–2113.

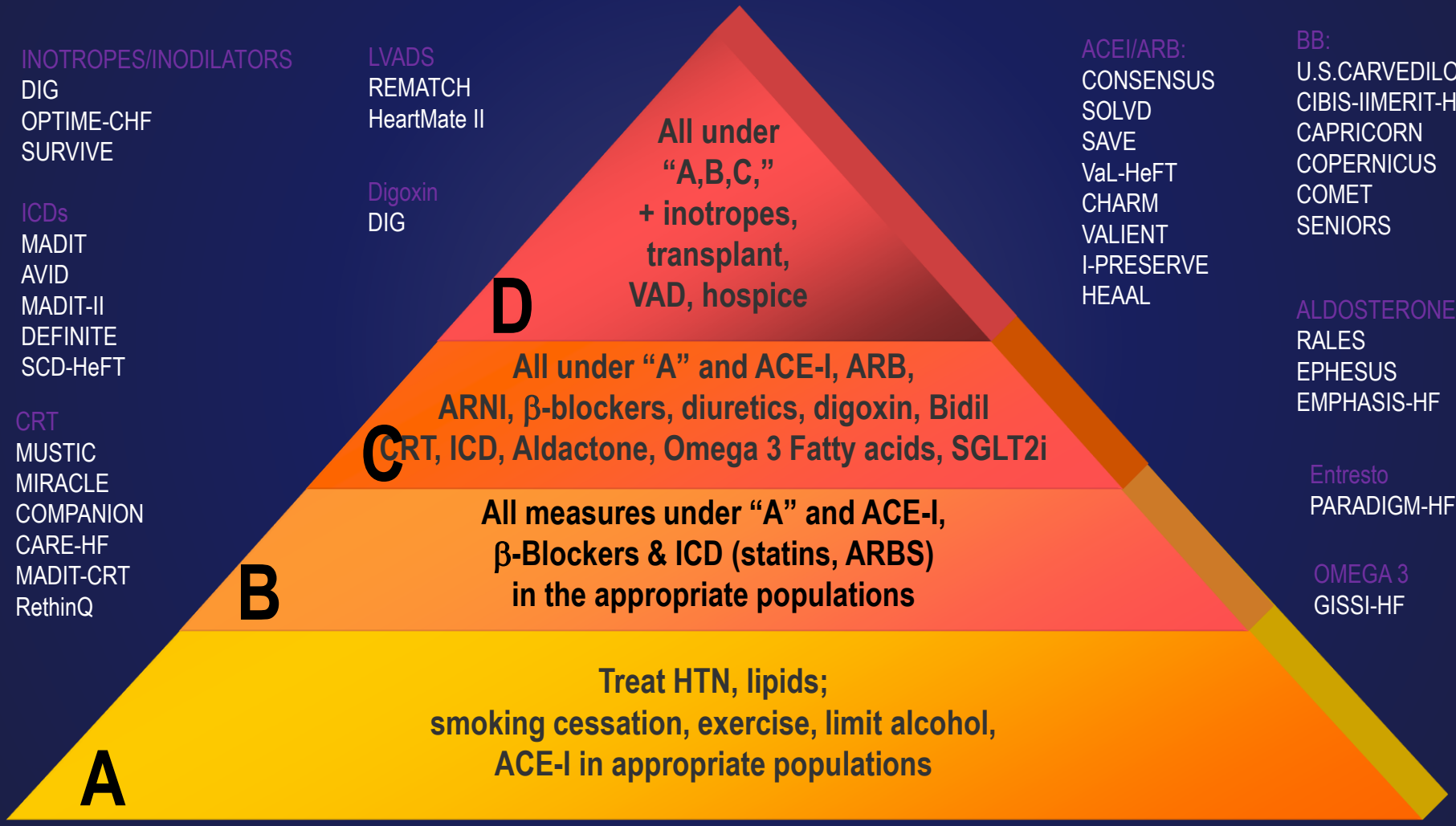
PATHOLOGIC TRANSITION OF CV DISEASE



Adapted from Cohn JN. *N Engl J Med*. 1996;335:490–498.

ACC/AHA PRACTICE GUIDELINES

PYRAMID APPROACH TO HF THERAPY



Yancy C W et al. Circulation. 2013;128:e240-e327

Recommendations for Treatment of HFpEF.

Recommendations	COR	LOE
Systolic and diastolic blood pressure should be controlled according to published clinical practice guidelines	I	B[27,91]
Diuretics should be used for relief of symptoms due to volume overload.	I	C
Coronary revascularization for patients with CAD in whom angina or demonstrable myocardial ischemia is present despite GDMT	IIa	C
Management of AF according to published clinical practice guidelines for HF*p*EF to improve symptomatic HF	IIa	C
Use of beta-blocking agents, ACE inhibitors, and ARBs for hypertension in HF*p*EF	IIa	C
ARBs might be considered to decrease hospitalizations in HF*p*EF	IIb	B[589]
Nutritional supplementation is not recommended in HF*p*EF	III: No Benefit	C

ACE indicates angiotensin-converting enzyme; AF, atrial fibrillation; ARBs, angiotensin-receptor blockers; CAD, coronary artery disease; COR, Class of Recommendation; GDMT, guideline-directed medical therapy; HF, heart failure; HF*p*EF, heart failure with preserved ejection fraction; and LOE, Level of Evidence.

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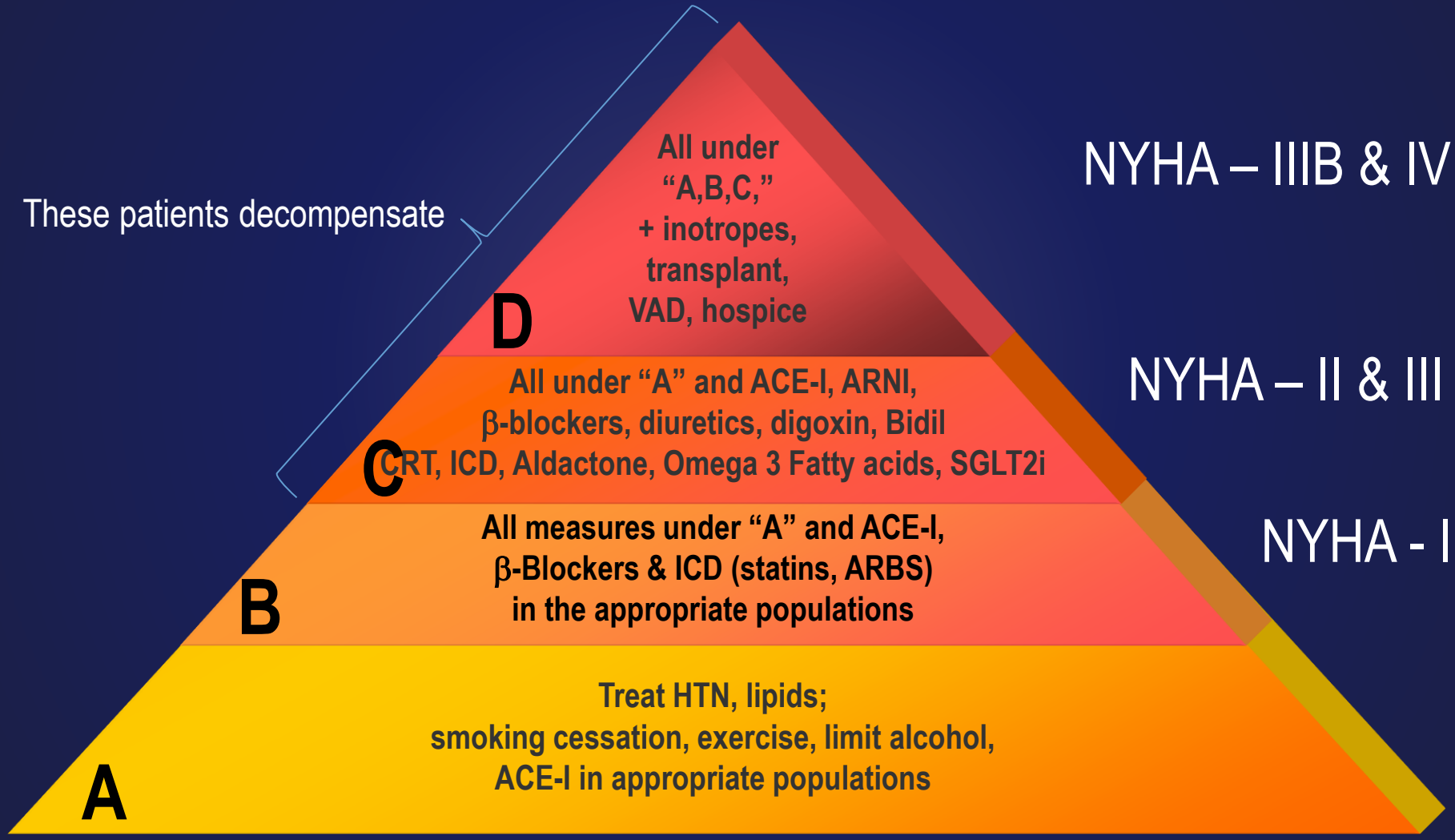
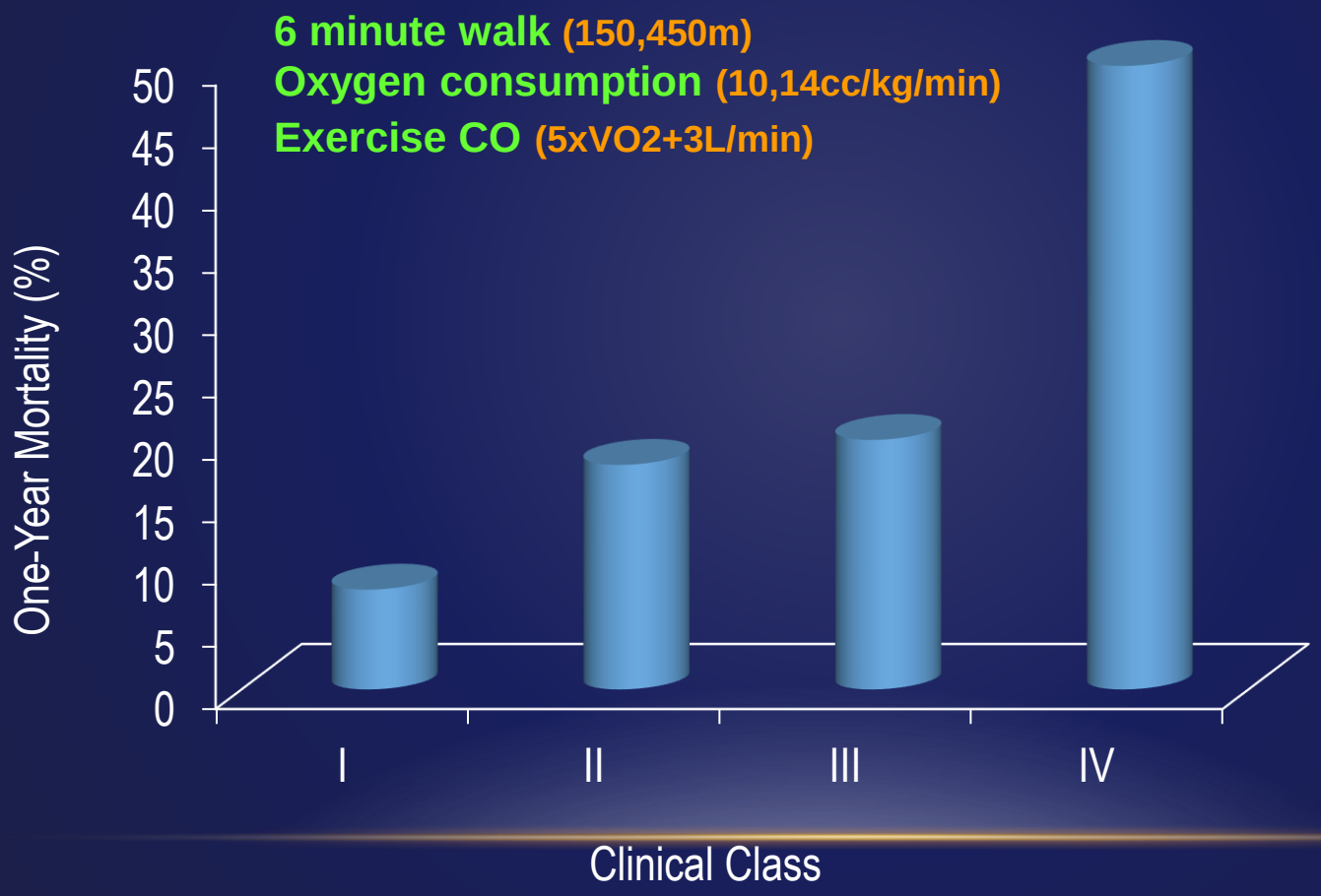
NYHA FUNCTIONAL CLASS



Yancy C W et al. Circulation. 2013;128:e240-e327

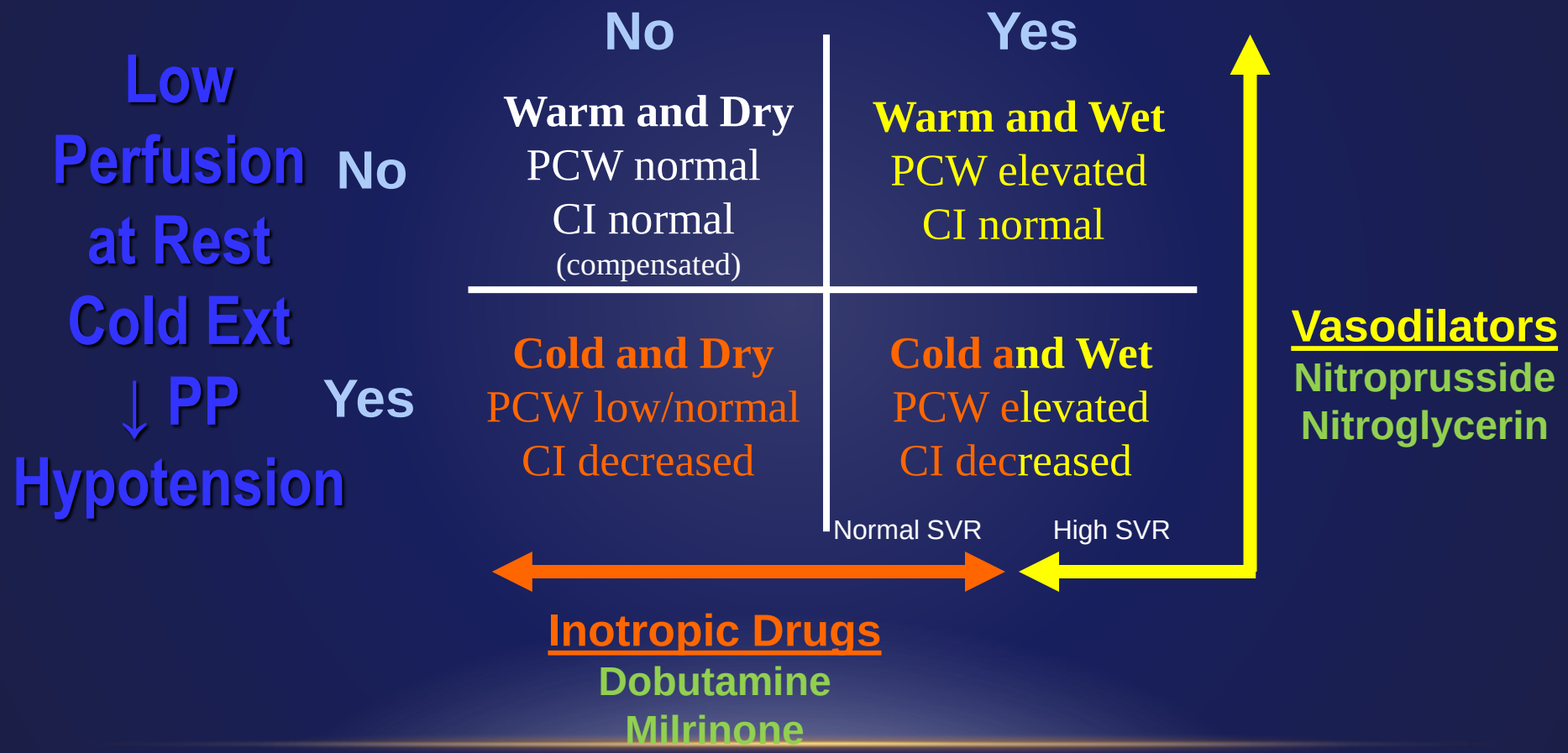
CLINICAL CLASS REMAINS THE #1 PREDICTOR OF MORTALITY IN HEART FAILURE



SAVE
SOLVD
VHeFT
CONSENSUS
Hy-C
GESICA

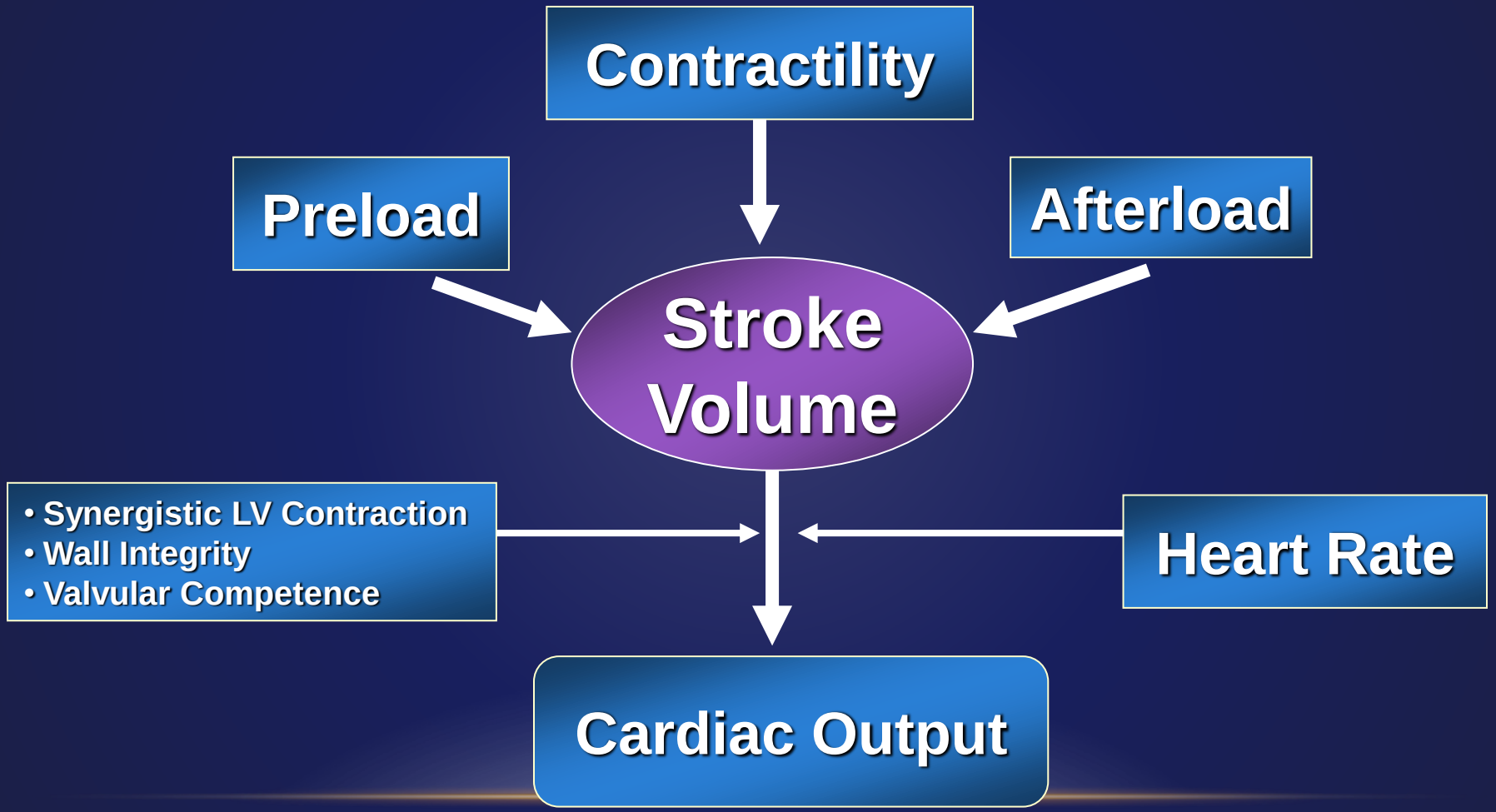
Hemodynamic Subsets

Congestion at Rest (Orthopnea, JVD, ascites, edema, S3)

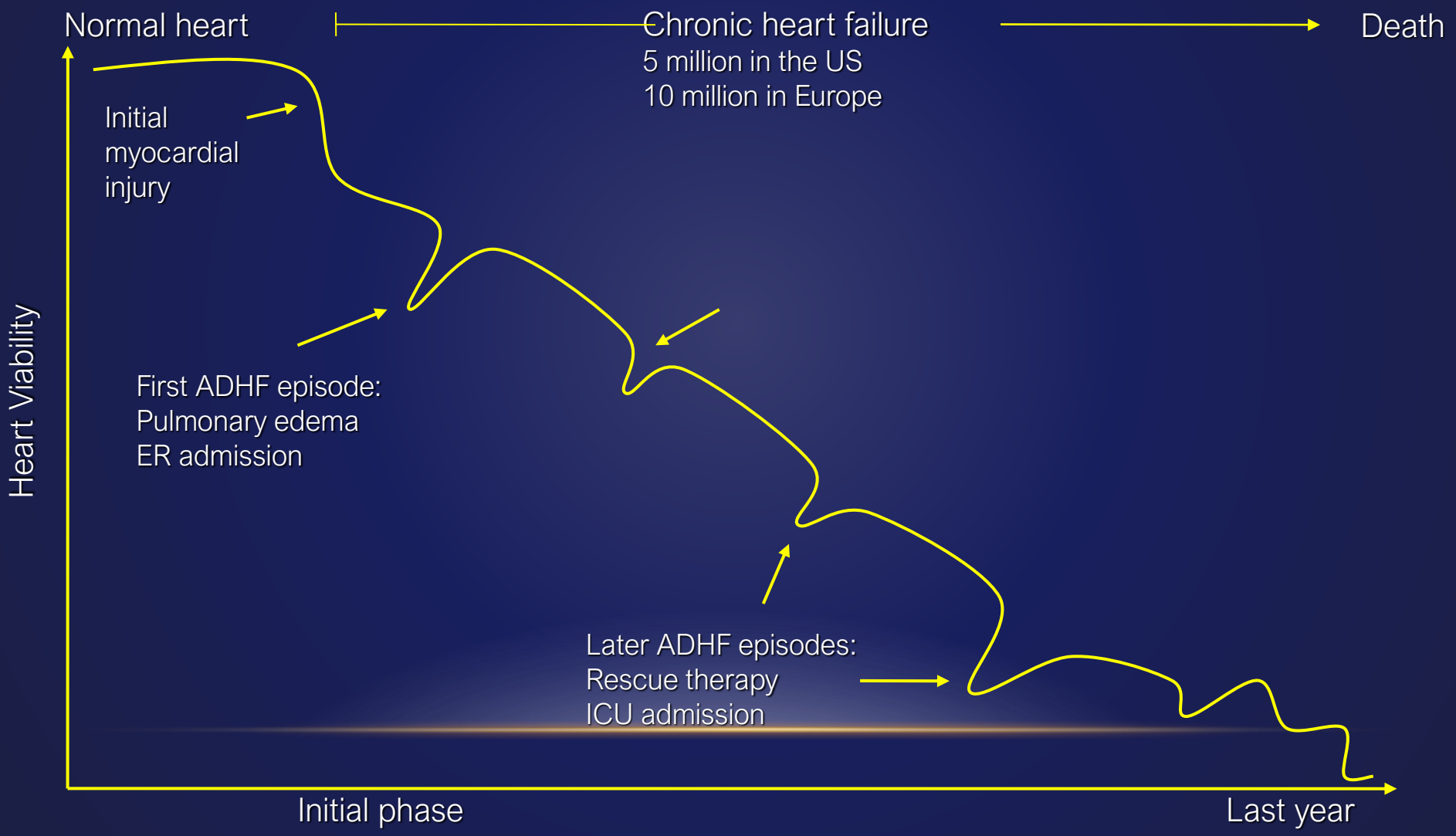


R. Bourge, UAB Cardiology (adapted from L. Stevenson)
Stevenson LW. *Eur J Heart Failure* 1999;1:251-257

DETERMINANTS OF VENTRICULAR FUNCTION

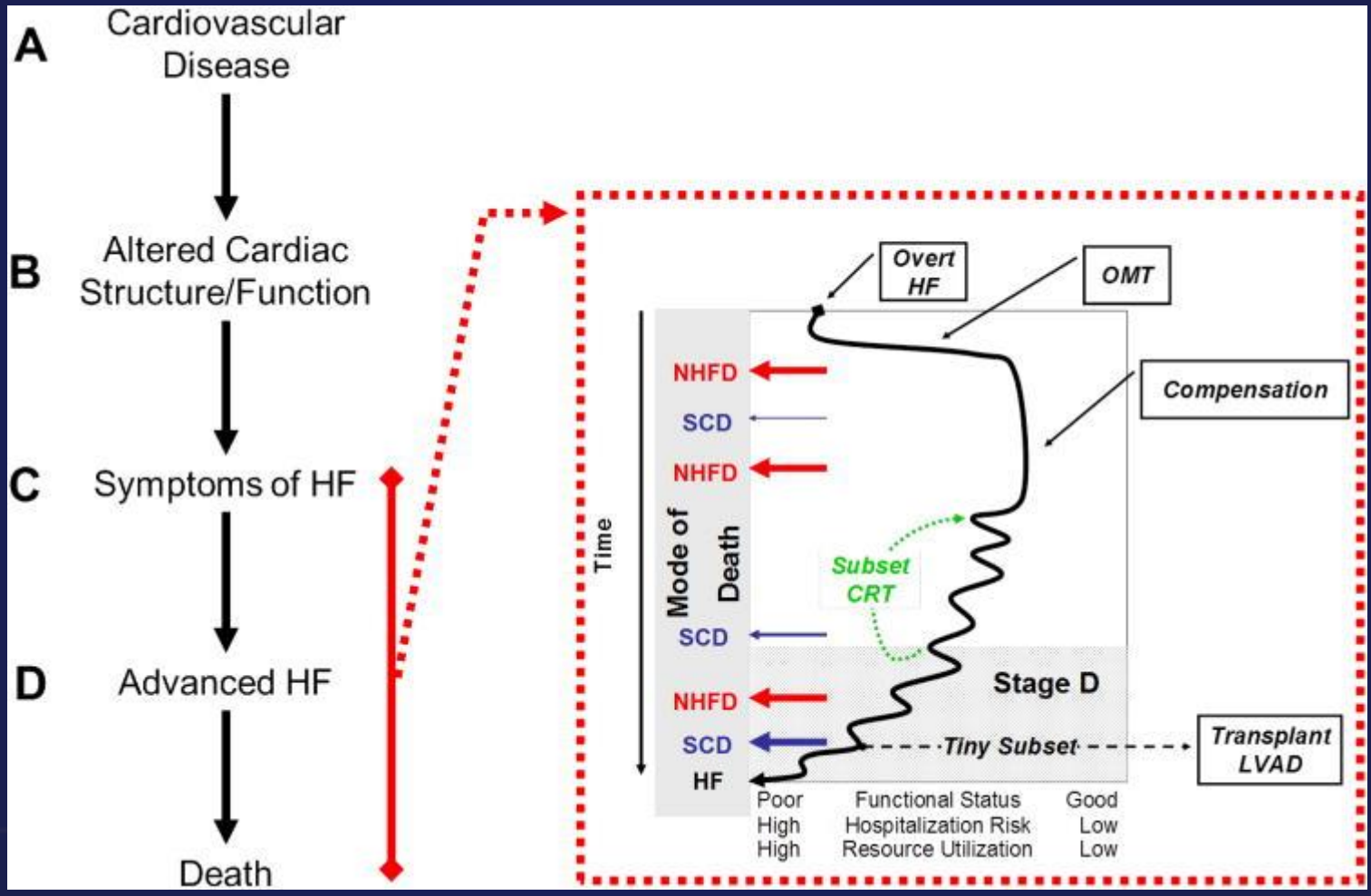


NATURAL HISTORY OF HF



Gheorghiade M. Am J Cardiol. 2005;96(suppl 6A):1-4G.

TRANSITION TO ADVANCED HEART FAILURE



Congest Heart Fail. 2011 Jul-Aug;17(4):160-8. doi: 10.1111/j.1751-7133.2011.00246.x. Epub 2011 Jul 21.

ESC CRITERIA FOR ADVANCED HEART FAILURE

- ***NYHA Class III-IV Symptoms***
- ***Episodes of volume overload and/or peripheral hypoperfusion***
- ***Objective evidence of severe cardiac dysfunction***
(EF<30%, Doppler Pseudonormal or Restrictive filling pattern, PCWP>16mmHg or RAP >12 mmHg)
- ***Severely impaired functional capacity***
(Inability to exercise, 6MWD<300m, Peak VO2<12-14 ml/kg/min)
- ***HF Hospitalizations***
(≥1 in past 6 months)
- ***Above occurring despite attempts to optimize diuretics, RAAS antagonists, BB, CRT or in the setting of intolerance to OMT***

DOES HE HAVE ADVANCED HEART FAILURE?

- 54 year old man referred with 4 years of HF from DCM. NYHA III-IV, 3 ADHF admissions in 9 months
- Echo EF 15%, EDD 7.4, Mod MR, Mod TR, Mod RV dysfunction
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- Comfortable

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- Meds:

Carvedilol, Lisinopril, Aldactone, Digoxin, Lasix

BACK TO THE PATIENT……..

Right heart catheterization shows:

BP 95/65/75 mm Hg

RA 10 mm Hg

PA 65/24/35 mm Hg

PCWP 16 mm Hg

CO 3.5 L/min

SVR 1440 dynes/sec

PVR 435 dynes/sec (5.4WU)

BACK TO THE PATIENT……

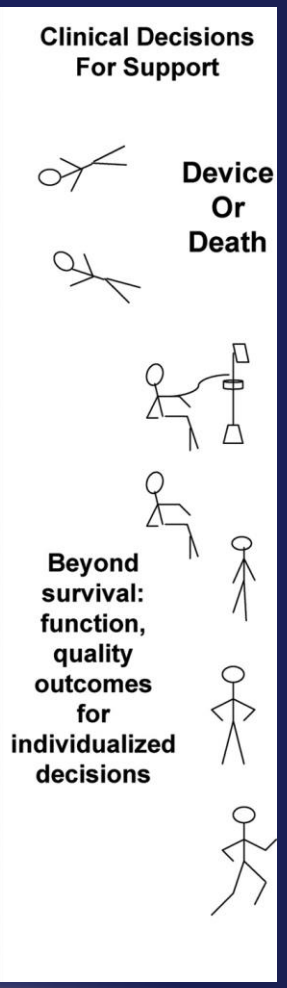
- Acute testing was not successful - admitted to telemetry on IV Milrinone.
- No absolute contraindications for transplant.
- Develops VT and received ICD shock 3 times.
- Placed on IV Amiodarone, and given volume for hypotension.
- The following clinical picture ensues after 2 days despite maximal medical therapy….

BACK TO THE PATIENT.....

- Patient on mechanical ventilator
- Vitals: BP 90/55, HR 104, JVD 12, clear lungs, +S3, +S4 , Palpable liver, Cool ext. 2+ edema
- Meds: Milrinone @ 0.5 mcg/kg/min, Amiodarone 0.5mg, Lasix
- Labs: Na+ - 132, Cr – 2.0, Bili – 2.4, Hgb – 10, WBC – 9, Platelets -155.
- Hemodynamics: CO -3.8, CI – 1.8, RA – 14, PCW – 18, SVR – 1108, PVR- 3.1

THE 7 SHADES OF ADVANCED HEART FAILURE

INTERMACS PROFILE-LEVEL	% of VADs 2010-11 N=2245	Trial Subjects With LVADs	Official Shorthand	Modifier options
INTERMACS 1	13%	---REMATCH / ---ADVANCE --- / ---REVIVE-IT ---	"Crash and burn"	± Arrhythmia, ± Temporary Circ Support
INTERMACS 2	42%		"Sliding fast" despite inotropic support	± Arr, TCS
INTERMACS 3	26%		Stable but inotropic therapy-dependent, In hosp or home	± Arr ± Frequent Flyer
INTERMACS 4	13%		Resting symptoms on oral therapy at home.	± Arr ± FF
INTERMACS 5	3%		"Housebound", Comfortable at rest, symptoms with minimal daily activity	± Arr ± FF
INTERMACS 6	2%		"Walking wounded"- ADL possible but meaningful activity limited	± Arr ± FF
INTERMACS 7	1%		Advanced Class III	± Arr



Stevenson L W , and Hunt S A Circulation. 2012;125:3069-3072

American Heart Association.

AT THIS POINT, IT IS APPROPRIATE TO CONSIDER….

- A) Dobutamine at 2.5 mcg/kg/min
- B) Intra-aortic balloon pump
- C) Intravenous vasodilators
- D) Mechanical circulatory support
- E) Palliative care consult

Recommendations for Inotropic Support, MCS, and Cardiac Transplantation.

Recommendations	COR	LOE	References
Inotropic support			
Cardiogenic shock pending definitive therapy or resolution	I	C	N/A
BTT or MCS in stage D refractory to GDMT	IIa	B	647, 648
Short-term support for threatened end-organ dysfunction in hospitalized patients with stage D and severe HF/EF	IIb	B	592, 649, 650
Long-term support with continuous infusion palliative therapy in select stage D HF	IIb	B	651–653
Routine intravenous use, either continuous or intermittent, is potentially harmful in stage D HF	III: Harm	B	416, 654–659
Short-term intravenous use in hospitalized patients without evidence of shock or threatened end-organ performance is potentially harmful	III: Harm	B	592, 649, 650
MCS			
MCS is beneficial in carefully selected* patients with stage D HF in whom definitive management (eg, cardiac transplantation) is anticipated or planned	IIa	B	660–667
Nondurable MCS is reasonable as a "bridge to recovery" or "bridge to decision" for carefully selected* patients with HF and acute profound disease	IIa	B	668–671
Durable MCS is reasonable to prolong survival for carefully selected* patients with stage D HF/EF	IIa	B	672–675
Cardiac transplantation			
Evaluation for cardiac transplantation is indicated for carefully selected patients with stage D HF despite GDMT, device, and surgical management	I	C	680

*Although optimal patient selection for MCS remains an active area of investigation, general indications for referral for MCS therapy include patients with LVEF <25% and NYHA class III–IV functional status despite GDMT, including, when indicated, CRT, with either high predicted 1- to 2-year mortality (eg, as suggested by markedly reduced peak oxygen consumption and clinical prognostic scores) or dependence on continuous parenteral inotropic support. Patient selection requires a multidisciplinary team of experienced advanced HF and transplantation cardiologists, cardiothoracic surgeons, nurses and ideally, social workers and palliative care clinicians.

BTT indicates bridge to transplant; COR, Class of Recommendation; CRT, cardiac resynchronization therapy; GDMT, guideline-directed medical therapy; HF, heart failure; HF/EF, heart failure with reduced ejection fraction; LOE, Level of Evidence; LVEF, left ventricular ejection fraction; MCS, mechanical circulatory support; N/A, not applicable; and NYHA, New York Heart Association.

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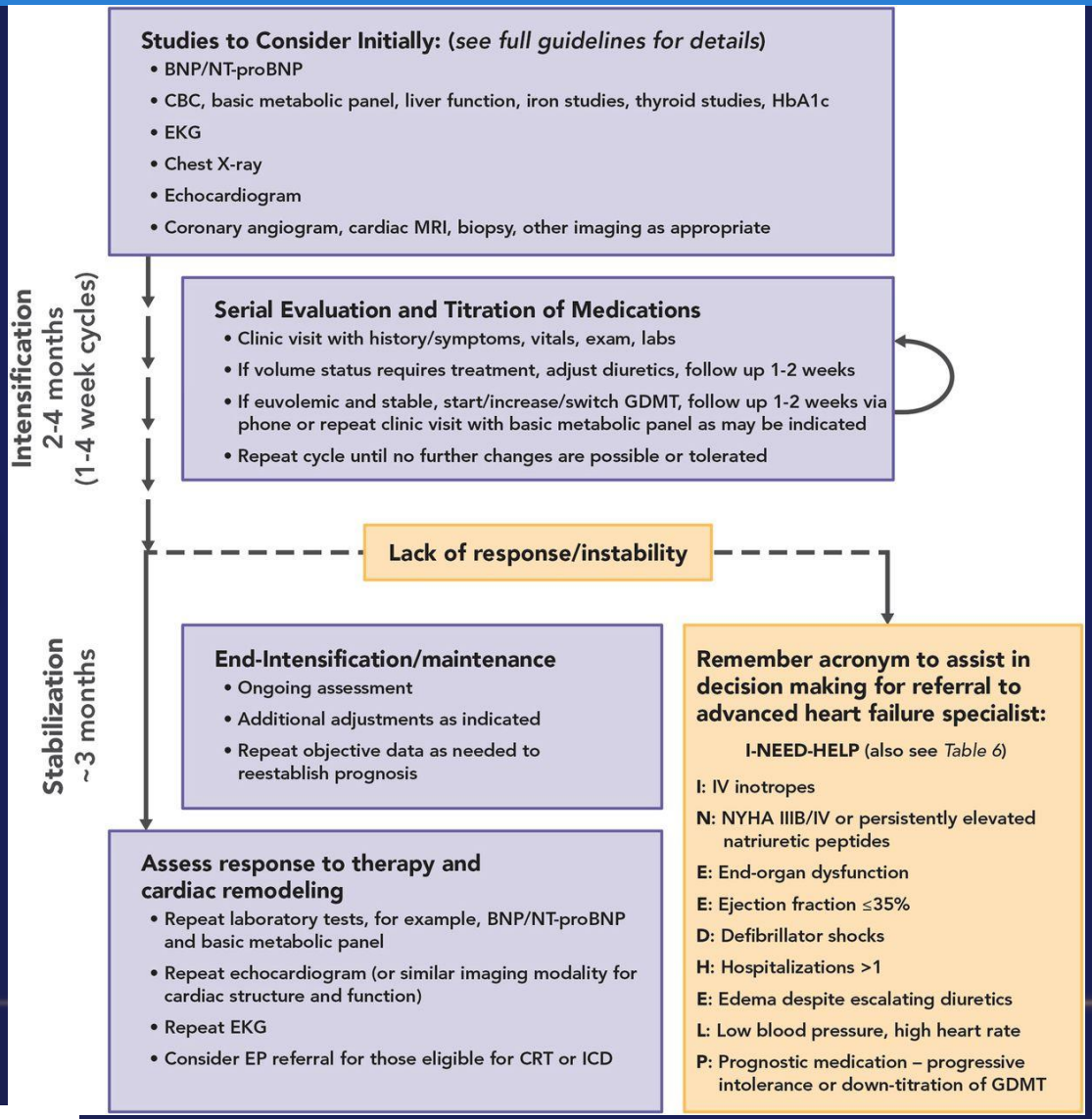
MEDICAL THERAPY FOR ADVANCED HEART FAILURE

DURING CALIBRATED MEDICAL THERAPY…. DECIDING REFERRAL TO HF PROGRAM

Unsuccessful?



Banner University Medicine

Heart Failure Pathway Writing Committee et al. JACC 2017;j.jacc.2017.11.025

BACK TO OUR PATIENT…….

IMPLANTED WITH HM II LVAD AS A BRIDGE TO TRANSPLANT. HE SHOULD BE LISTED FOR HEART TRANSPLANT AS;

- A) Status 1
- B) Status 2
- C) Status 3
- D) Status 4
- E) Discretionary status 3 for 30 days and then status 4
- F) Status 5
- G) Status 6

ACE INHIBITOR, ARB OR ARNI USE IS INDICATED IN THE FOLLOWING HF POPULATION;

- A. ACC stage C heart failure patients
- B. ACC stage B heart failure patients
- C. ACC stage A patients with hypertension
- D. All of the above

THE DETERMINATION OF ADVANCED HEART FAILURE INCLUDES CONSIDERATION OF FOLLOWING PARAMETERS DESPITE OPTIMAL MEDICAL THERAPY EXCEPT;

- A. ***NYHA Class III-IV Symptoms***
- B. ***Objective evidence of severe cardiac dysfunction***
  (EF<30%, Doppler Pseudonormal or Restrictive filling pattern, PCWP>16mmHg or RAP >12 mmHg)
- C. ***Severely impaired functional capacity***
  (Inability to exercise, 6MWD<300m, Peak VO2<12-14 ml/kg/min)
- D. ***HF Hospitalizations***
  (≥1 in past 6 months)
- E. Ventricular tachyarrhythmia successfully treated with antiarrhythmic and defibrillator

ANSWERS

Q1: D

ACEI, ARB or ARNI is guideline recommended therapy for ACC stage B, C and D heart failure. ACEI or ARB is also recommended for stage A patient who have hypertension.

Q2: E

Responses A, B, C and D are included in the European Society of Cardiology guideline to be considered for the determination of advanced heart failure and indicate deterioration of cardiac function despite optimal medical therapy. Ventricular tachyarrhythmia that is successfully treated with an ICD and antiarrhythmic medications is not a parameter that is included in the guideline and may not always indicate advanced heart failure.

THANK YOU!