ACUTE HEART FAILURE AND COMORBIDITY IN THE ELDERLY

Treatment of cardiogenic shock

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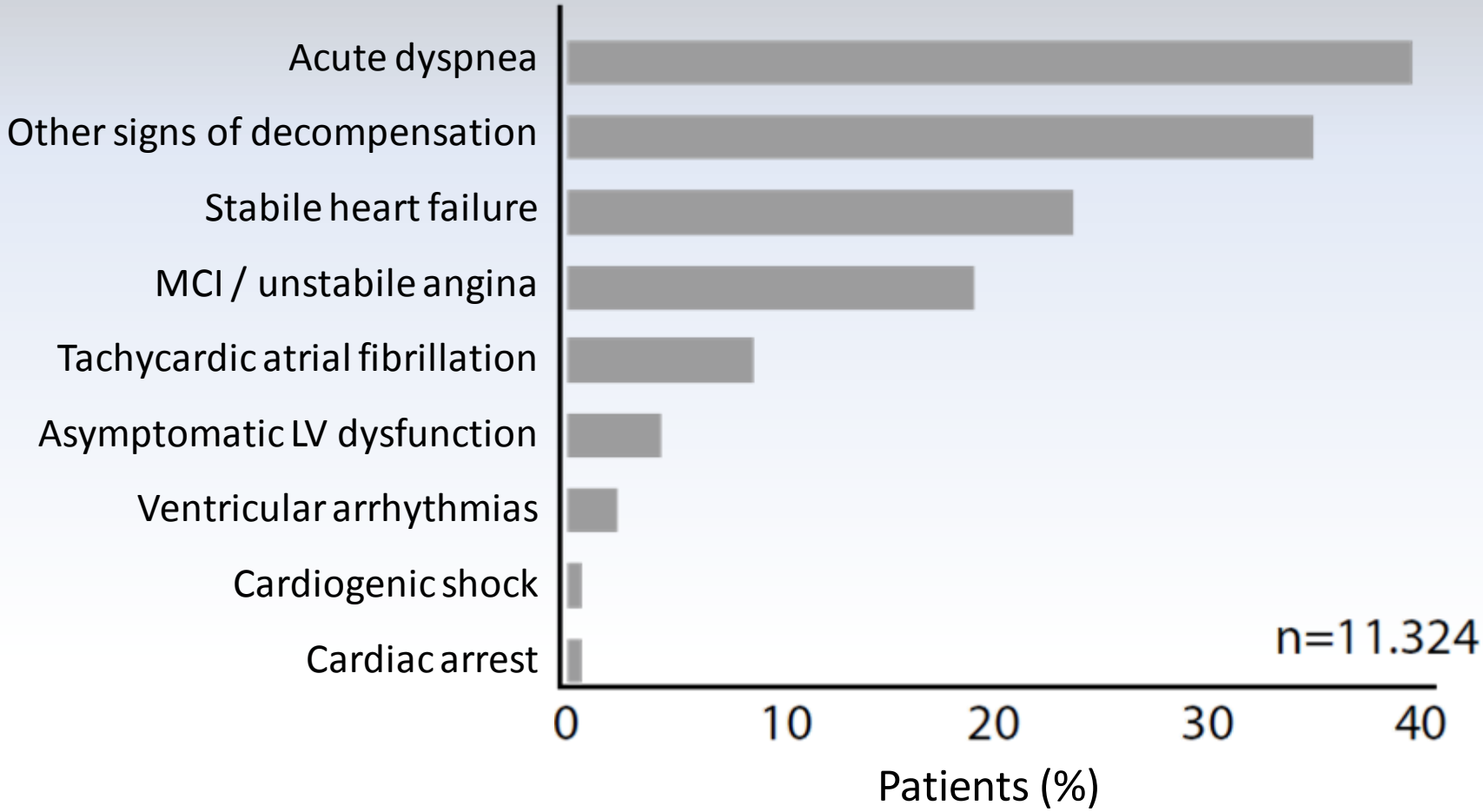
Cardiovascular findings in hospitalized heart failure in the ED — «Euro Heart Failure Survey»



ED = emergency department, MCI = Myocardial infartion, LV = left ventricular dysfunction

Cleland JG, et al. *Eur Heart J 2003;* **24**:442–463

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Acute heart failure syndrome (AHFS)

- **AHFS leading cause of hospitalization among patients >65 years of age[1]**
  - **Highest costs related to heart failure**
  - **Sentinel prognostic event[2]**
    - **recurrent hospitalization 50% at 6 months**
    - **1-year mortality 30%**
- **Patient profile characterized by comorbidities**
  - **Hypertension, chronic kidney disease**
  - **Hyponatremia, anemia**
  - **COPD**

[1]Go AS, et al. *Circulation* 2013;**127**:e6-245. [2]Kociol RD, et al. *Am Heart J* 2010;**160**:885-92.

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Triggers of AHFS – 1

- Nonadherence
  - medication regimen, sodium or fluid restriction
- Acute myocardial ischemia
- Uncorrected high blood pressure
- AF and other arrhythmias
- Recent addition of negative inotropic drugs
  - verapamil, nifedipine, diltiazem, beta blockers
- Pulmonary embolus

De Keulenaer GW. *Circulation* 2009; **119**:3044 –6.

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Triggers of AHFS – 2

- Initiation of drugs that increase salt retention
  - steroids, glitazones, NSAIDs
- Excessive alcohol or illicit drug use
- Endocrine abnormalities
  - thyroid disorders, diabetes mellitus
- Concurrent infections
- Additional acute cardiovascular disorders
  - valve disease, aortic disease, endo-, myo- or pericarditis

De Keulenaer GW. *Circulation* 2009; **119**:3044 –6.

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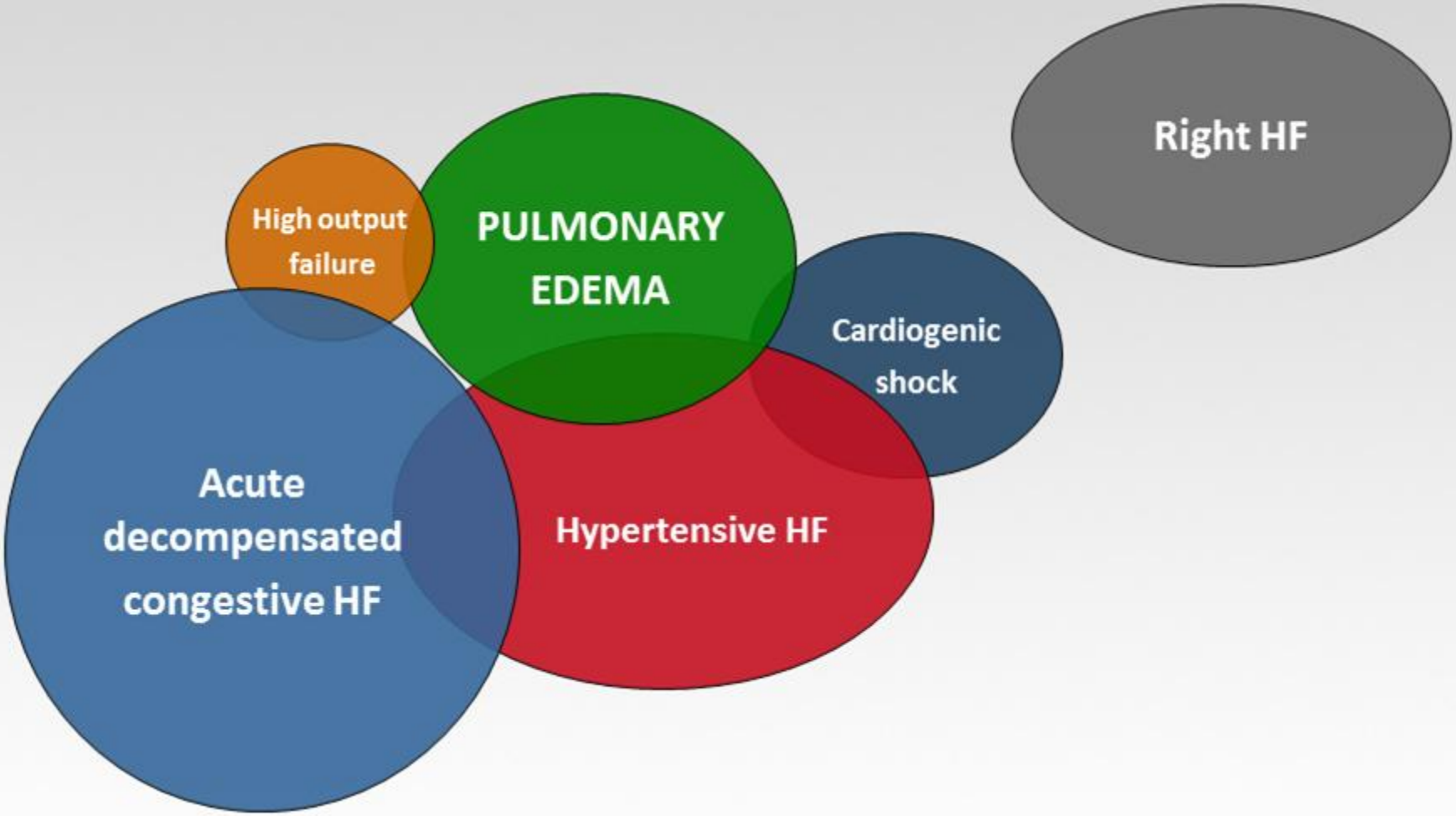
ESC 2005 Classification of AHFS



Adapted from Filippatos & Zannad. *Heart Fail Rev* 2007; **12**:87–90.

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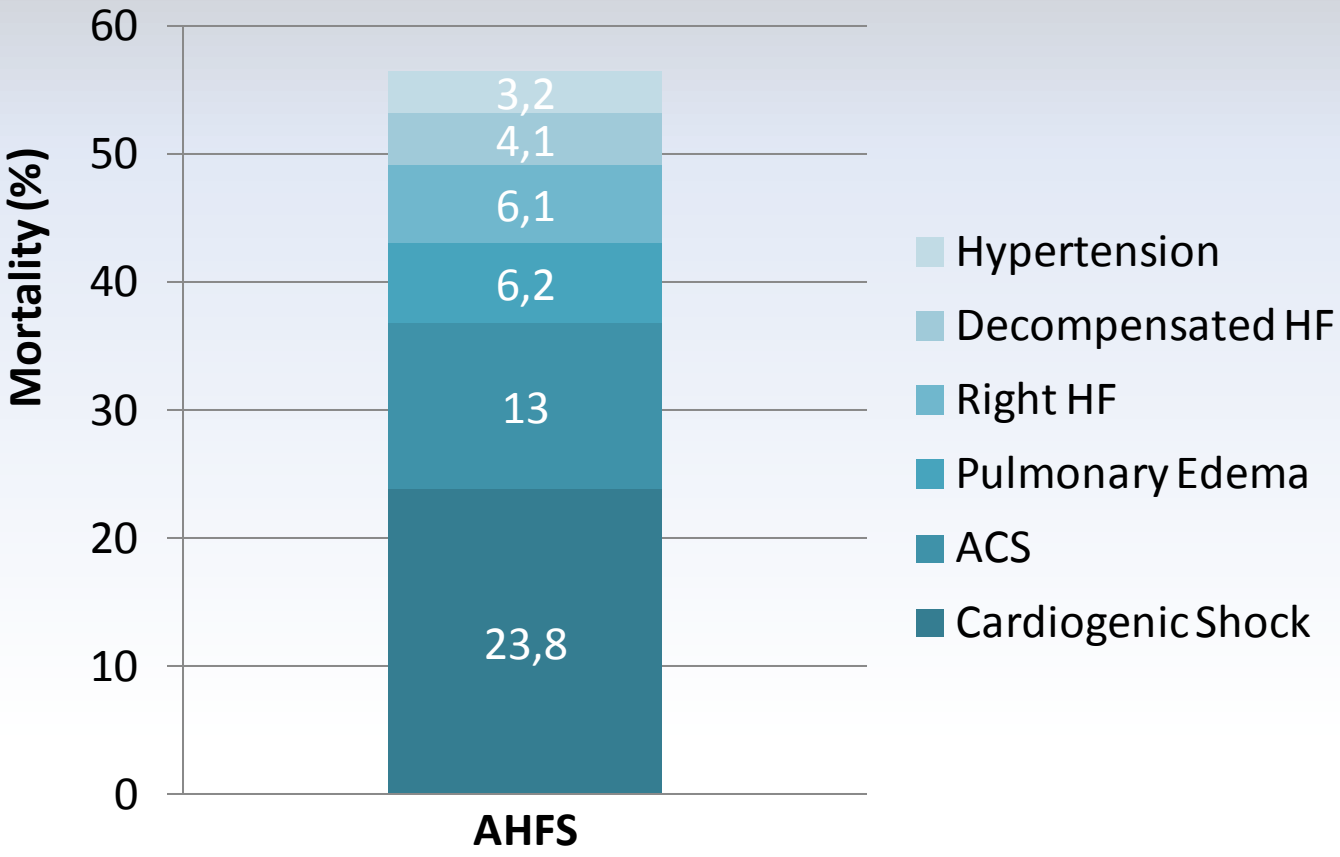
AHFS Hospital All-cause Mortality (6,4 %) by Clinical Profile at Entry — «Italian Registry»



AHFS = acute heart failure syndrome, HF = heart failure, ACS = acute coronary syndrome

Oliva F, et al. *Eur J Heart Fail* 2012; **14**:1208–17.

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AHFS in the Emergency Department

Diagnosis, treatment, and disposition

- **80% of ED patients with AHFS hospitalized**

- **Achieve hemodynamic balance**
- **Improve functional capacity**
- **Decrease mortality and length of stay**
  - **decompensation of underlying, chronic HF**
  - **shock, arrhythmias, or ST-segment myocardial infarction**

AHFS = acute heart failure syndrome, ED = emergency department

Peacock WF. *Cardiol Clin.* 2005; **23**:569 –88, viii.

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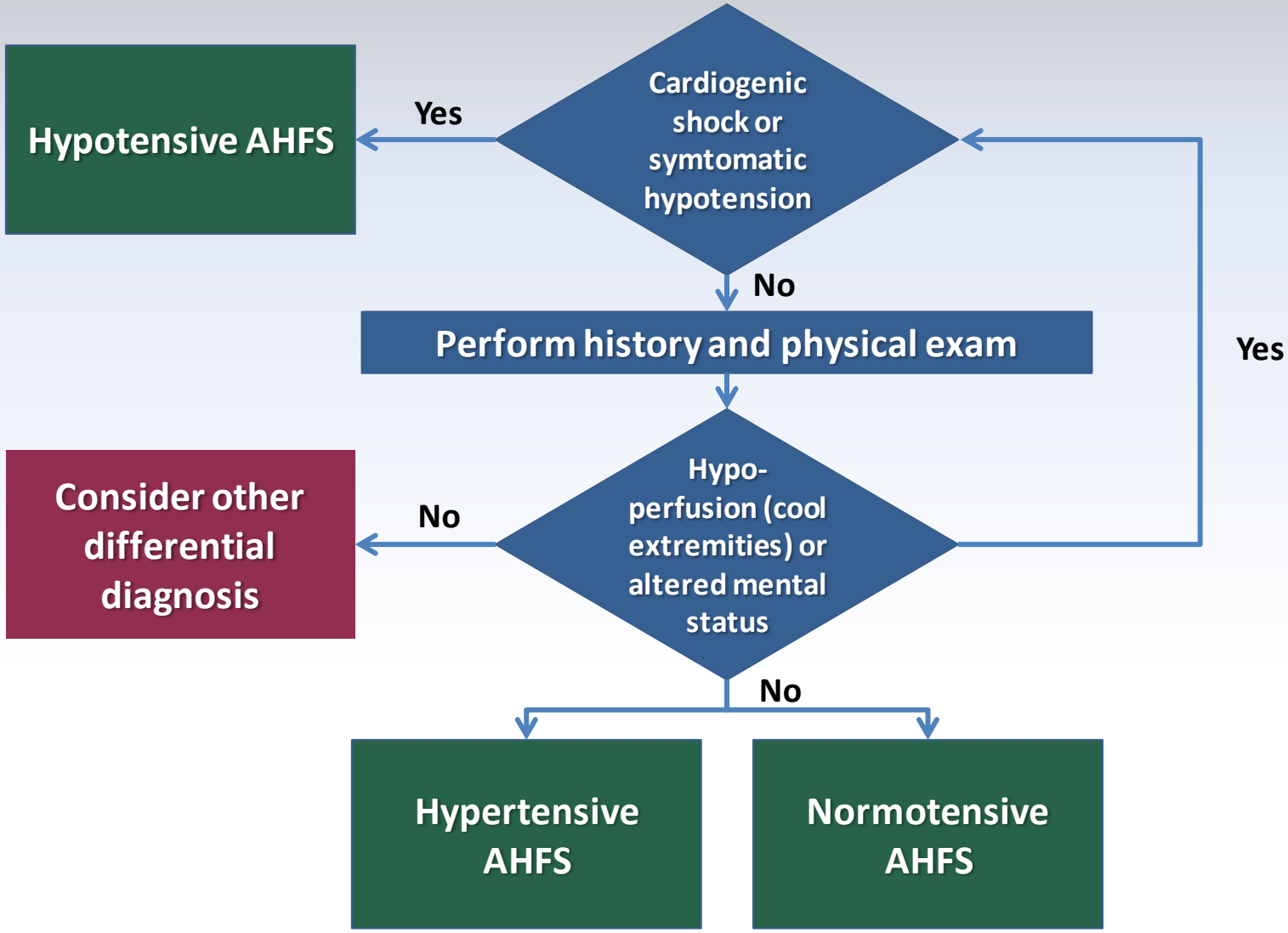
Suspected AHFS in the Emergency Department



Adapted from Collins S, et al. *Ann Emerg Med* 2007; **51:**45-57.

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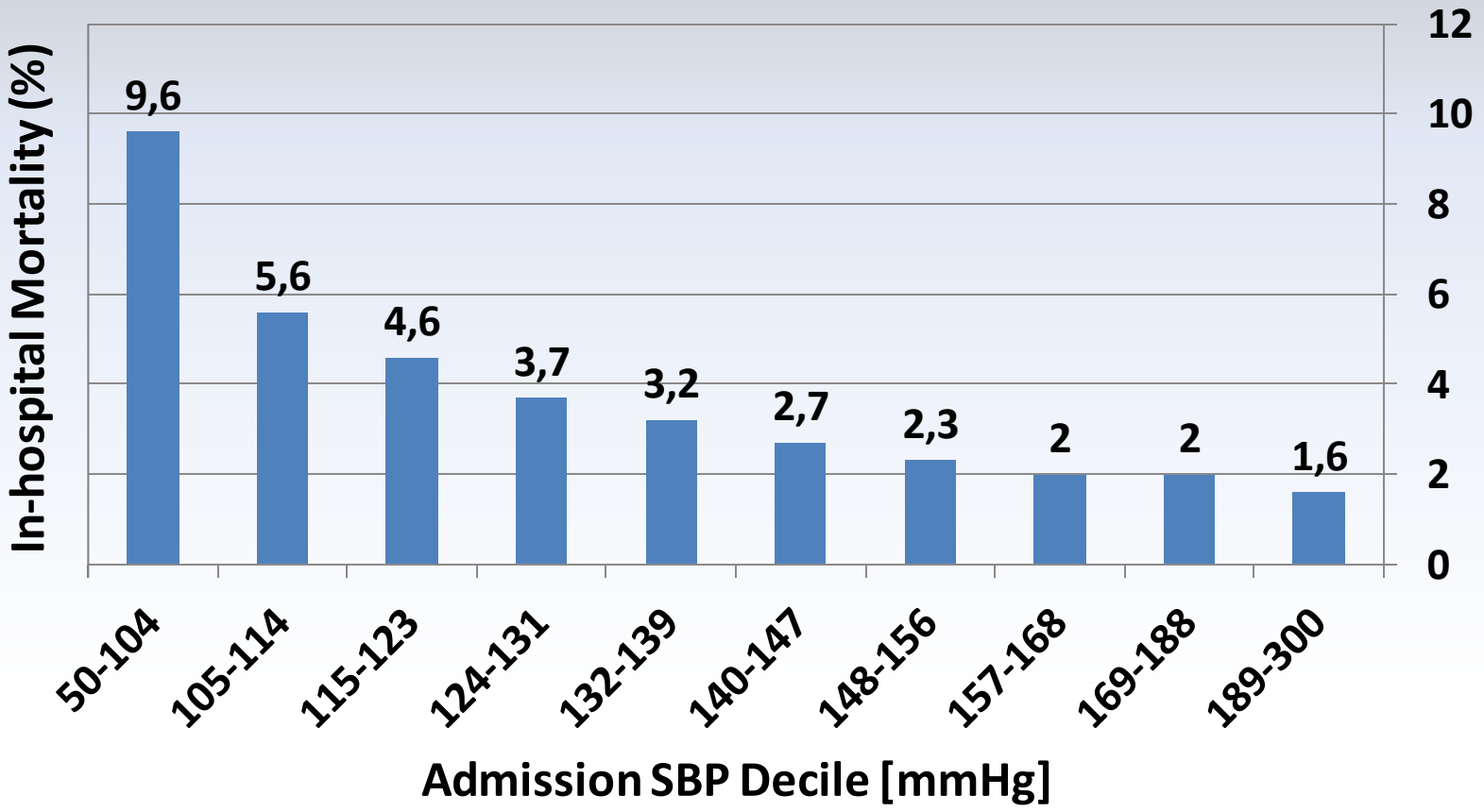
In-hospital Mortality Rates by Admission SBP Deciles in AHFS (n = 48.567)



SBP = systolic blood pressure, AHFS = acute heart failure syndrom

Gheorgiade M, et al. *JAMA* 2006; **296**:2217-26.

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Independent predictors of AHFS all-cause hospital mortality «Italian Registry»

	Odds ratio	95% CI	*P*-value
SBP mmHg (continuous)	0.984	0.976–0.992	<0.0001
Age years (continuous)	1.07	1.05–1.10	<0.0001
Somnolent, confused, sedated	3.35	2.06–5.45	<0.0001
Creatinine >1.5 vs. ≤ 1.5 mg/dL	2.25	1.40–3.60	0.0008
Sodium <136 vs. ≥ 136 mEq/L	2.00	1.26–3.19	0.004
Shock	2.97	1.41–6.24	0.004
Pulmonary oedema	1.70	1.05–2.75	0.031

CI = confidence interval, SBP = systolic blood pressure

Oliva F, et al. *Eur J Heart Fail* 2012; **14**:1208–17.

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Cardiogenic Shock

- Consequence of cardiac pump failure
  - CO decreases
  - PCWP increases
- Pathophysiology compensates for diminished CO to maintain perfusion to vital organs
  - SVR increases

CO = cardiac output, SVR = systemic vascular resistance, PCWP = pumonary capillary wedge pressure

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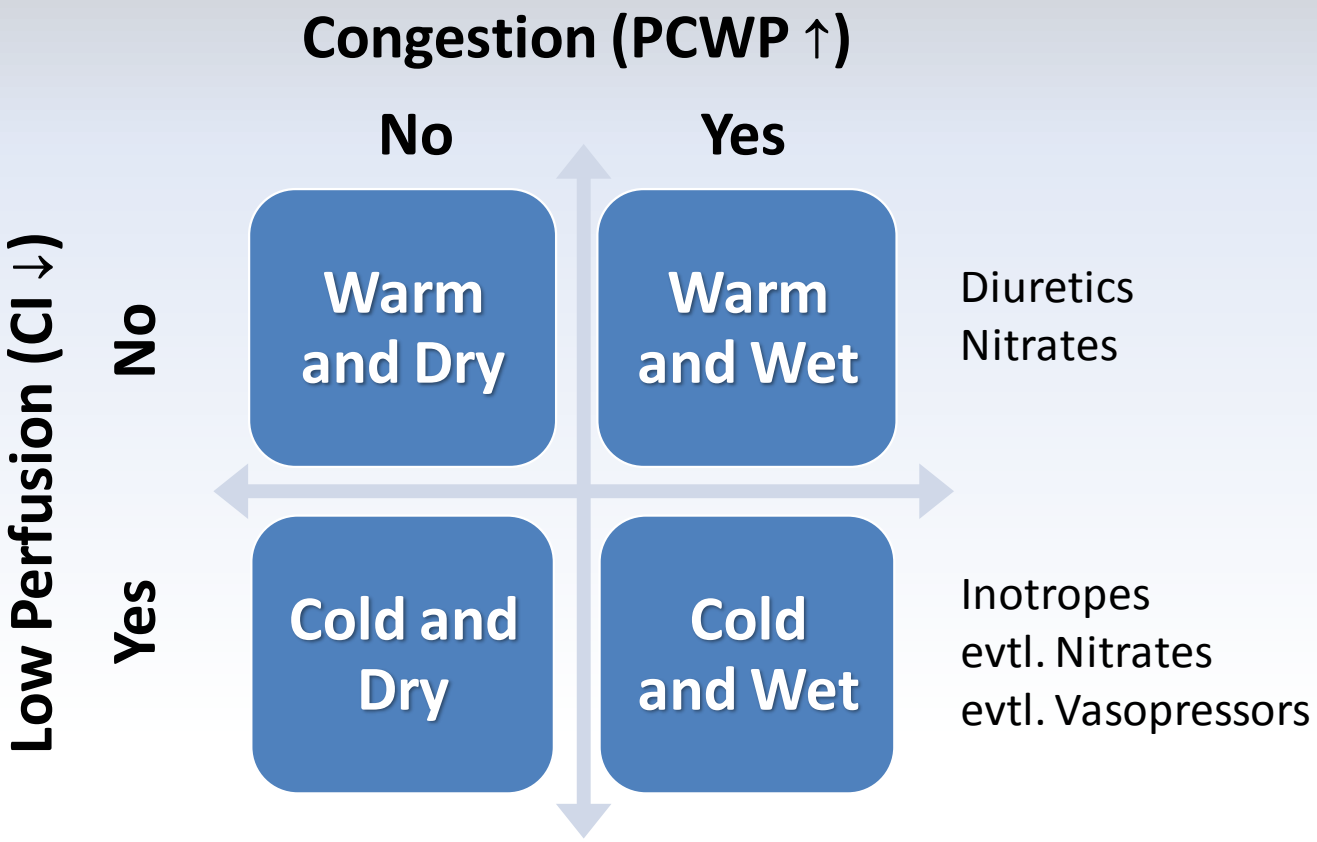
Clinical Destinction of AHFS



PCWP = pulmonary capillary wedge pressure, CI = cardiac index

Nohria A, et al. *JAMA* 2002;**287**:628–40.

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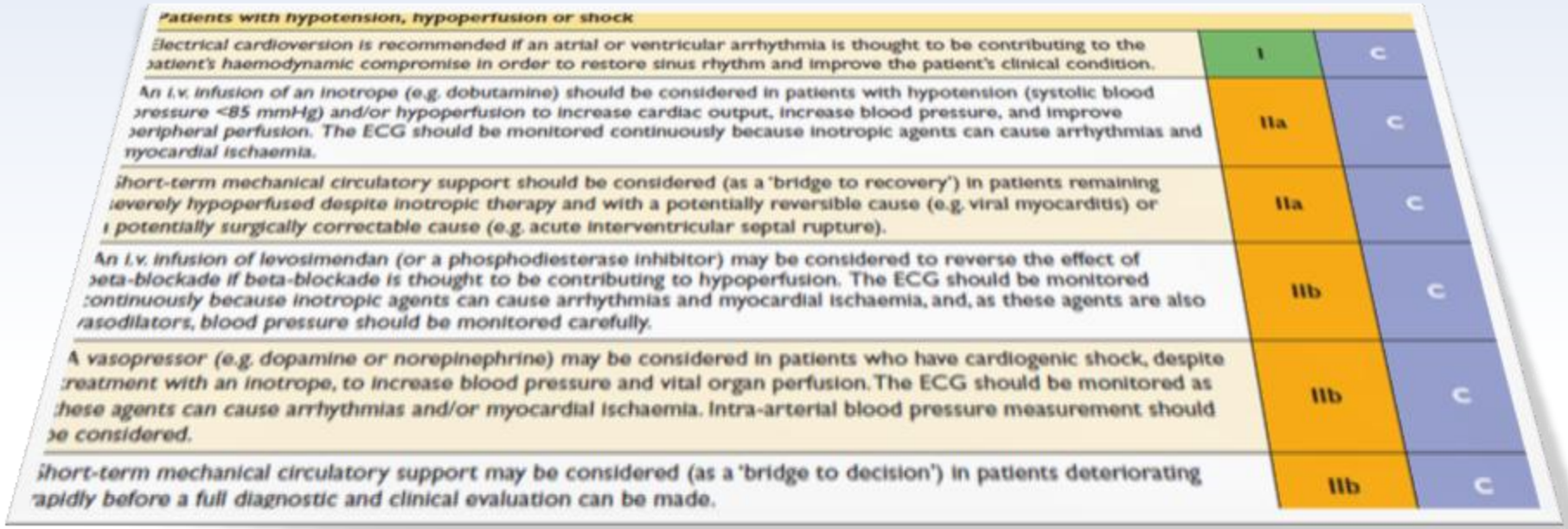
Treatment of AHFS with hypotension, hypoperfusion or shock

PDE = phosphodiesterase

- Electrical cardioversion
- Inotrope (eg, dobutamin)
- Short-term mechanical support
- Levosimendan/PDE-Inhibitor
- Vasopressor (eg, dopamin)



Patients with hypotension, hypoperfusion or shock		
Electrical cardioversion is recommended if an atrial or ventricular arrhythmia is thought to be contributing to the patient's haemodynamic compromise in order to restore sinus rhythm and improve the patient's clinical condition.	I	C
An i.v. infusion of an inotrope (e.g. dobutamine) should be considered in patients with hypotension (systolic blood pressure <85 mmHg) and/or hypoperfusion to increase cardiac output, increase blood pressure, and improve peripheral perfusion. The ECG should be monitored continuously because inotropic agents can cause arrhythmias and myocardial ischaemia.	IIa	C
Short-term mechanical circulatory support should be considered (as a 'bridge to recovery') in patients remaining severely hypoperfused despite inotropic therapy and with a potentially reversible cause (e.g. viral myocarditis) or a potentially surgically correctable cause (e.g. acute interventricular septal rupture).	IIa	C
An i.v. infusion of levosimendan (or a phosphodiesterase inhibitor) may be considered to reverse the effect of beta-blockade if beta-blockade is thought to be contributing to hypoperfusion. The ECG should be monitored continuously because inotropic agents can cause arrhythmias and myocardial ischaemia, and, as these agents are also vasodilators, blood pressure should be monitored carefully.	IIb	C
A vasopressor (e.g. dopamine or norepinephrine) may be considered in patients who have cardiogenic shock, despite treatment with an inotrope, to increase blood pressure and vital organ perfusion. The ECG should be monitored as these agents can cause arrhythmias and/or myocardial ischaemia. Intra-arterial blood pressure measurement should be considered.	IIb	C
Short-term mechanical circulatory support may be considered (as a 'bridge to decision') in patients deteriorating rapidly before a full diagnostic and clinical evaluation can be made.	IIb	C

McMurray JJ, et al. *Eur J Heart Fail* 2013; **15**:361-2.

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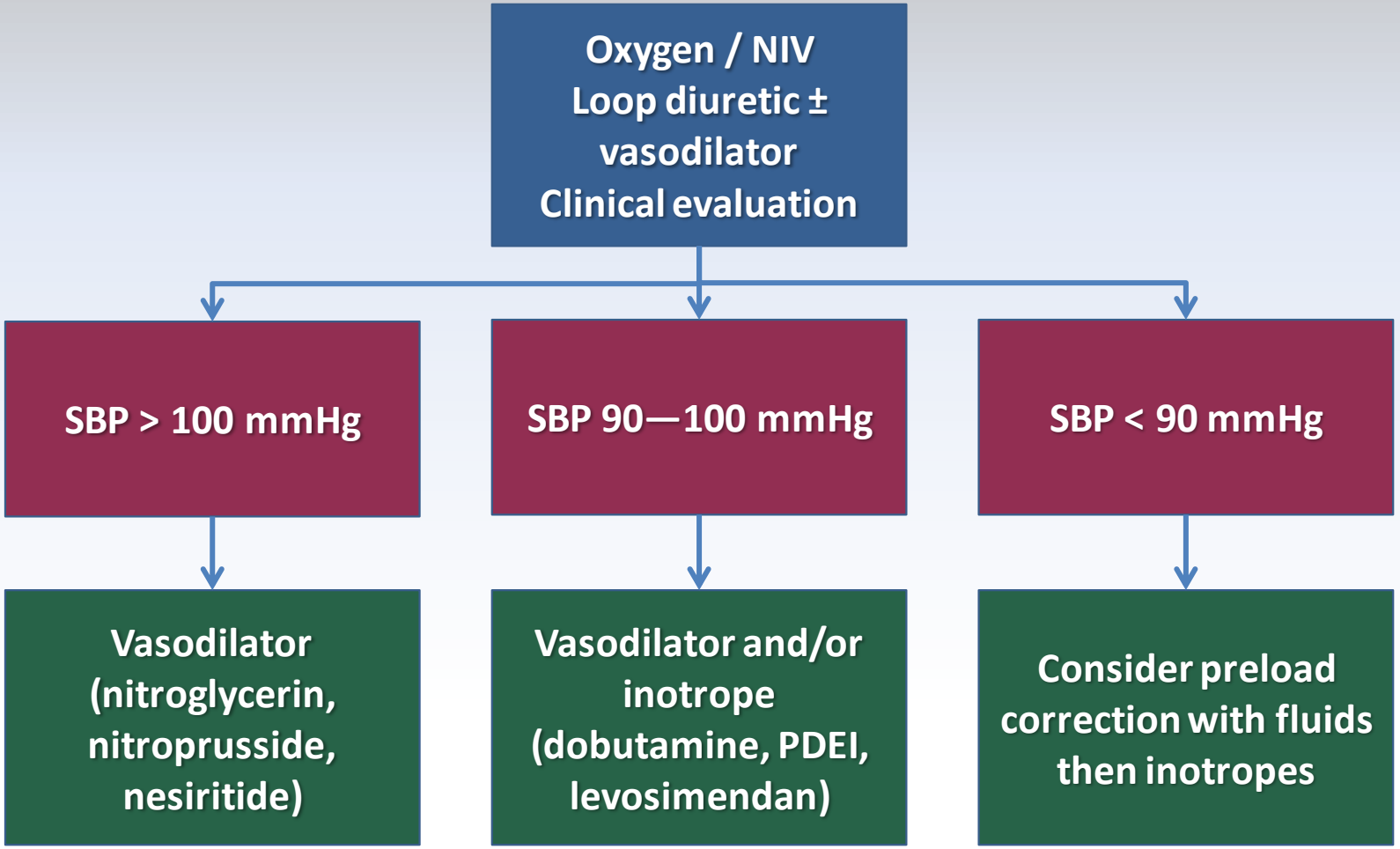
Proposed algoritm for use of IV drugs in AHFS



IV = intravenous, NIV = non-invasive ventilation, SBP = systolic blood pressure, PDEI = phosphodiesterase inhibitor

Lemasle L, et al. *Annual Update Intens Care Emerg Med* 2013; pp. 237-47.

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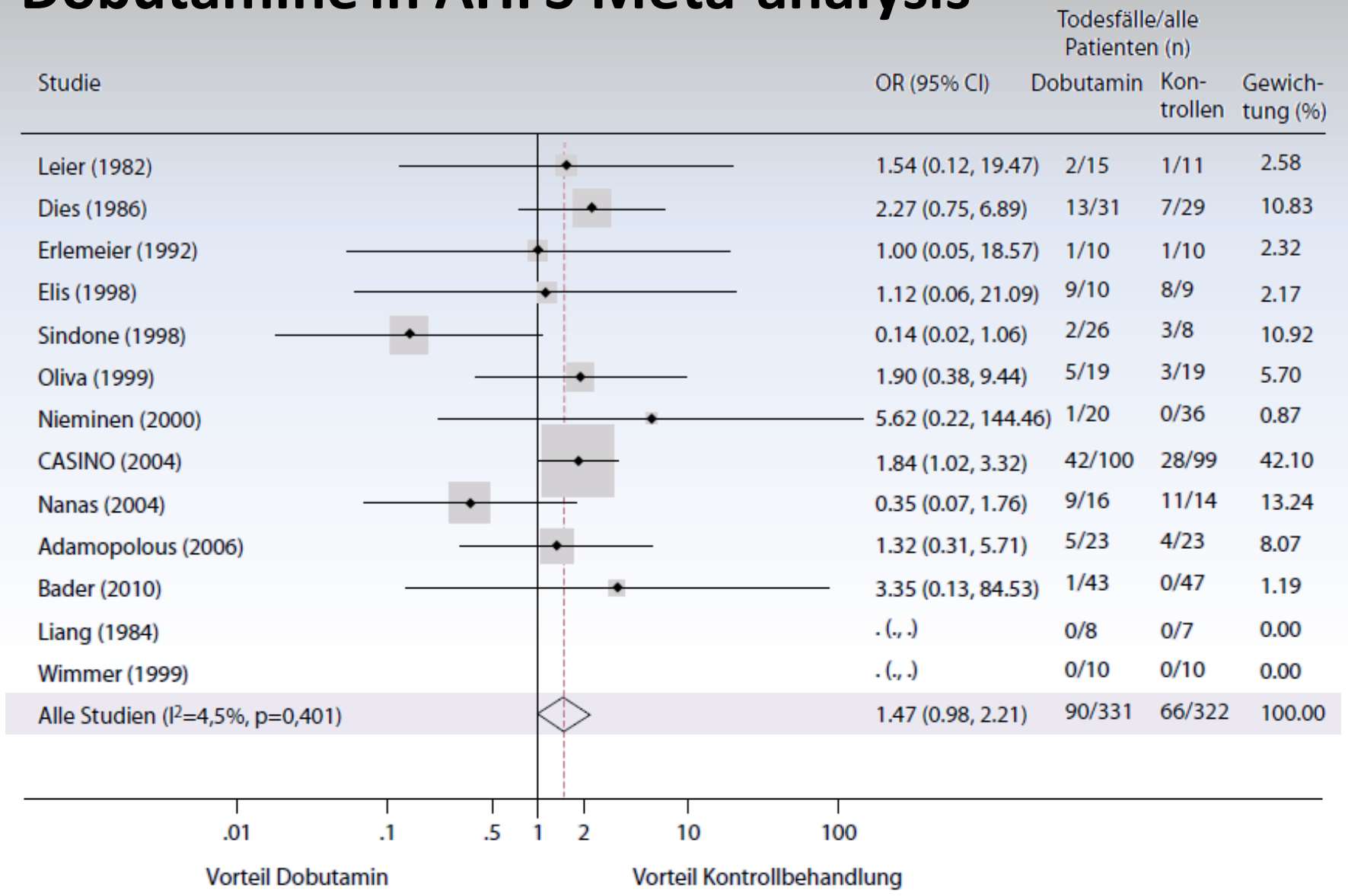
Dobutamine in AHFS Meta-analysis



Tacon CJ. *Intensive Care Med* 2012; **38**:359-67.

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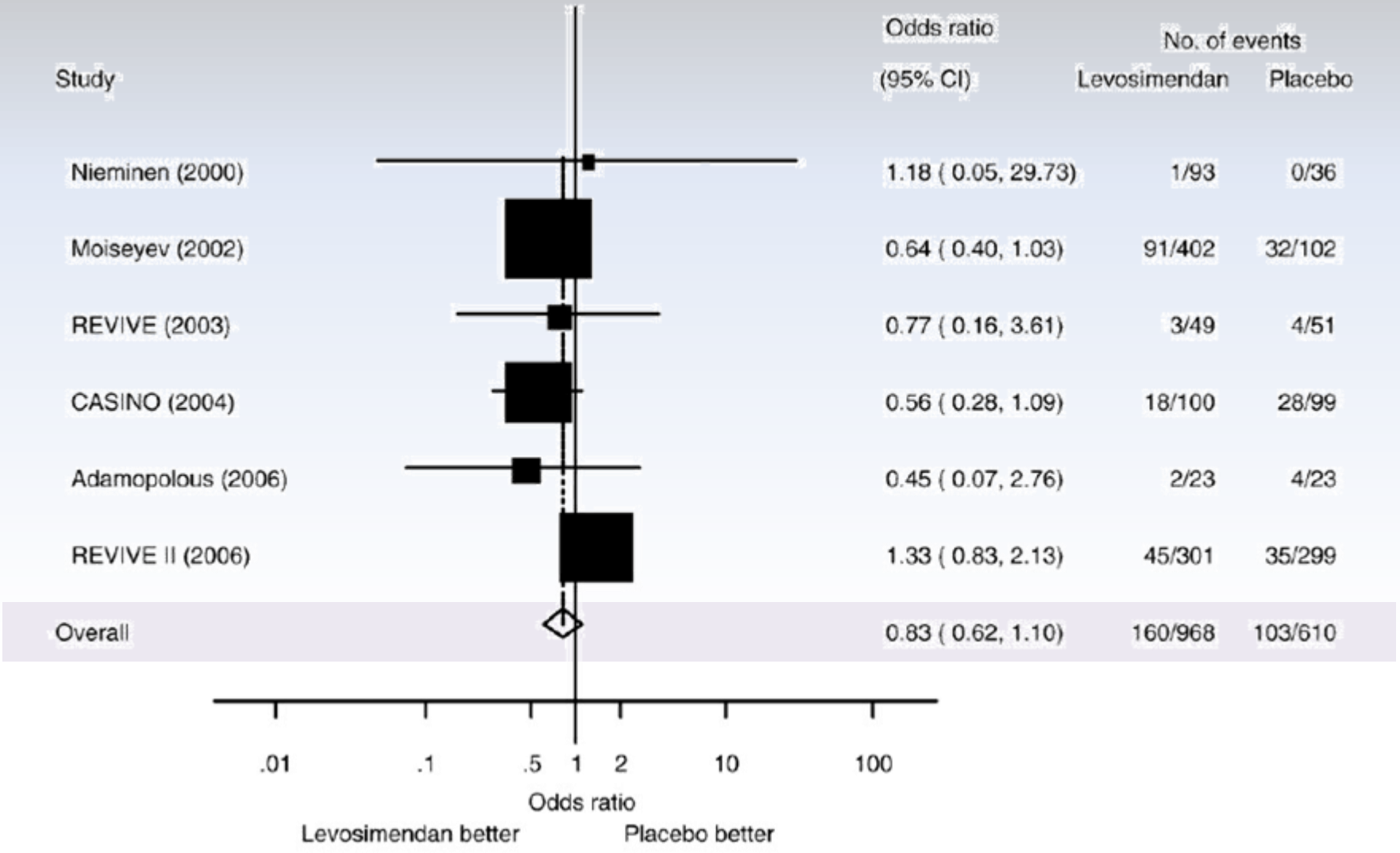
Levosimendan vs. Placebo in AHFS Meta-analysis



Delaney A, et al. *Int J Cardiol* 2010; **138**:281–9.

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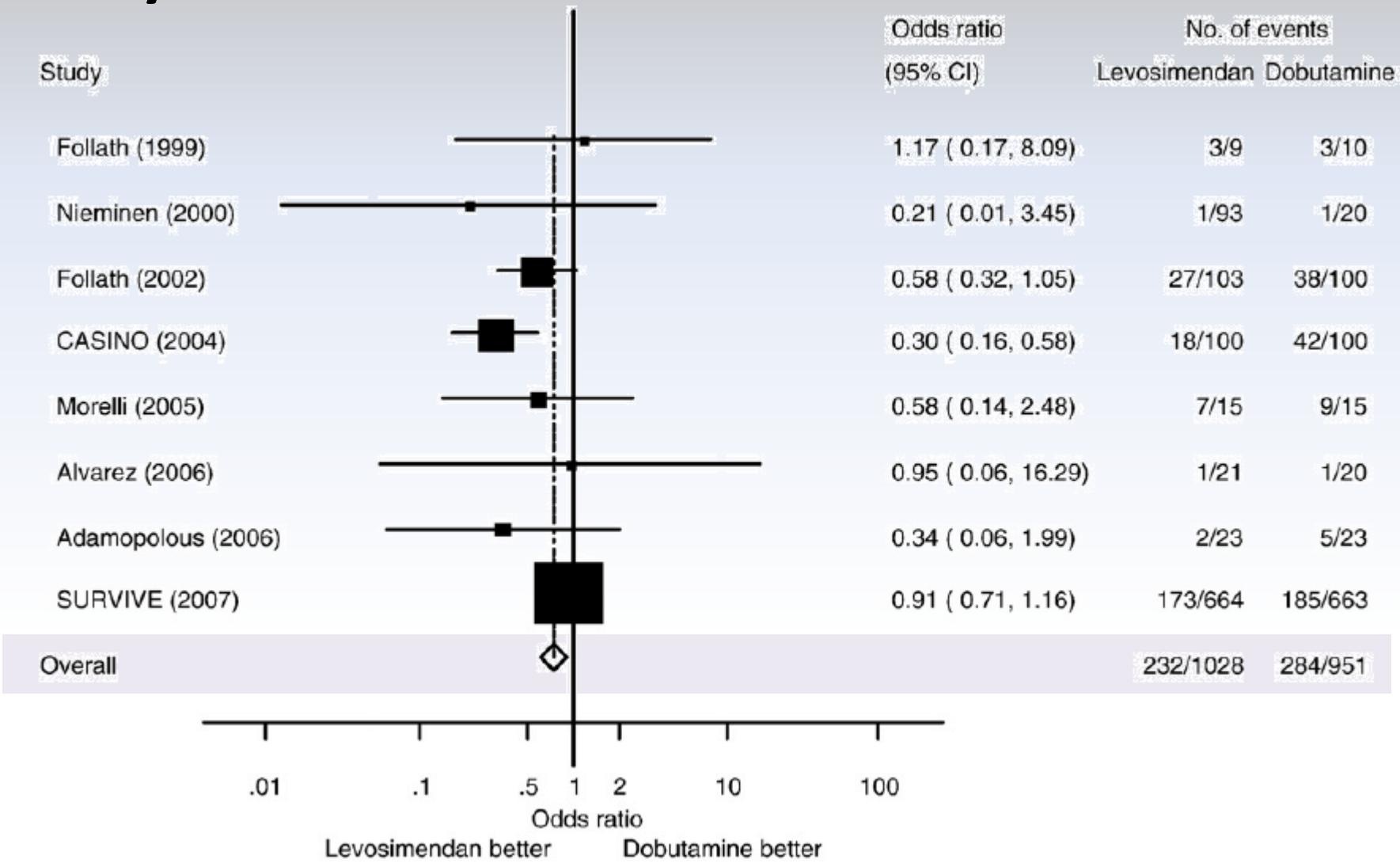
Levosimendan vs. Dobutamin in AHFS Meta-analysis



Delaney A, et al. *Int J Cardiol* 2010; **138**:281–9.

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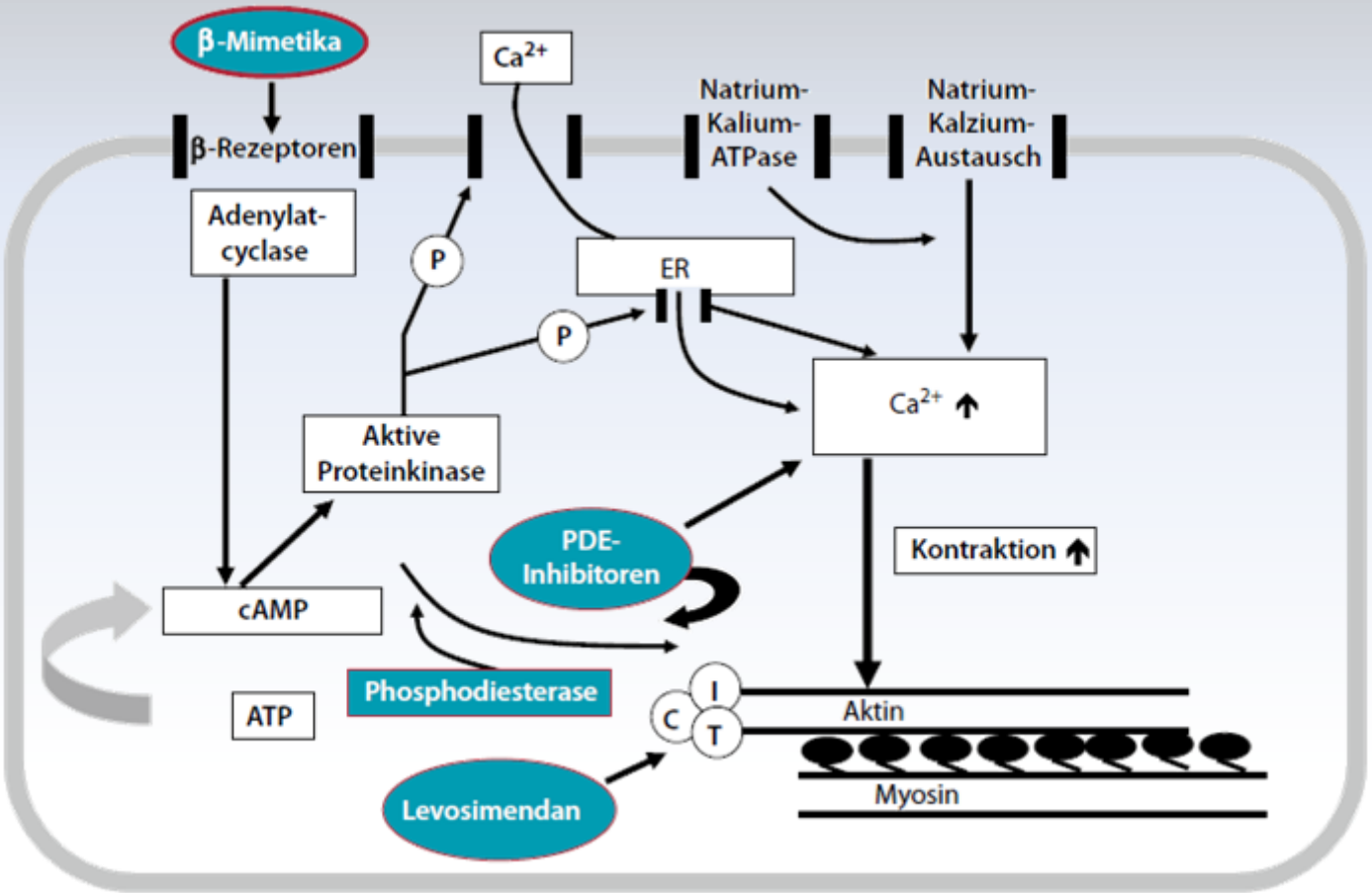
Mechanism of action of inotropes



ER = endoplasmatic reticulum, C/I/T = troponin C/I/T, P = phophsor

Jannsens U. *Med Klin Intensivmed Notfmed* 2012; **107**:397–425.

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Vasopressors for hypotensive shock (Review)

Havel C, Arrich J, Losert H, Gamper G, Müllner M, Herkner H

- 23 RCTs with 3212 hypotensive shock patients and 1629 deaths
- Six vasopressors in 11 comparisons

- **No difference in mortality between norepinephrine and dopamine**
- **Dopamine increases risk for arrhythmia**
- **Choice of vasopressors does not influence the outcome**

Havel C, et al. *Cochrane Database Syst Rev* 2011; **May 11**:CD003709.

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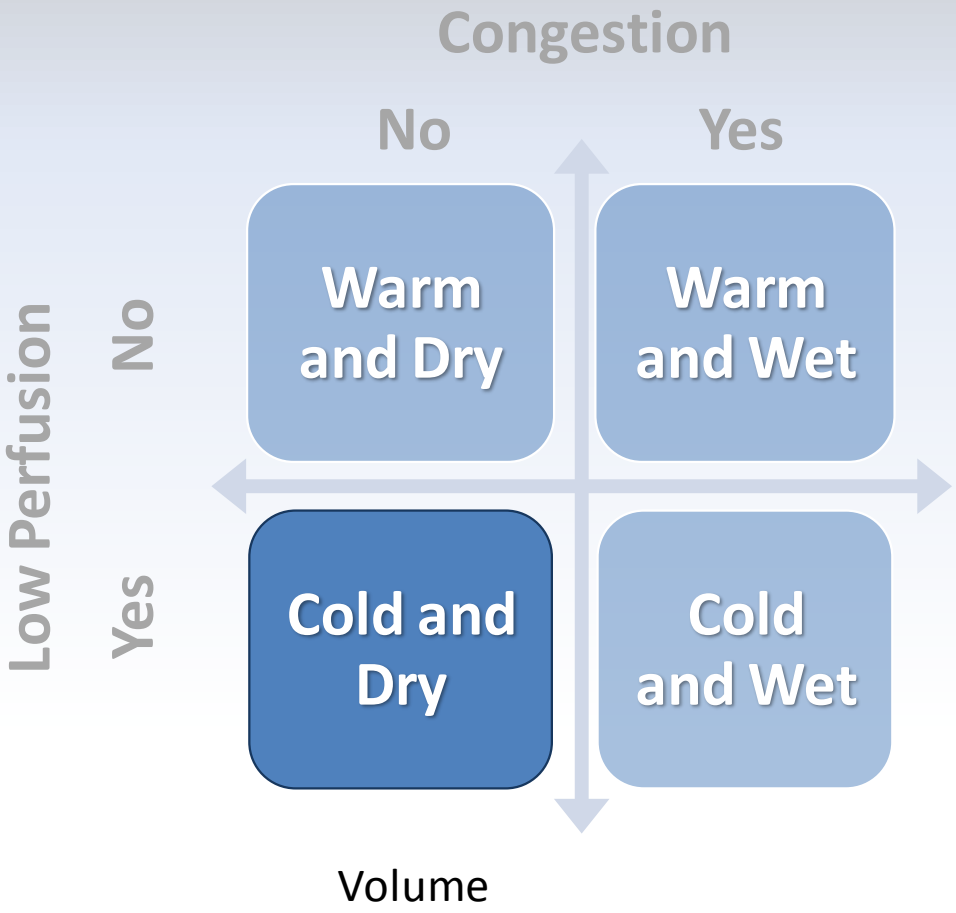
Clinical Destinction of AHFS



Nohria A, et al. *JAMA* 2002;**287**:628–40.

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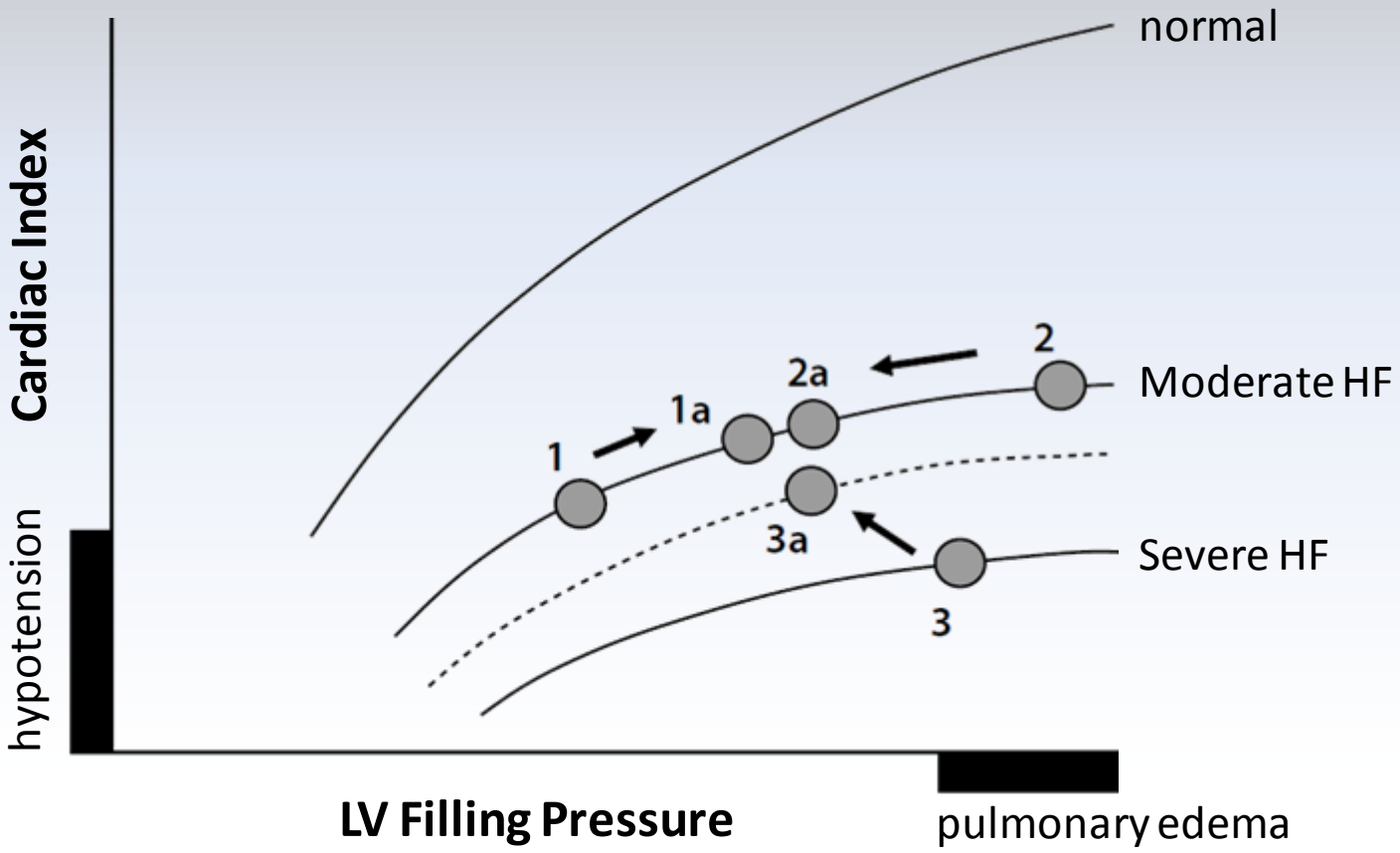
Frank-Starling-based Treatment of AHFS



1a = Volume resuscitation, 2a = Diuretics/vasodilators, 3a = Inotropes

LV = left ventricular, HF = heart failure

Modif. after Wollert KC & Drexler H. *Internist (Berl)* 1998; **39**:459–66.

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Summary and Conclusions

- In AHFS, hypotensive elderly patients with comorbidities are at the highest risk of death.
- Correction of triggering events, rapid stabilization of hemodynamics and improvement of symptoms and respiratory status are important goals.
  - Electrical cardioversion, diuretics, vasodilators have good evidence for efficacy when indicated.
  - Use of inotropes and vasopressors are of limited value.

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