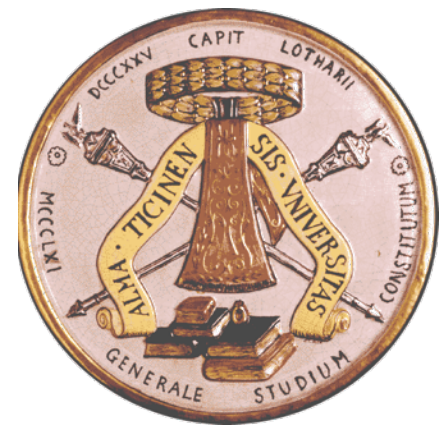




27° Meeting GiViTI

7-8-9 Novembre 2018

Alexander Hotel, Abano Terme



Lo shock cardiogeno in TI

Guido Tavazzi, MD PhD

University of Pavia

*Anesthesia and Intensive Care, Dept I
Fondazione Policlinico San Matteo, IRCCS*



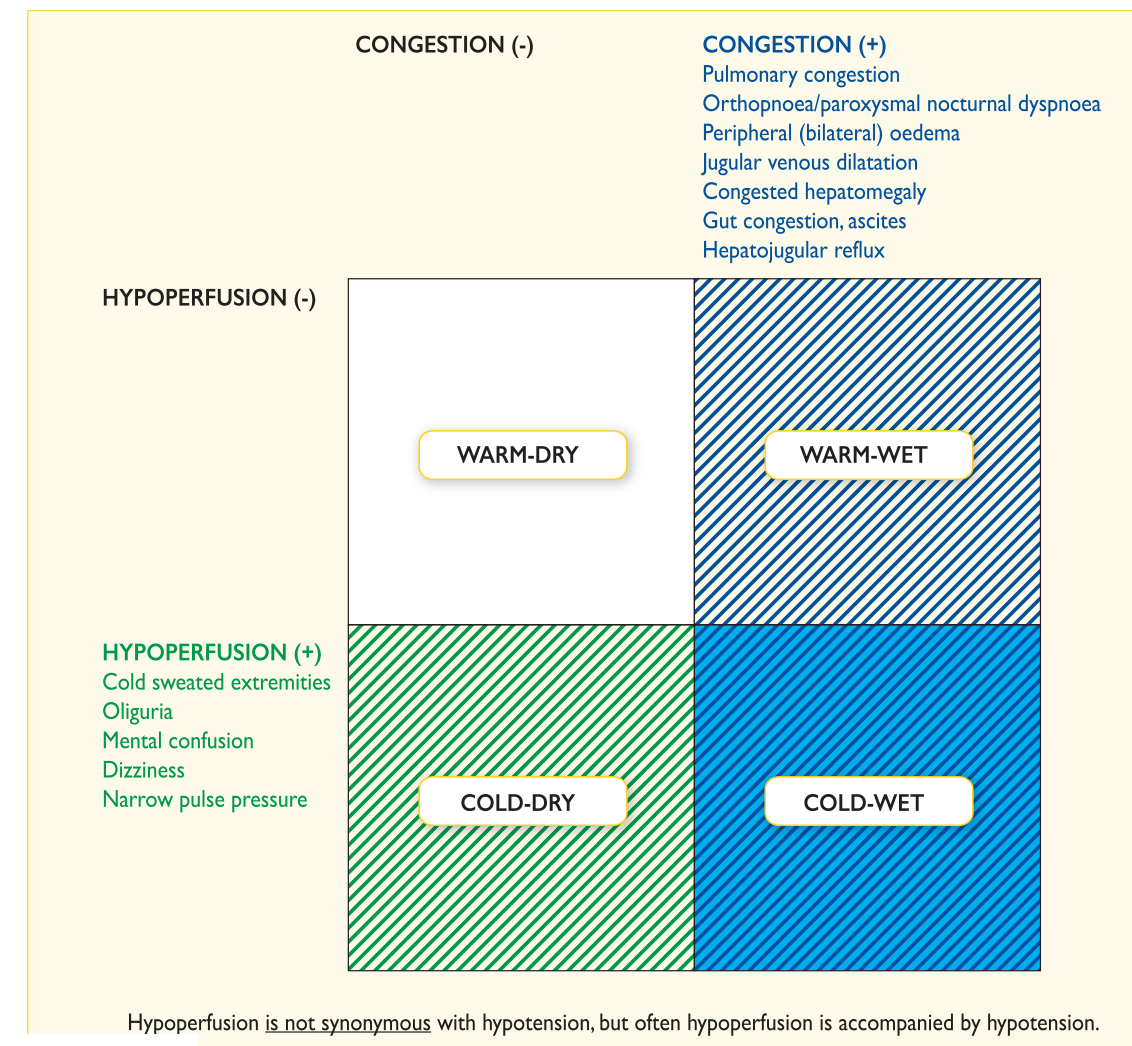
2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure

The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC)

12. Acute heart failure

12.1 Definition and classification

AHF refers to rapid onset or worsening of symptoms and/or signs of HF. It is a life-threatening medical condition requiring urgent evaluation and treatment, typically leading to urgent hospital admission.



12.3.4 Management of patients with cardiogenic shock

Cardiogenic shock is defined as hypotension (SBP < 90 mmHg) despite adequate filling status with signs of hypoperfusion (Table 12.2).

5-12% of pts admitted for ACS

Contemporary Management of Cardiogenic Shock

A Scientific Statement From the American Heart Association

Cardiogenic shock (CS) is a low-cardiac-output state resulting in life-threatening end-organ hypoperfusion and hypoxia.^{1,2} Acute myocardial infarction (MI) with left ventricular (LV) dysfunction remains the most frequent cause of CS.^{1,3} Advances in reperfusion therapy have been associated with improvements in survival, but significant regional disparities in evidence-based care have been reported, and in-hospital mortality remains high (27%–51%).^{1,4–9} Management

Table 1. Pragmatic and Clinical Trial Definitions of CS

Clinical Definition	SHOCK Trial ^{9*}	IABP-SHOCK II ^{1†}	ESC HF Guidelines ¹⁵
Cardiac disorder that results in both clinical and biochemical evidence of tissue hypoperfusion	Clinical criteria: SBP <90 mm Hg for ≥30 min OR Support to maintain SBP ≥90 mm Hg AND End-organ hypoperfusion (urine output <30 mL/h or cool extremities) Hemodynamic criteria: CI of ≤2.2 L·min ⁻¹ ·m ⁻² AND PCWP ≥15 mm Hg	Clinical criteria: SBP <90 mm Hg for ≥30 min OR Catecholamines to maintain SBP >90 mm Hg AND Clinical pulmonary congestion AND Impaired end-organ perfusion (altered mental status, cold/clammy skin and extremities, urine output <30 mL/h, or lactate >2.0 mmol/L)	SBP <90 mm Hg with adequate volume and clinical or laboratory signs of hypoperfusion Clinical hypoperfusion: Cold extremities, oliguria, mental confusion, dizziness, narrow pulse pressure Laboratory hypoperfusion: Metabolic acidosis, elevated serum lactate, elevated serum creatinine

Management of cardiogenic shock

Holger Thiele^{1*}, E. Magnus Ohman², Steffen Desch¹, Ingo Eitel¹, and Suzanne de Waha¹

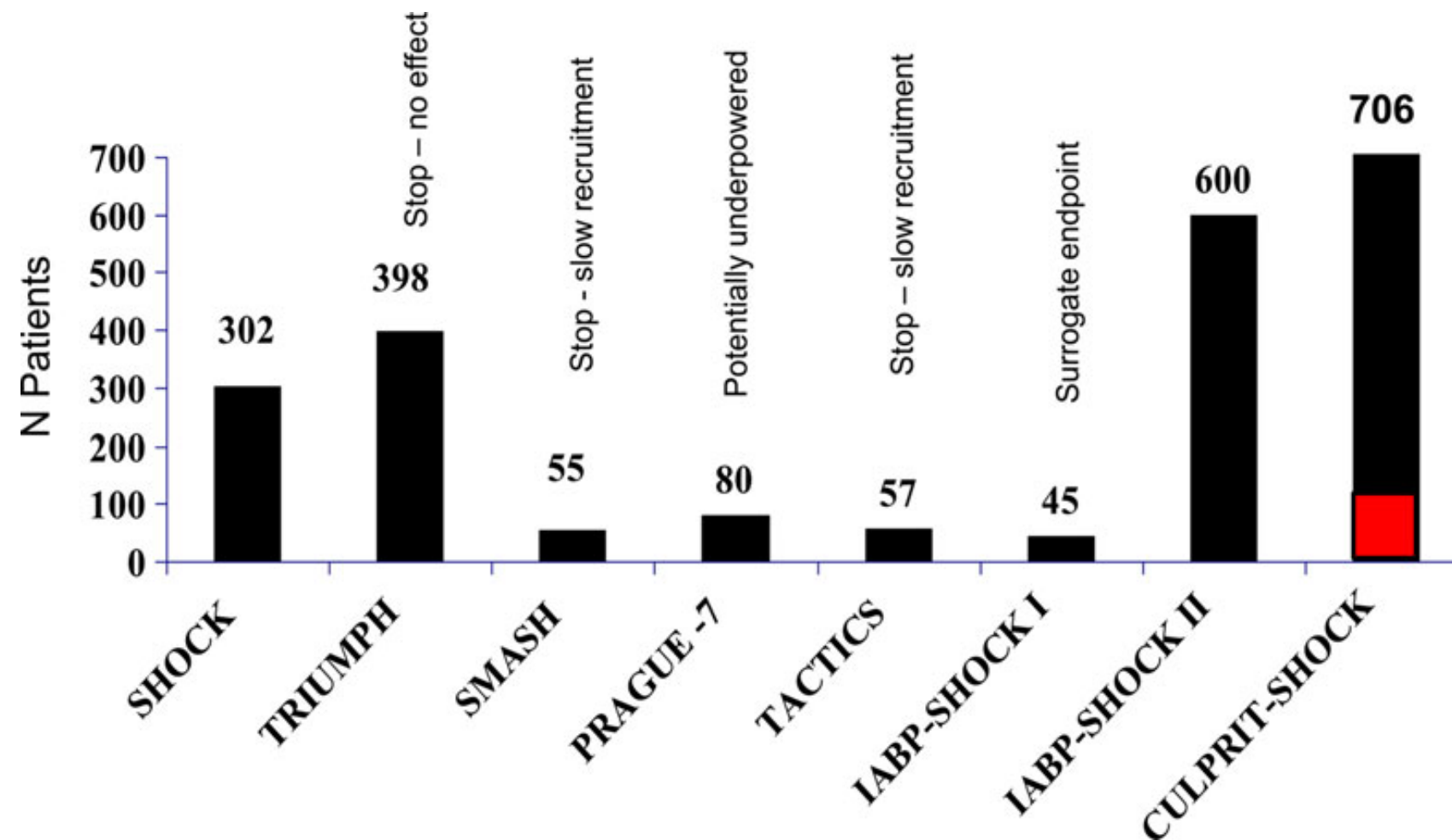


Figure 5 Number of patients included in major randomized cardiogenic shock trials.

Clinical picture and risk prediction of short-term mortality in cardiogenic shock

CARDSHOCK: multicentre, prospective, observational study (2010-2012); enrolment in emergency departments, cardiac and intensive care units within 6 h from admission

Table 1 Baseline characteristics of the study population

Characteristic	All (n = 219)	ACS (n = 177)	Non-ACS (n = 42)	P-value
Age, years	67 (12)	68 (11)	62 (15)	0.03
Age >75 years, n (%)	54 (25)	45 (25)	9 (21)	0.6
Women, n (%)	57 (26)	39 (22)	18 (43)	0.006
BMI, median (IQR)	26.5 (24.2–29.0)	26.6 (24.2–29.0)	25.8 (23.0–29.4)	0.3
Medical history, n (%)				
Coronary artery disease	76 (35)	59 (33)	17 (40)	0.4
Previous myocardial infarction	54 (25)	42 (24)	12 (29)	0.5
Prior revascularization				
PCI	32 (15)	28 (16)	4 (10)	0.3
CABG	16 (7)	10 (6)	6 (14)	0.05
Heart failure	36 (16)	16 (9)	20 (48)	<0.001
Hypertension	132 (60)	111 (63)	21 (50)	0.13
Diabetes	62 (28)	56 (32)	6 (14)	0.03
Asthma/COPD	25 (11)	18 (10)	7 (17)	0.2
Renal insufficiency	25 (11)	14 (8)	11 (26)	0.001
Atrial fibrillation	32 (15)	17 (10)	15 (36)	<0.001
Stroke/TIA	20 (9)	14 (8)	6 (14)	0.2
Smoker	87 (40)	78 (44)	9 (21)	0.01
In-hospital length of stay, days	12 (7–25)	11 (6–27)	16 (10–24)	0.11
In-hospital mortality, n (%)	80 (37)	70 (40)	10 (24)	0.06

Cardiogenic shock in intensive care units: evolution of prevalence, patient profile, management and outcomes, 1997–2012

Greater Paris area ICUs CUB-REACollège des Utilisateurs de Bases de données en Réanimation (Intensive Care Database User Group)

Definitions

Cardiogenic shock was defined as systolic blood pressure ≤ 90 mmHg in the absence of hypervolaemia and associated with cyanosis, cold extremities, changes in mental status, persistent oliguria, or congestive heart failure.^{10,16} The definition of CS remained unchanged throughout the periods studied.

Of 316 905 hospital admissions between 1997 and 2012, 19 416 (6.1%) were for CS (Figure 1); over the 15-year study period, the prevalence of CS increased from 4.1% to 7.7%.

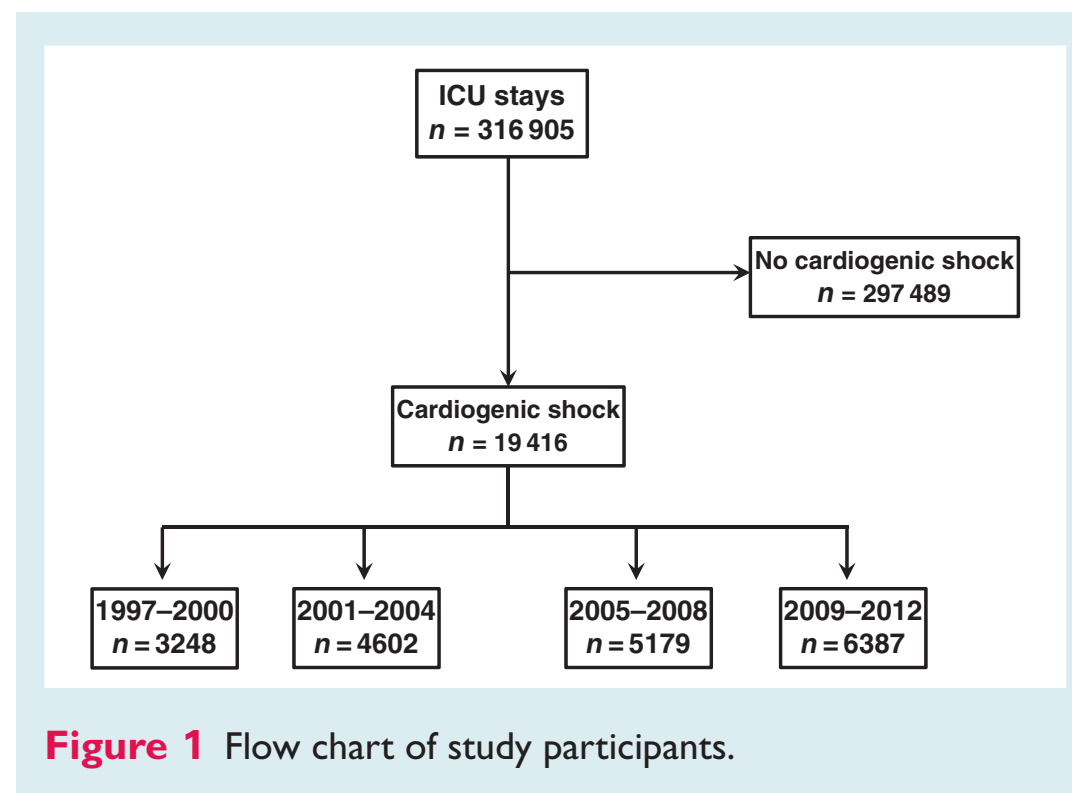


Figure 1 Flow chart of study participants.

Cardiogenic shock in intensive care units: evolution of prevalence, patient profile, management and outcomes, 1997–2012

Table 1 Characteristics and outcomes in cardiogenic shock patients from 1997 to 2012

	1997–2000 (n = 3248)	2001–2004 (n = 4602)	2005–2008 (n = 5179)	2009–2012 (n = 6387)	P-value for trends	Change from 1997 to 2012 (95% CI)
Age, years	66.4 ± 16.1	65.1 ± 16.5	63.6 ± 16.9	63.7 ± 16.6	<0.001	–2.7 (–2.0 to –3.4)
<60	941 (29)	1559 (34)	2030 (39)	2419 (38)	<0.001	8.9 (6.9 to 10.9)
60–74	1189 (37)	1548 (34)	1629 (31.5)	2062 (32)		–4.3 (–6.3 to –2.3)
≥75	1116 (34)	1495 (32.5)	1519 (29)	1899 (30)		–2.0 (–6.6 to –2.7)
Men	1977 (61)	2877 (62.5)	3315 (64)	4152 (65)	<0.001	4.0 (1.9–6.0)
Clinical presentation						
SAPS-II	58.7 ± 25.3	59.3 ± 24.7	63.8 ± 23.7	64.5 ± 23.3	<0.001	5.8 (4.8–6.8)
Acute respiratory failure	1149 (35)	2175 (53)	2984 (58)	3410 (53)	<0.001	18.0 (16.0–20.1)
ARDS	230 (7)	447 (10)	644 (12)	685 (11)	<0.001	3.6 (2.5–4.8)
Coma	506 (16)	1181 (26)	1631 (31.5)	1673 (26)	<0.001	10.6 (8.9–12.2)
Acute renal failure	1039 (32)	1936 (42)	2807 (54)	3468 (54)	<0.001	22.3 (20.3–24.3)
Acidosis	258 (8)	650 (14)	1166 (22)	1511 (24)	<0.001	15.7 (14.3–17.1)
DIC	78 (2)	175 (4)	257 (5)	283 (4)	<0.001	2.0 (1.3–2.7)
Sepsis	649 (20)	1135 (25)	1552 (30)	1815 (28)	<0.001	8.4 (6.7–10.2)
Arrhythmia	466 (14)	672 (15)	854 (16.5)	926 (14.5)	0.008	0.2 (–1.4–1.6)
Conduction disorder	172 (5)	245 (5)	259 (5)	282 (4)	0.106	–0.9 (–1.8–0.01)
Leading causes of cardiogenic shock						
Decompensated heart failure	964 (30)	1105 (24)	1327 (26)	1705 (27)	0.17	–3 (–5.1 to –0.9)
Cardiac arrest	586 (18)	989 (21.5)	1225 (24)	1397 (22)	<0.001	3.6 (1.8–6.0)
Acute myocardial infarction	461 (14)	534 (12)	535 (10)	763 (12)	0.005	–2.2 (–4.3 to –0.1)
Pulmonary embolism	148 (5)	120 (3)	131 (2.5)	186 (3)	0.001	–1.7 (–3.8–0.4)
Drug intoxication	160 (5)	230 (5)	265 (5)	269 (4)	0.077	–0.7 (–2.8–1.4)
Endocarditis	49 (1.5)	66 (1)	126 (2)	153 (2)	<0.001	0.9 (–1.2–3.0)
Myocarditis	28 (0.9)	51 (1)	83 (2)	76 (1)	0.108	0.3 (–1.8–2.4)
Length of stay in ICU, median [IQR]	10 [3–23]	10 [3–24]	11 [3–26]	12 [4–25]	<0.001	–
In-ICU death	1635 (50)	2294 (50)	2416 (46.5)	2860 (45)	<0.001	–5.6 (–7.7 to –3.5)
Outcomes in ICU survivor patients	n = 1613	n = 2308	n = 2763	n = 3527		
Discharge to home	63 (4)	107 (5)	103 (4)	78 (2)	<0.001	–0.7 (–1.3 to –0.2)
Discharge to another hospital	431 (27)	567 (24)	628 (23)	733 (21)		–1.8 (–3.2 to –0.4)
Intrahospital transfer	1114 (69)	1633 (71)	2009 (73)	2716 (77)		8.3 (6.2–10.3)

Cardiogenic shock in intensive care: evolution of prevalence, patient management and outcomes, 1997-2012

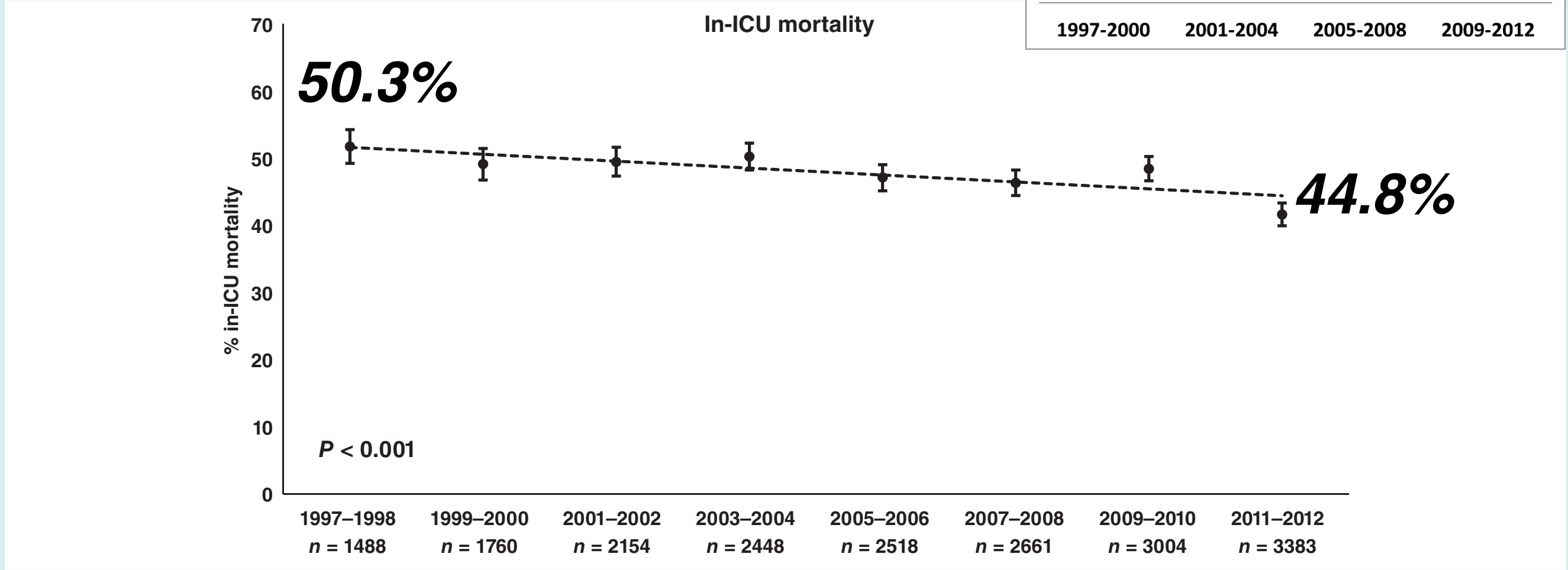
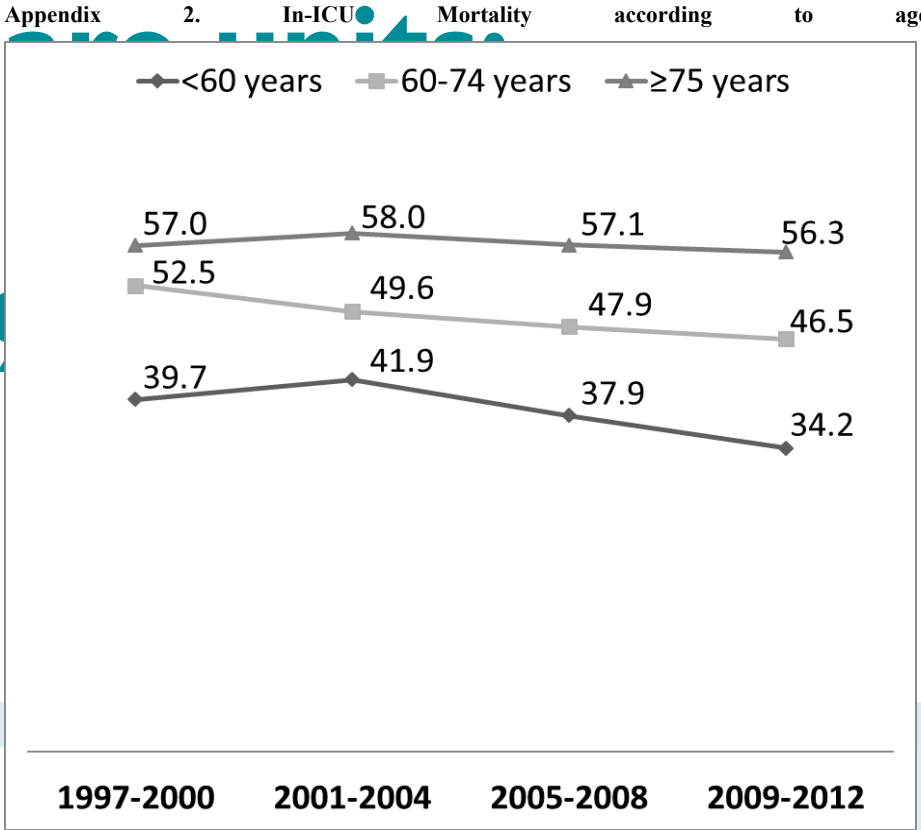


Figure 2 In-intensive care unit (ICU) mortality ($P < 0.001$).

1.**Selezione pazienti:** Pazienti adulti con shock cardiogeno

Rapporto nazionale TI di altro tipo - Anni 2011, 2012, 2013, 2014, 2015, 2016, 2017

TI**Pazienti**

(N): 28631

2.**Selezione pazienti:** Pazienti adulti medici
con shock cardiogeno puro senza trauma**TI**

N=299

Pazienti

N=21291

3.**Selezione pazienti:** Pazienti adulti medici
con shock cardiogeno puro senza trauma**TI**

N=284

Pazienti

N=19250

Caratteristiche e comorbidità

Età, anni	%
<65	28.3
65-75	28.9
>75	42.8
Maschi %	61.9
Degenza media pre TI (days)	3.1 (±10.1)
Comorbidità %	92.3

Provenienza

	N	%
Reparto medico	5098	26.6
Reparto chirurgico	820	4.3
Pronto soccorso	9962	52.0
Altra TI	2007	10.5
Terapia subintensiva	1266	6.6

Comorbidità (top 10)

	N	%
Ipertensione	10745	55.8
Infarto miocardico	5289	27.5
Aritmia	5142	26.7
NYHA classe II-III	4818	25.0
BPCO moderata	3517	18.3
Diabete Tipo II senza terapia insulinica	3174	16.5
Insufficienza Renale moderata o grave	3098	16.1
Malattia vascolare periferica	2797	14.5
Vasculopatia cerebrale	2689	14.0
NYHA classe IV	2524	13.1
Sovrappeso	6480	33.9
Obeso	3703	19.4

Motivo del trasferimento da Altra TI (N=2007)

	N	%
Competenza specialistica	796	39.7
Approccio step-up	844	42.1

Condizioni all'Ammissione

Shock Cardiogeno “puro”19250

Supporto ventilatorio e cardiovascolare 92,6%

	GiViTi	CUB-REA (2009-2012)	CULPRIT-SHOCK
SAPS II	64.6 (\pm 21.9)	64.5 \pm 23.3	
Acute respiratory Failure %	92.5	53	81.3
Neurological %	36.2	26	67.6
Acute Renal failure %	64.7	54	26.5
Metabolic %	56.3	24	66.3
DIC %	2.3	4	

Acute respiratory Failure %	Ipossico	ipercapnico	misto	mantenimento viene aeree
	35.4	4.8	15.2	37.3

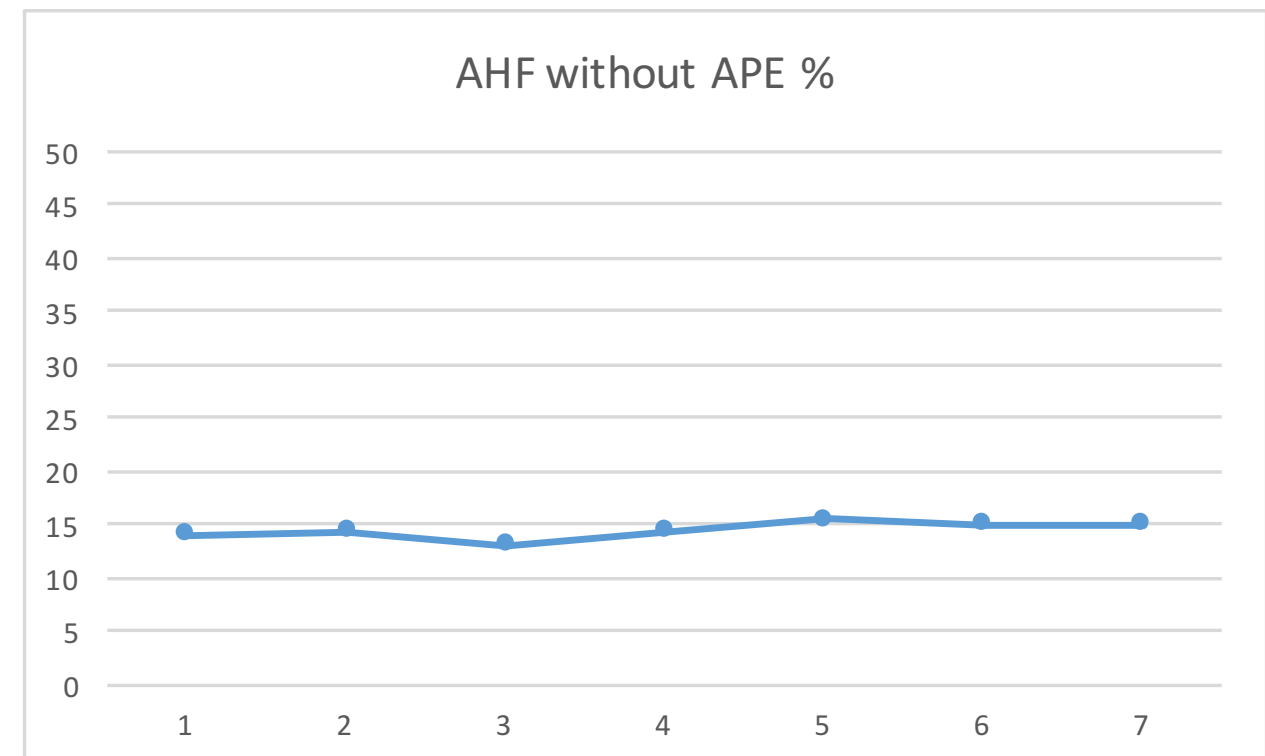
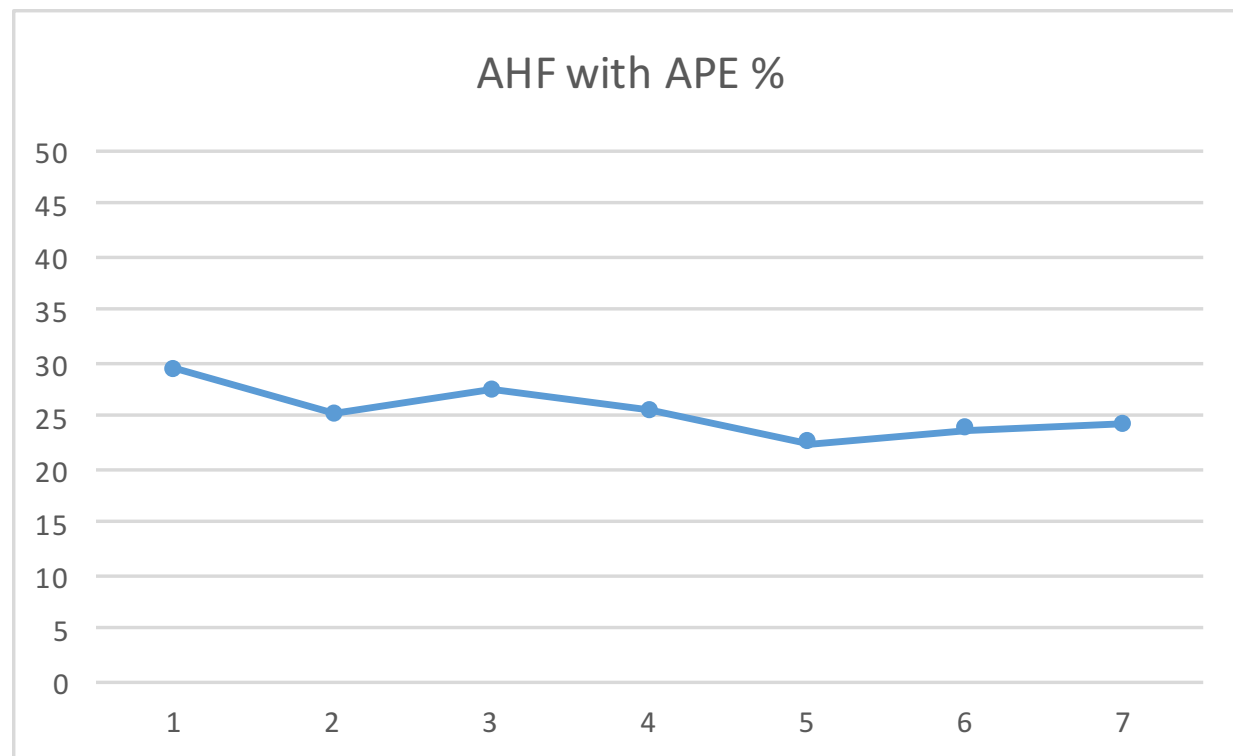
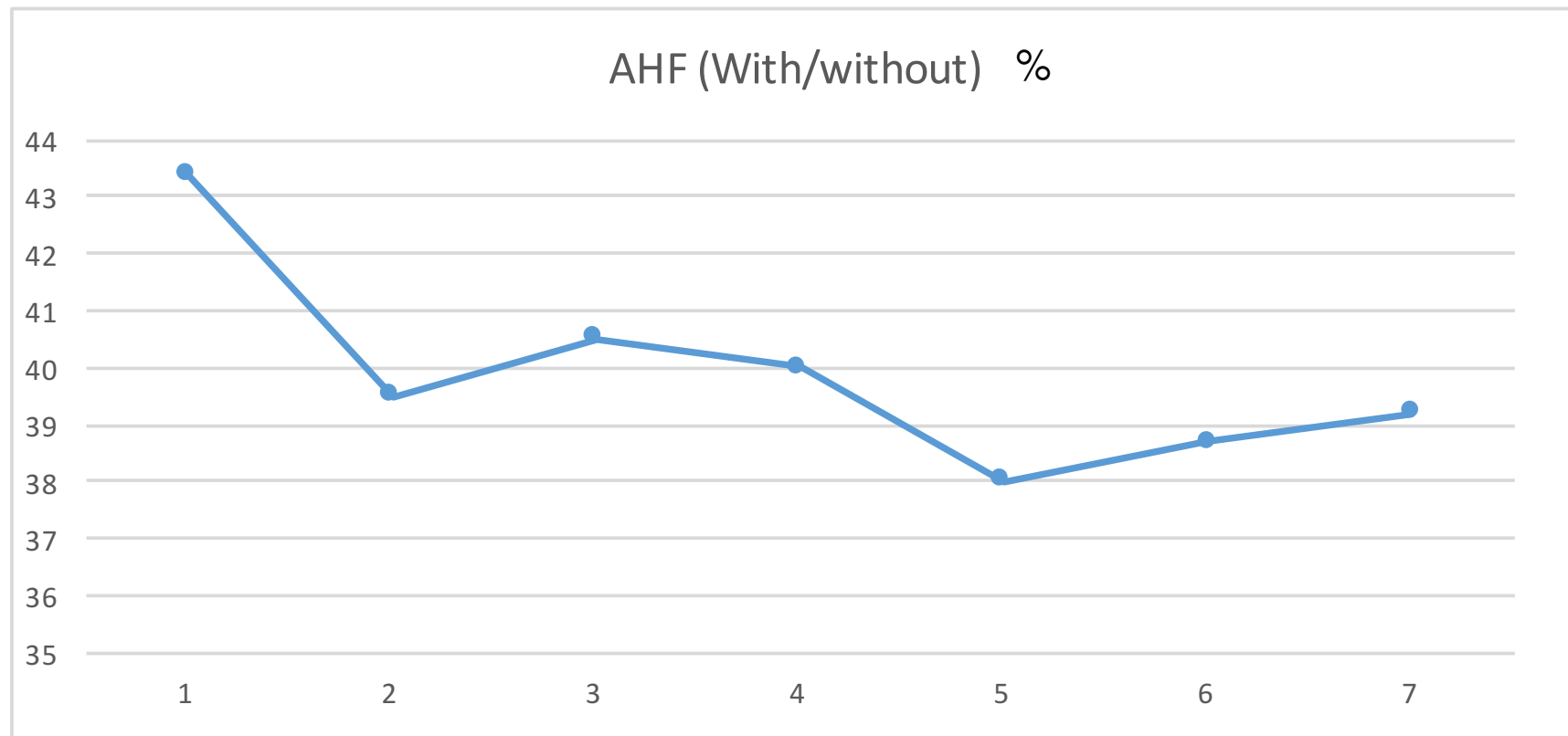
Trend insufficienze d'organo

	2011	2012	2013	2014	2015	2016	2017
Acute Respiratory Failure %	93	91.8	92.4	93.2	92	91.4	92.6
Neurological %	35.3	35.7	33	34.2	36.8	35.4	36.7
Acute Renal Failure %	62	64.2	64.2	65	65.1	66.7	65.4
Metabolic %	51.6	51.9	53.8	57.5	58	59.5	59
DIC %	3.1	2	2.5	2	2.2	2.4	1.6

Eziologia

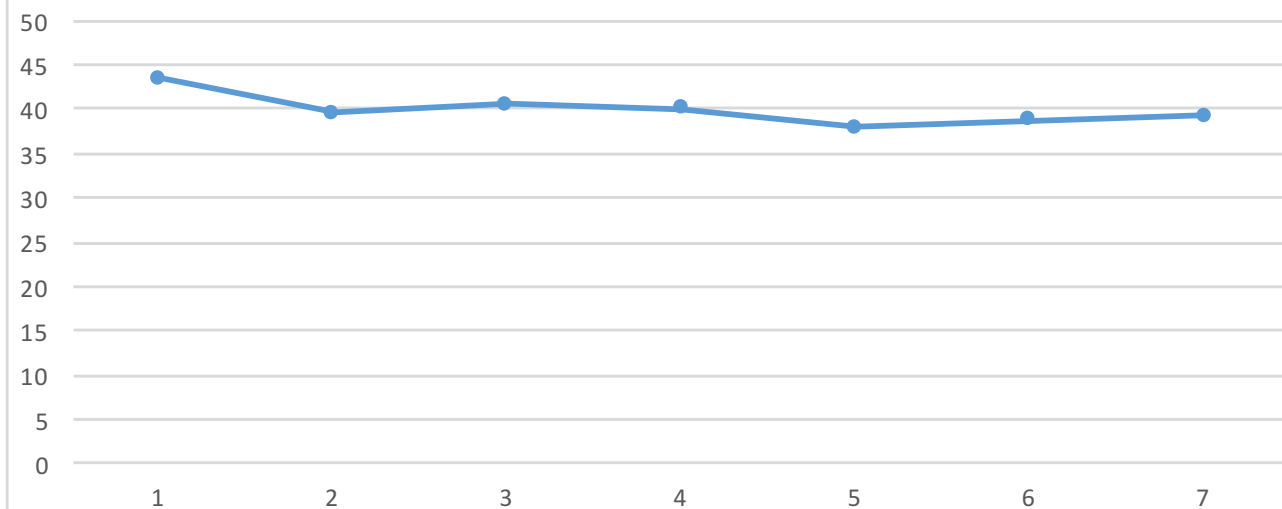
	GiViTi	CUB-REA (2009-2012)
Acute Heart Failure (With/without PE) %	40.1 (25.6/14.5)	27
Cardiac Arrest %	36.9	22
Myocardial Infarction %	17.9	12
Arrhythmias %	9.7	14.5
Pulmonary Embolism %	3.9	3
Endocarditis		2
Myocarditis		1
RV Failure	6.6	

AHF with and without

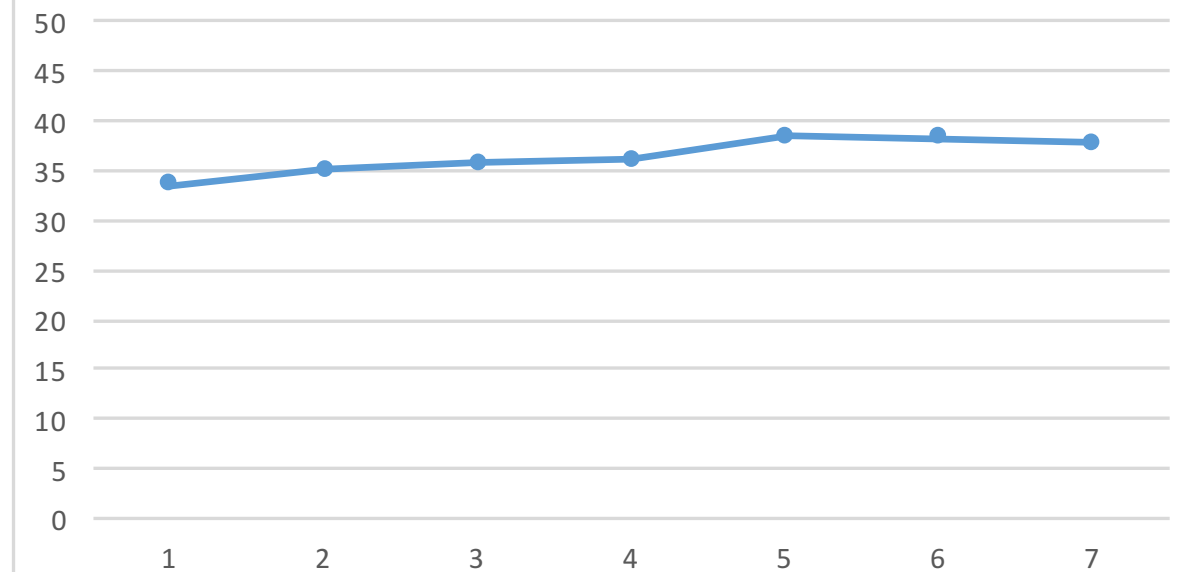


Trend: Eziologia

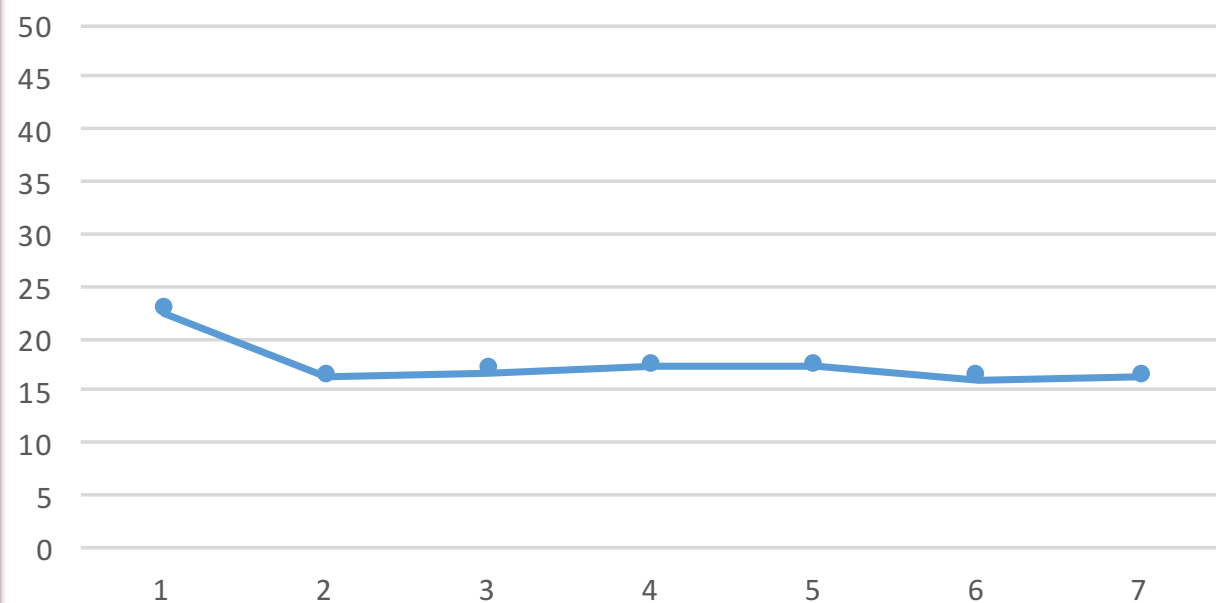
AHF (With/without) %



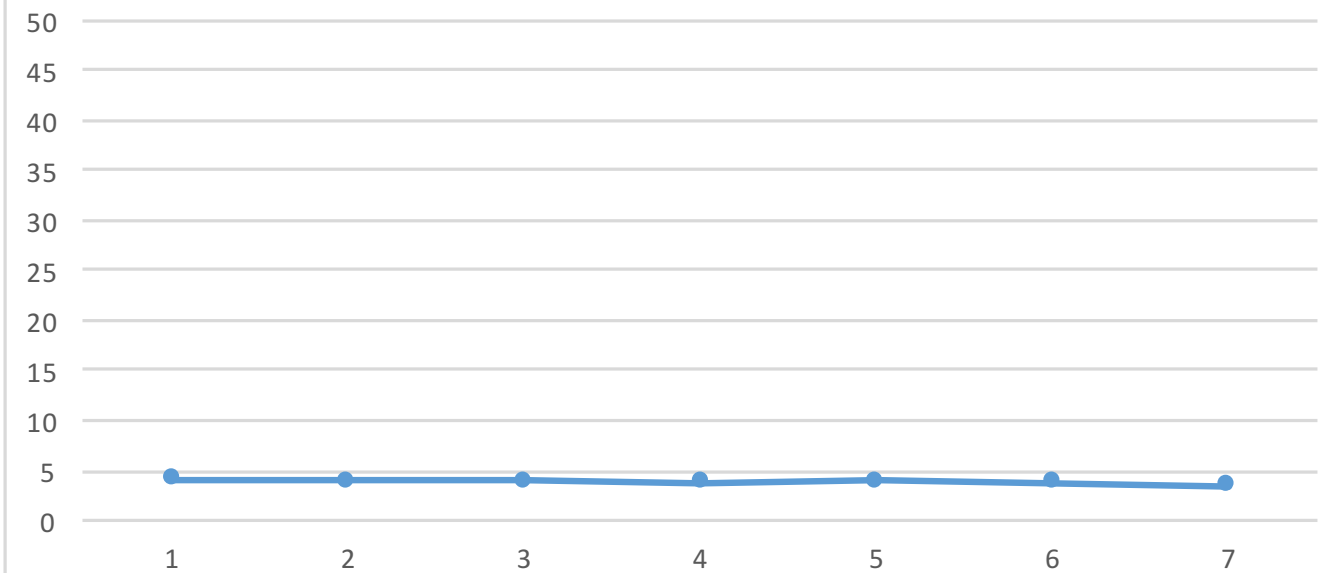
Cardiac Arrest %



MI %



Pulmonary Embolism %



Caratteristiche per patologia

	Scompenso sinistro	Arresto Cardiaco	Infarto Acuto	Embolia Polmonare
Età	72,4 (11,9)	69,1(13,4)	69,4 (11,9)	71(13,5)
Comorbidity				
Ipertensione %	58,8	55	58,7	52,9
Infarto %	32	26,5	35,8	9,8
BPCO %	22,4	14,8	13,1	14,4
IRA %	28,8	11,8	10	9
Diabete %	18,5	10,9	9,2	12
NYHA II-IV %	35 (NYHA IV 20,9)	20,4	15,6	12,6

Trattamenti per patologia

Trattamenti	Scompenso sinistro	Arresto Cardiaco	Infarto Acuto	Embolia Polmonare
PCI	17,9	34,5	67	8,6
Vasoattivi	97,5	95,1	95,6	96,8
CRRT	13,7	7,1	7,9	7,1
IABP	13,8	14,7	42	1,5
ECMO	1,6	3,3	3,4	1,6

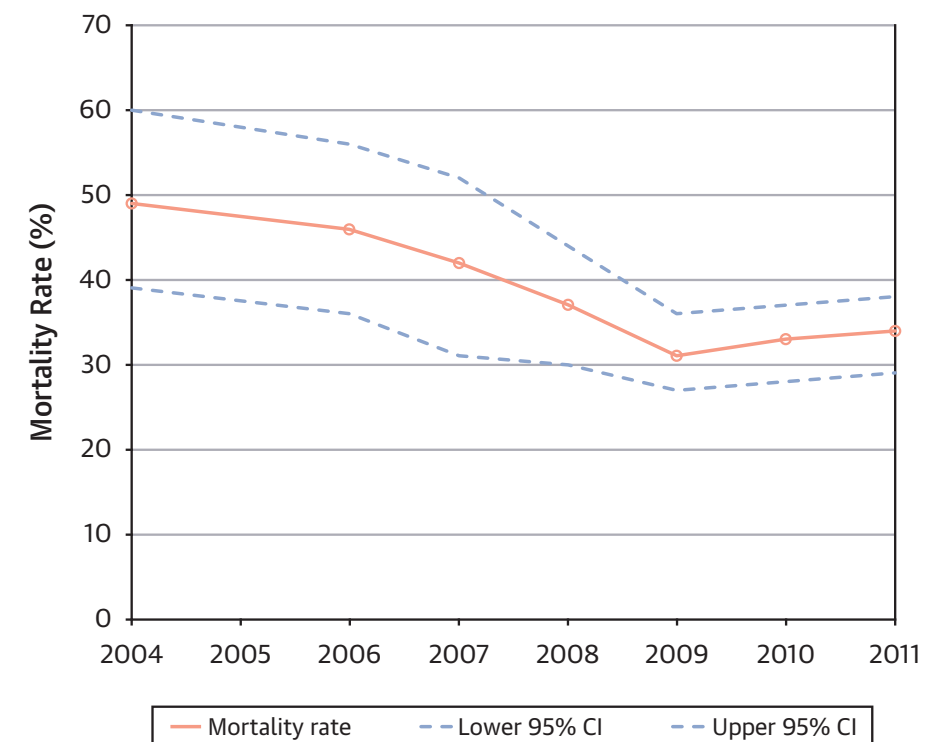
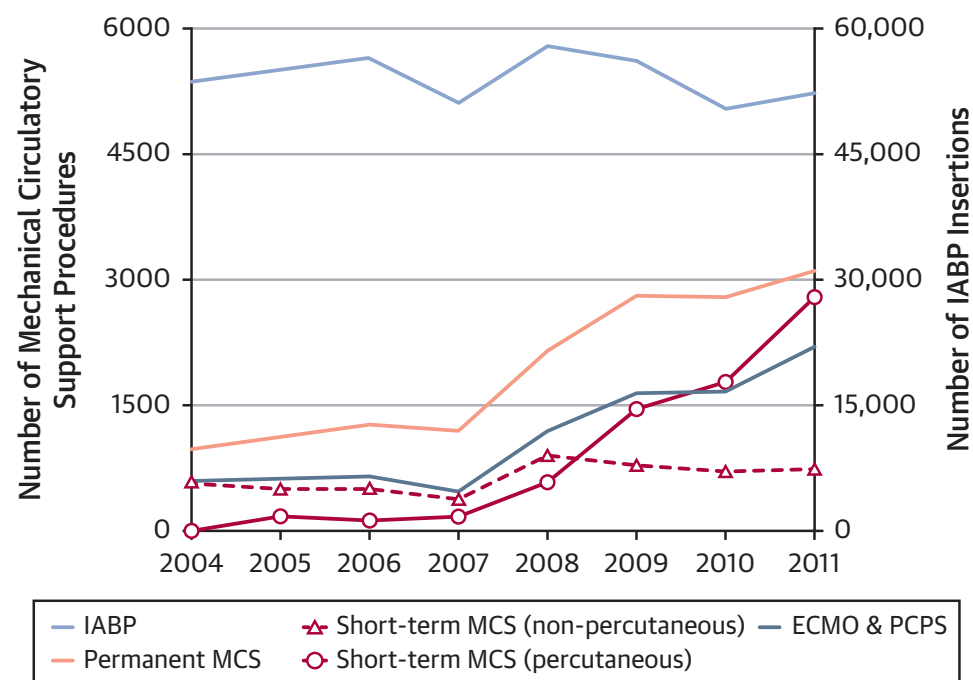
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National Trends in the Utilization of Short-Term Mechanical Circulatory Support



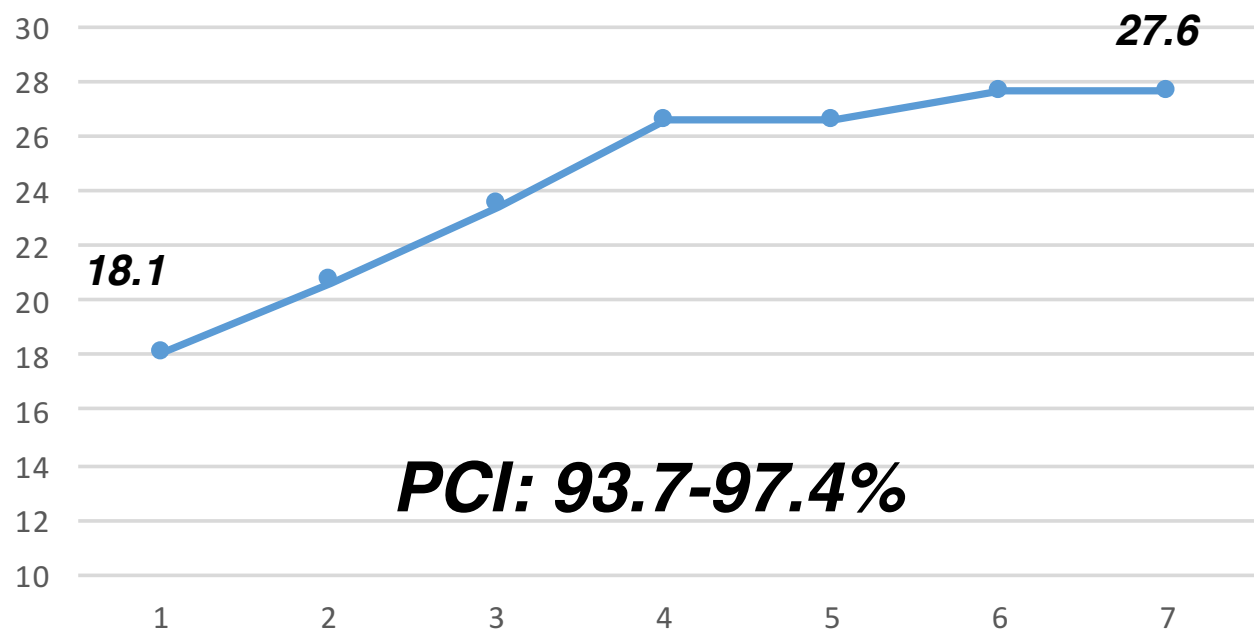
Incidence, Outcomes, and Cost Analysis

J Am Coll Cardiol 2014;64:1407-15

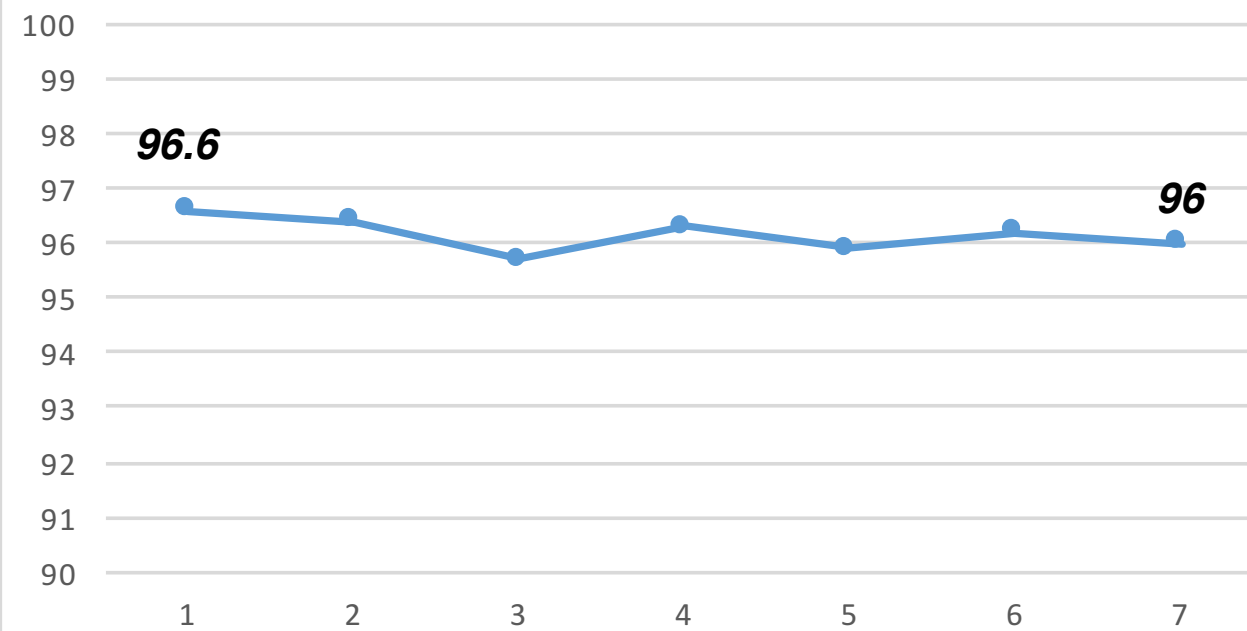


Trend: Trattamenti

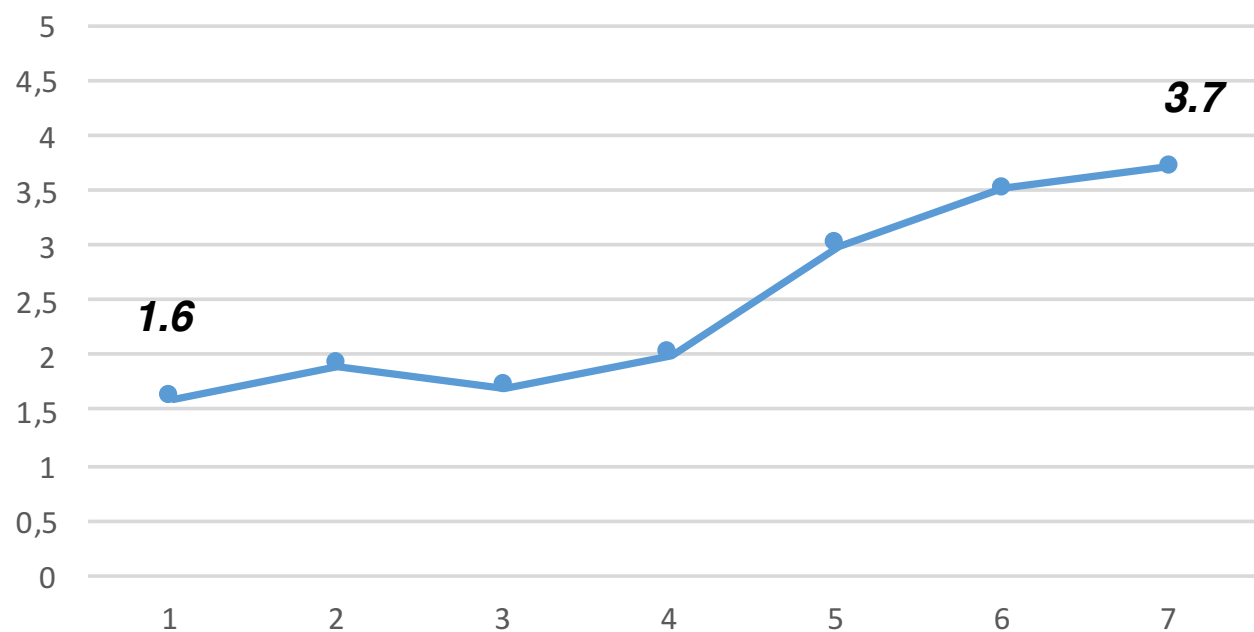
Intervention %



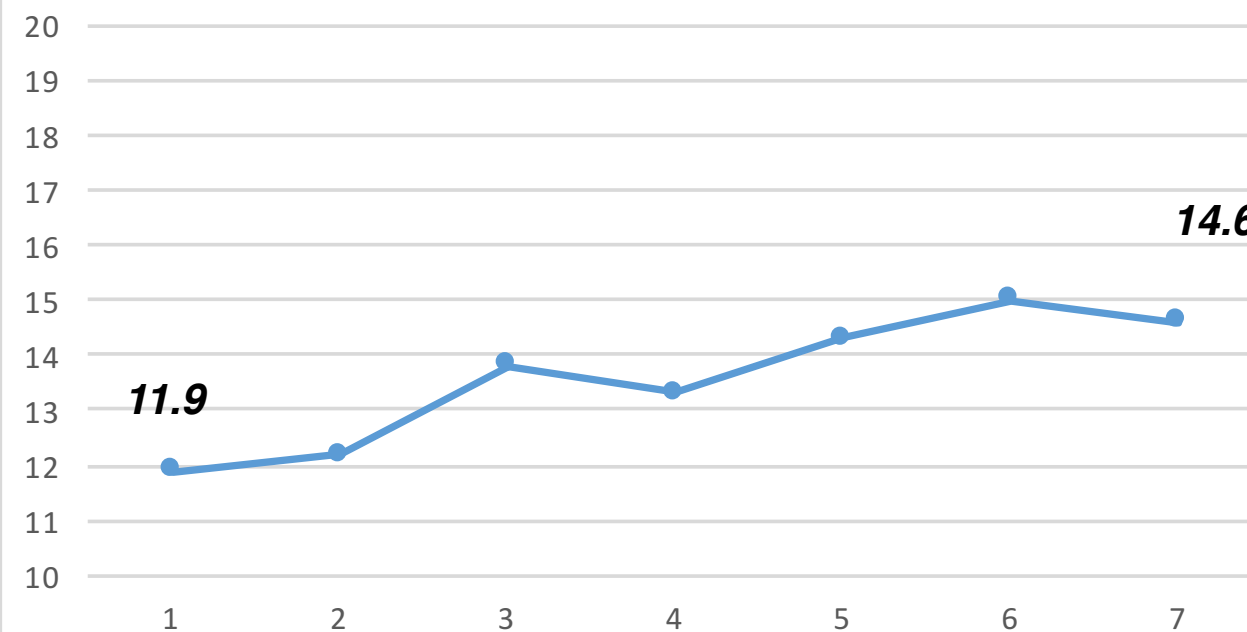
Vasopressori



MSE



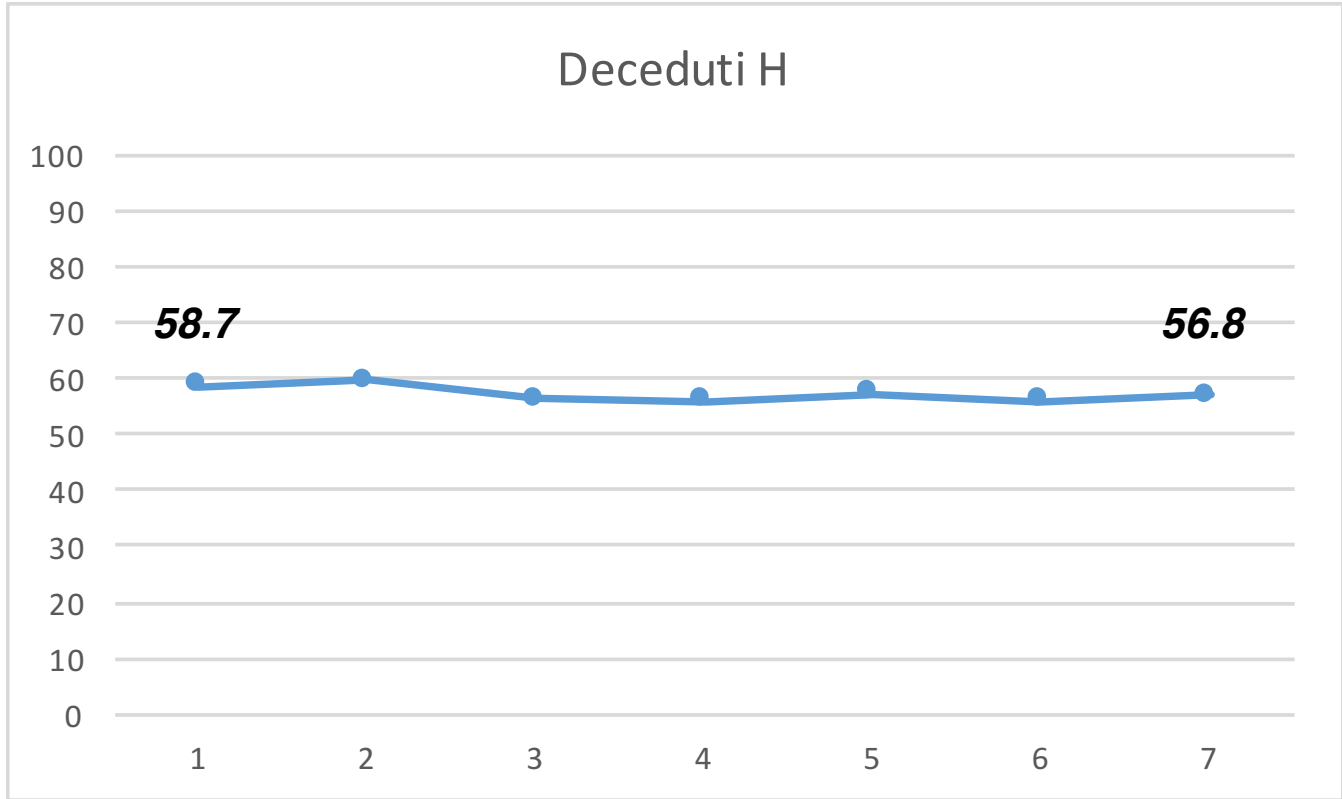
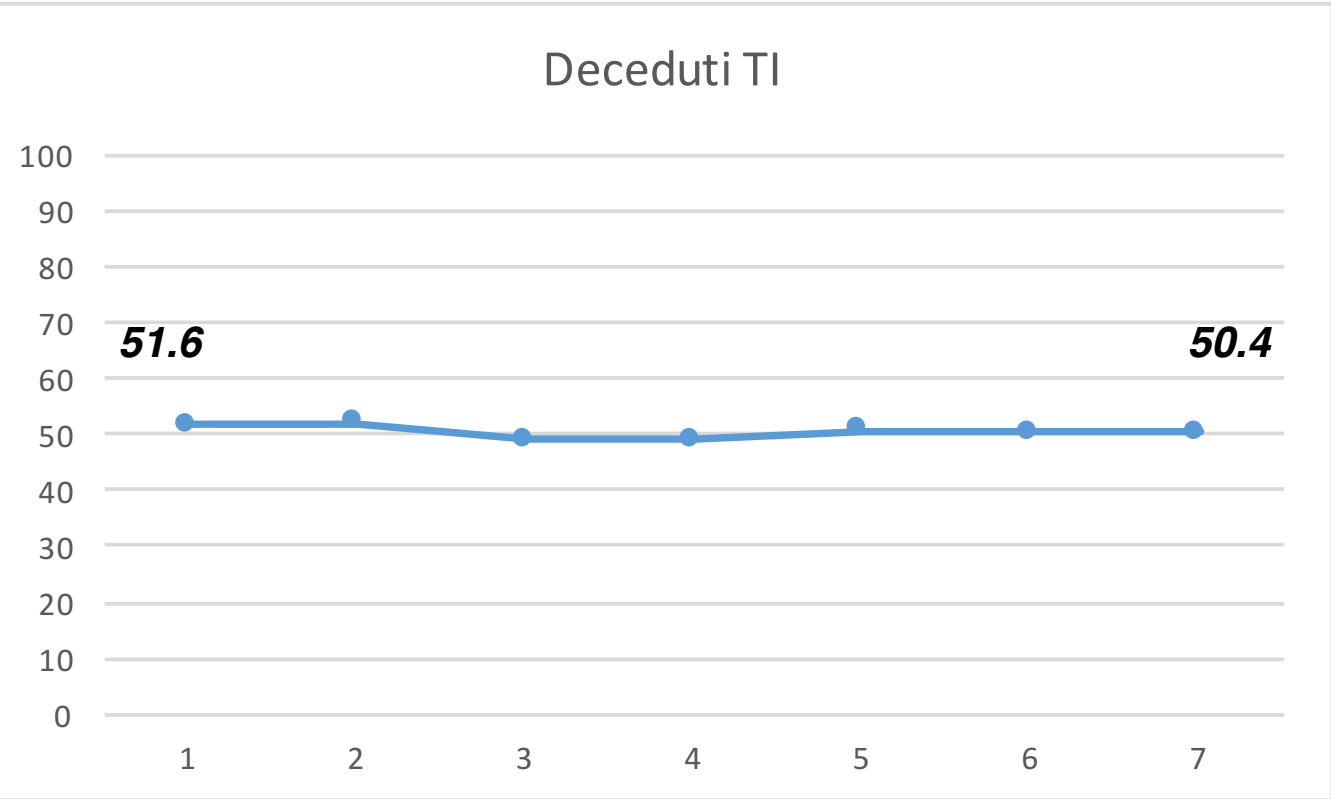
IABP



Mortalità

Mortalità TI Globale: 51.3%
5.6 (±)giorni

Mortalità H Globale: 58.7%
11 (±19.1) giorni



	Scompenso sinistro	Arresto Cardiaco	Infarto Acuto	Embolia Polmonare
Mortalità TI %	44,7	57,4	44,4	61
Mortalità H %	52,8	62,8	52,5	65,3

Clinical picture and risk prediction of short-term mortality in cardiogenic shock

CARDSHOCK: multicentre, prospective, observational study (2010-2012); enrolment in emergency departments, cardiac and intensive care units within 6 h from admission

Table 1 Baseline characteristics of the study population

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Asthma/COPD	25 (11)	18 (10)	7 (17)	0.2
Renal insufficiency	25 (11)	14 (8)	11 (26)	0.001
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Cardiogenic shock in intensive care units: evolution of prevalence, patient profile, management and outcomes, 1997–2012

Etienne Puymirat, Jean Yves Fagon, Philippe Aegerter, et al

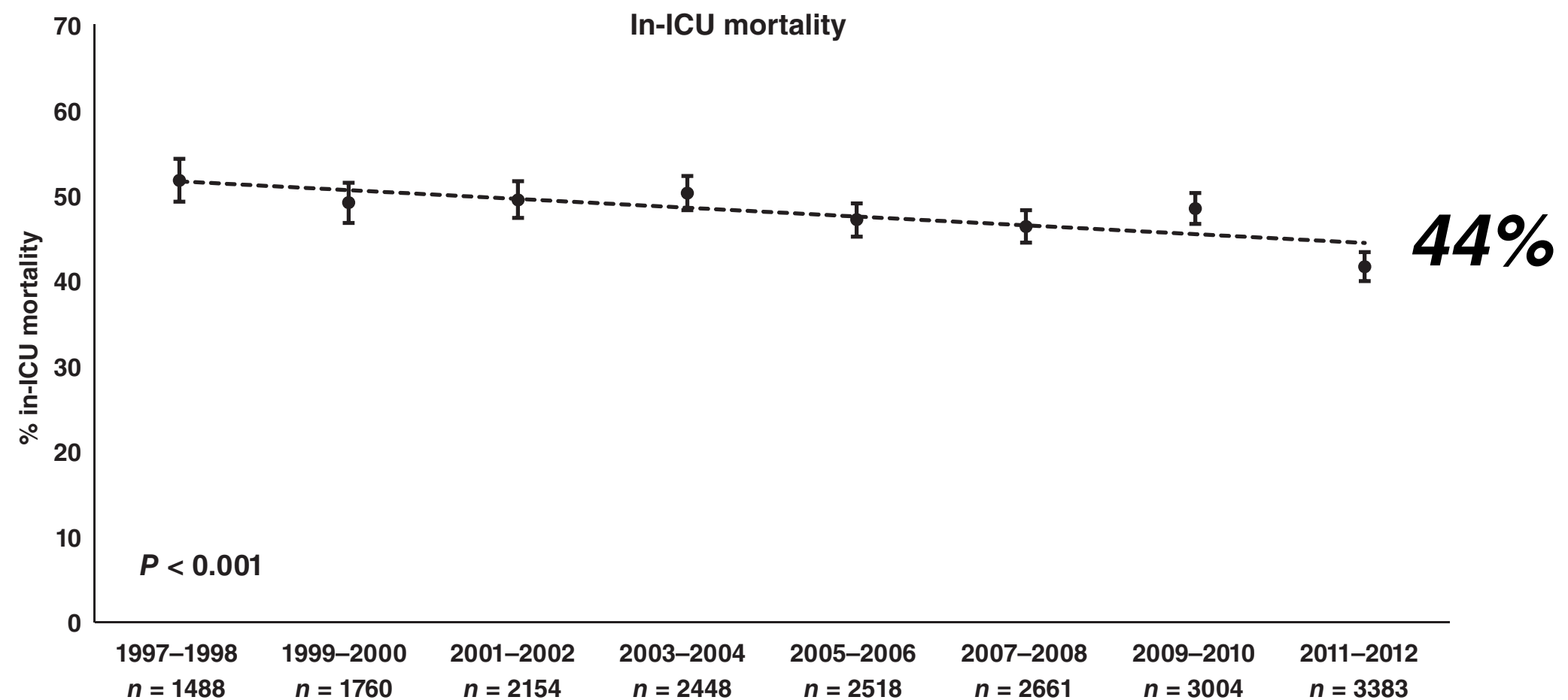


Figure 2 In-intensive care unit (ICU) mortality ($P < 0.001$).

	Scompenso sinistro	Arresto Cardiaco	Infarto Acuto	Embolia Polmonare
Mortalità TI %	44,7	57,4	44,4	61
Mortalità H %	52,8	62,8	52,5	65,3

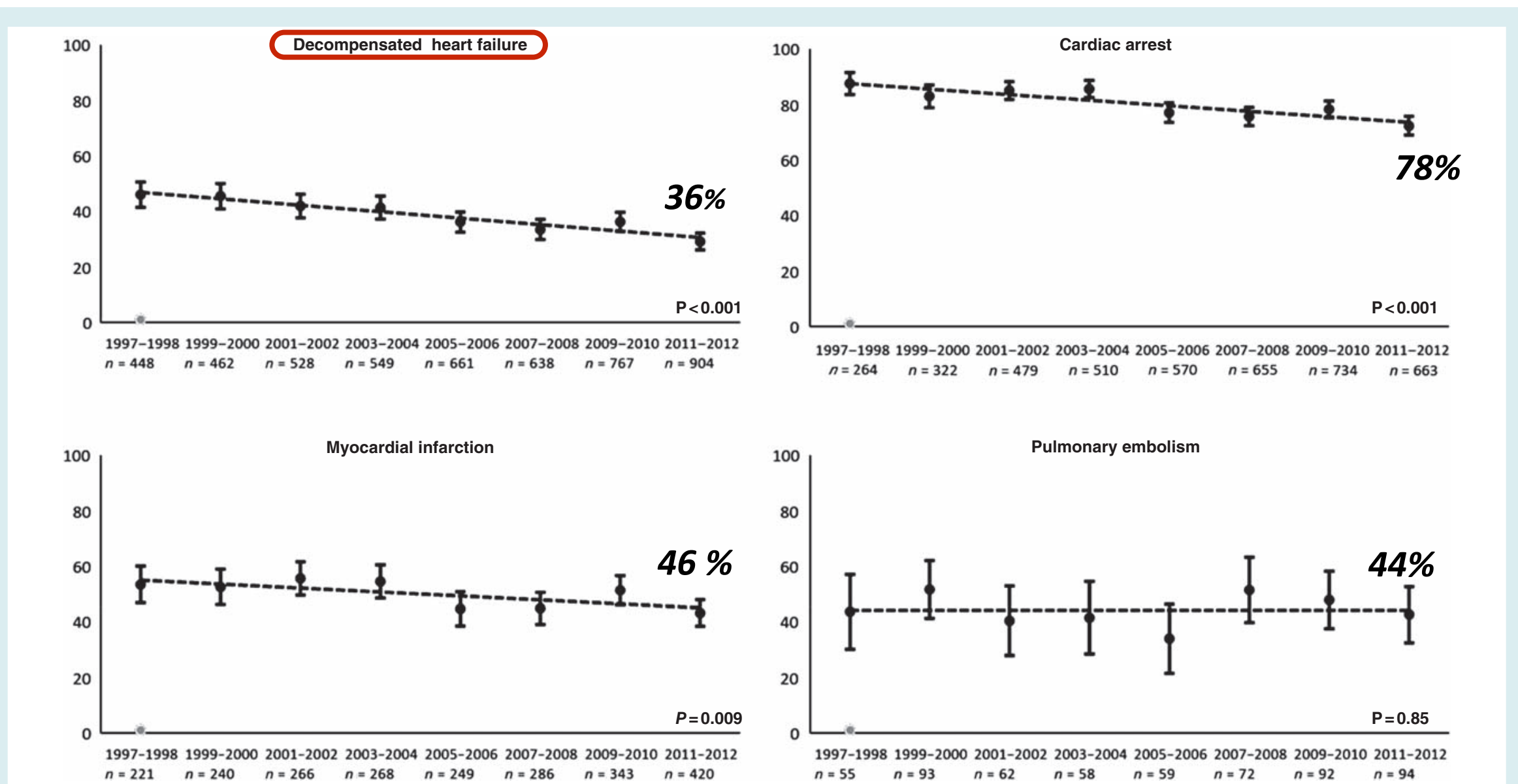
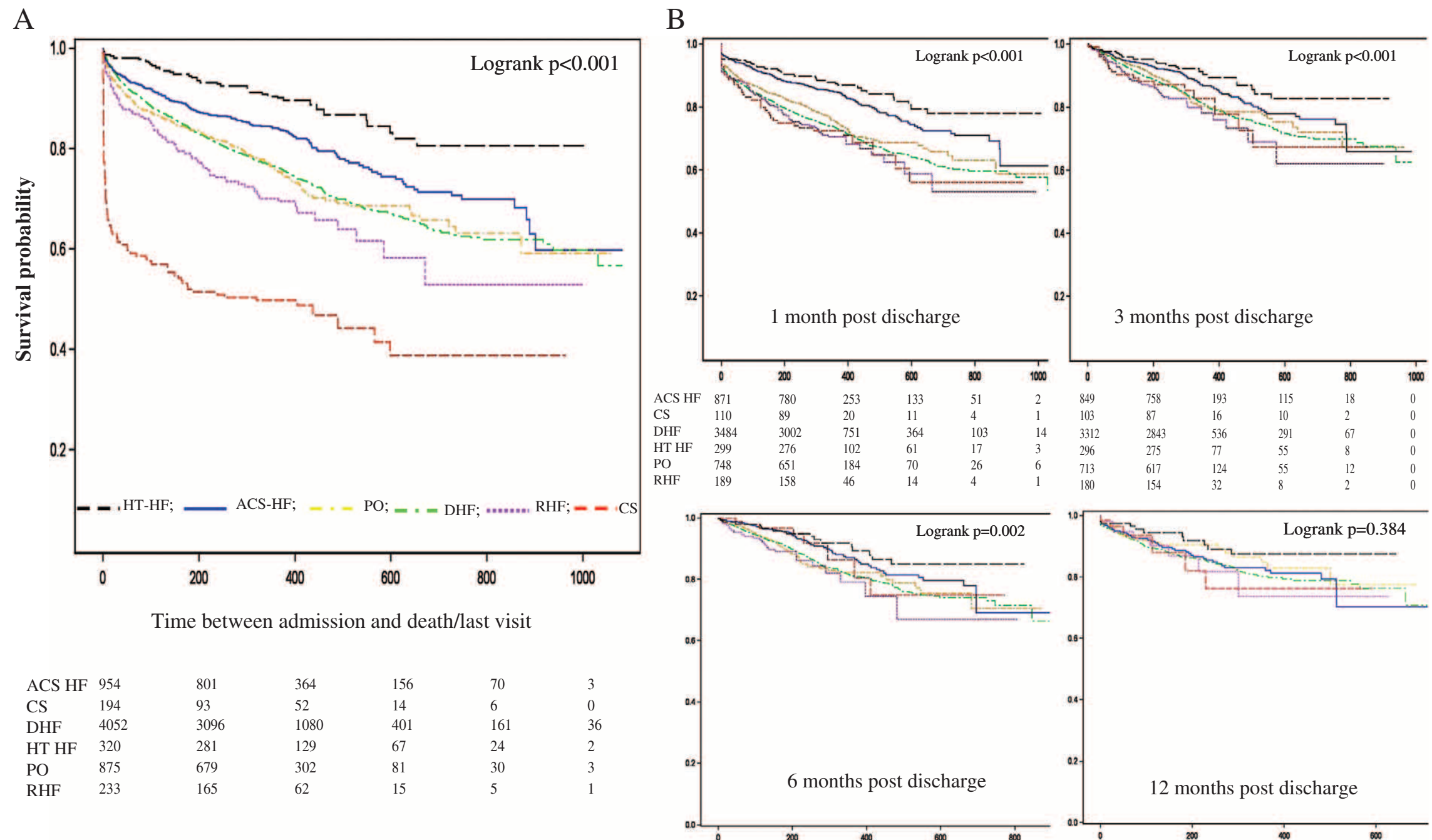


Figure 4 In-intensive care unit (ICU) mortality according to primary diagnosis.

Cosa viene dopo?...

Clinical phenotypes and outcome of patients hospitalized for acute heart failure: the ESC Heart Failure Long-Term Registry

Kaplan-Meier curves for all-cause death



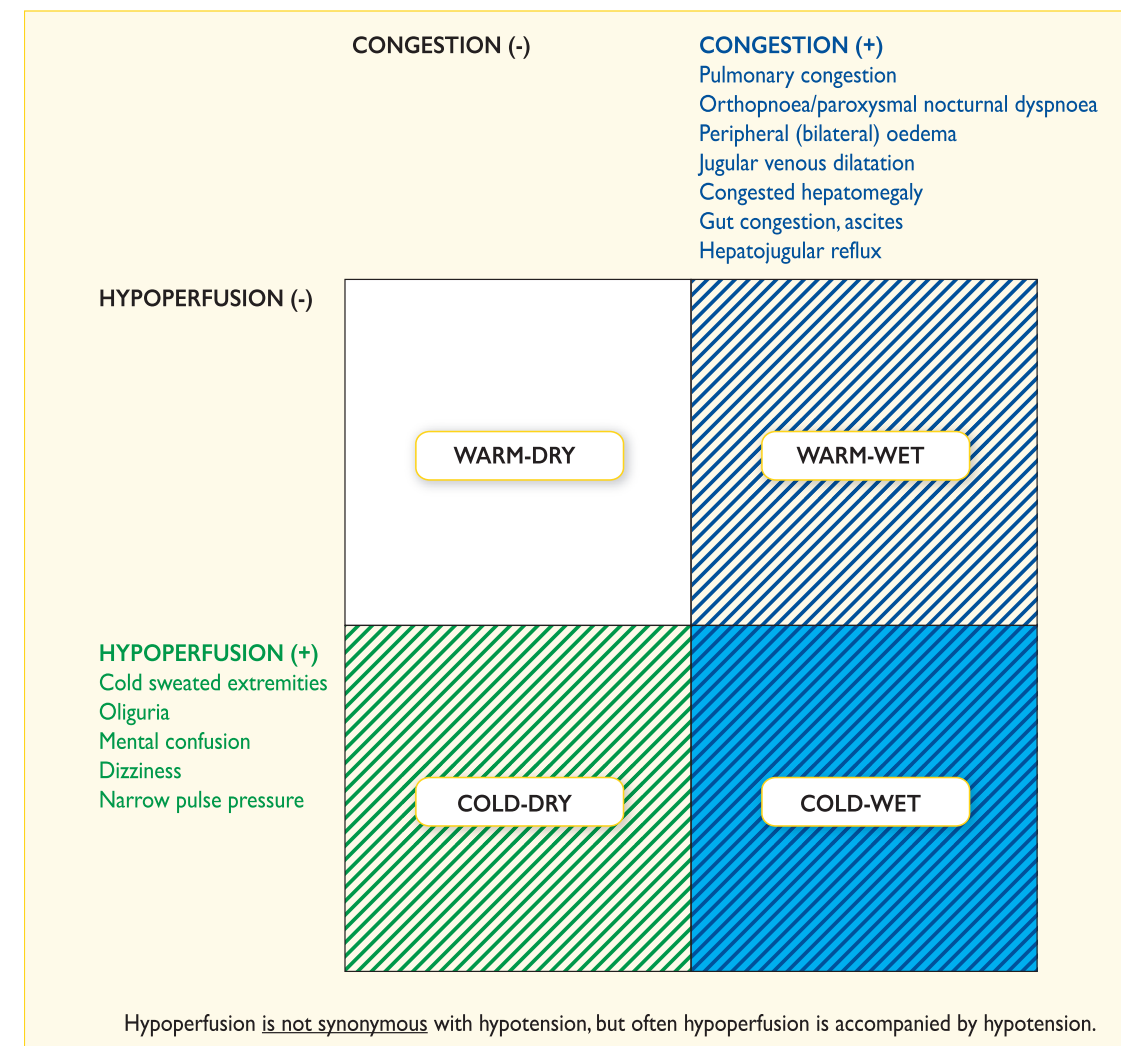
2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure

The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC)

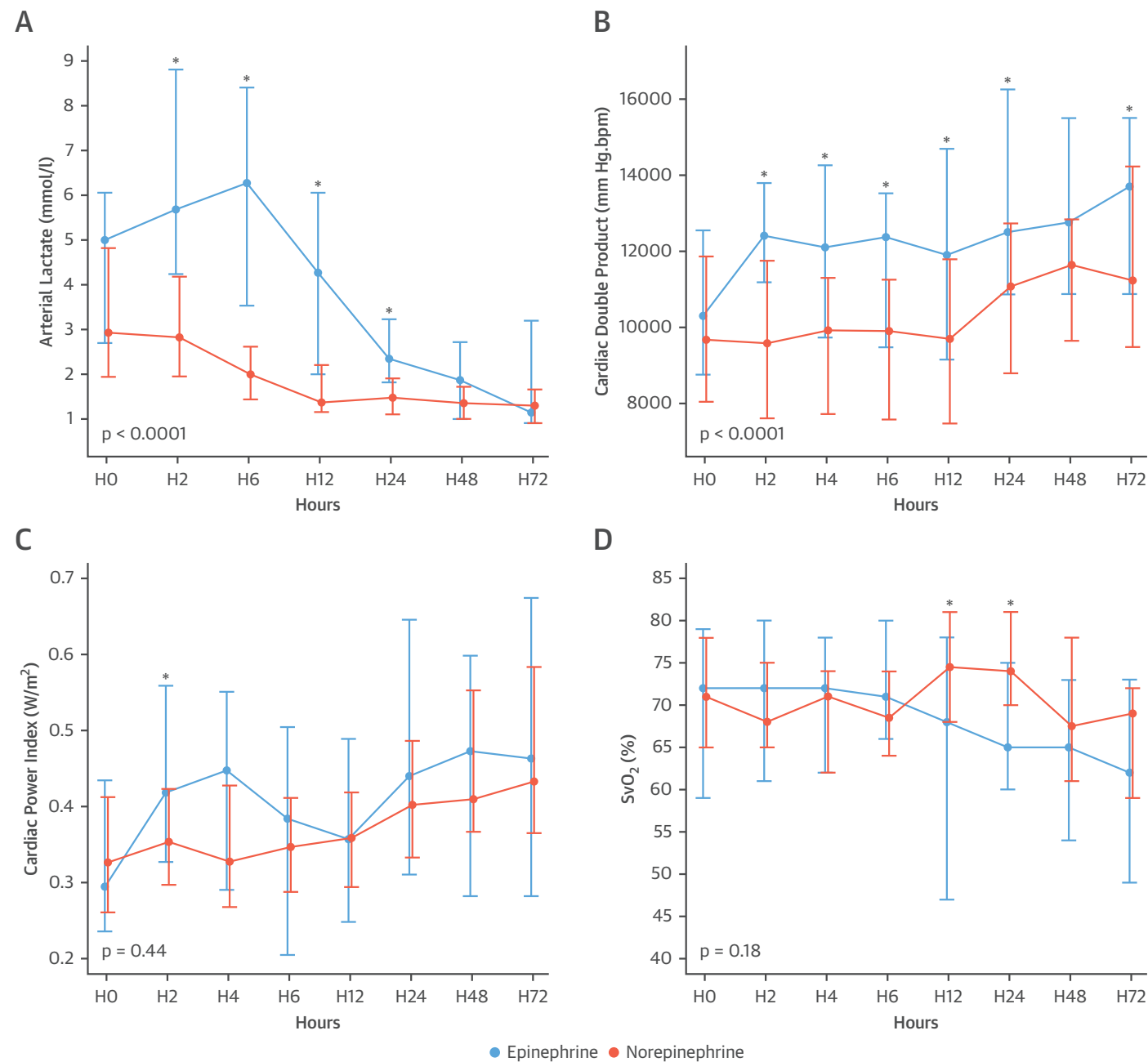
12. Acute heart failure

12.1 Definition and classification

AHF refers to rapid onset or worsening of symptoms and/or signs of HF. It is a life-threatening medical condition requiring urgent evaluation and treatment, typically leading to urgent hospital admission.



Epinephrine Versus Norepinephrine for Cardiogenic Shock After Acute Myocardial Infarction



Mean dosage 0.6 mcg/Kg/min!!!!!!

Extra corporeal membrane oxygenation in the therapy of cardiogenic shock (ECMO-CS): rationale and design of the multicenter randomized trial

Petr Ostadal¹, Richard Rokyta², Andreas Kruger¹, Dagmar Vondrakova¹, Marek Janotka¹, Ondrej Smíd³, Jana Smalcova³, Milan Hromadka², Ales Linhart³, and Jan Bělohávek^{3*}

Table 1 Inclusion criteria of the ECMO-CS trial.

Patients must fulfil criteria for rapidly deteriorating (A) or severe (B) cardiogenic shock:

A. Rapidly deteriorating cardiogenic shock is defined as a progressive hemodynamic instability necessitating repeated bolus administration of vasopressors to maintain mean arterial pressure > 50 mmHg + impaired left ventricle systolic function (left ventricle ejection fraction (LVEF) < 35% or LVEF 35-55% in case of severe mitral regurgitation or aortic stenosis)

B. Severe cardiogenic shock is defined by all following criteria:

1. Hemodynamic:

Cardiac Index (CI) < 2.2 L/min/m² + norepinephrine dose > 0.1 µg/kg/min + dobutamine dose > 5 µg/kg/min or Systolic blood pressure < 100 mmHg + norepinephrine dose > 0.2 µg/kg/min + dobutamin dose > 5 µg/kg/min + (LVEF < 35% or LVEF 35-55% + severe mitral regurgitation or aortic stenosis)

2. Metabolic:

Lactate – two consecutive values ≥ 3 mmol/L (with at least 30 min interval between samples), with non-decreasing trend on steady doses of inotropes and/or vasopressors or SvO₂ – two consecutive values < 50% (with at least 30 min interval between samples), with non-increasing trend on steady doses of inotropes and/or vasopressors

3. Hypovolemia must be excluded:

Central venous pressure > 7 mmHg or pulmonary capillary wedge pressure > 12 mmHg

Table 2 Exclusion criteria of the ECMO-CS trial.

- 1 Age < 18 years
2. Life expectancy lower than 1 year
3. High suspicion of pulmonary embolism or cardiac tamponade as a cause of shock
4. Significant bradycardia or tachycardia which might be responsible for hemodynamic instability and not treated by pacing or cardioversion
5. Cardiac arrest survivors remaining comatose
6. Hyperthrophic obstructive cardiomyopathy
7. Peripheral artery disease disabling insertion of outflow cannula to femoral artery
8. Moderate to severe aortic regurgitation
9. Aortic dissection
10. Uncontrolled bleeding or TIMI major bleeding within last 6 months
11. Known cognitive dysfunction with CPC ≥ 3

Cosa viene dopo?...

Priorità di Ricerca:

- Definire la sindrome e i target emodinamici
- Fenotipizzazione HF e CS (ottimizzazione registri)
- Trattamento con farmaco terapia (recenti RCT) e MCS
(quando e quali)
- Valutare i sistemi di monitoraggio (perfusione generale vs
perfusione d'organo) e diagnosi

Grazie a

GiViTi

Gruppo Italiano per la Valutazione degli Interventi in Terapia Intensiva



Guido Bertolini

Stefano Finazzi

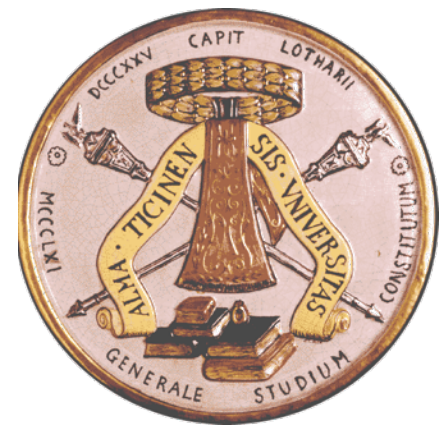
Andrea Bottazzi



27° Meeting GiViTI

7-8-9 Novembre 2018

Alexander Hotel, Abano Terme



Lo shock cardiogeno in TI

Guido Tavazzi, MD PhD

University of Pavia

*Anesthesia and Intensive Care, Dept I
Fondazione Policlinico San Matteo, IRCCS*

