"Diagnóstico, identificación y selección de pacientes con shock cardiogénico susceptibles de tratamiento avanzado"

Barcelona, 11 de diciembre 2015

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Hospital de la Santa Creu i Sant Pau
Barcelona

Potenciales conflictos de interés en relación con esta presentación:

- Conferencias: Cardiorentis, Novartis, Orion-Pharma
- Ensayos clínicos: Cardiorentis, Novartis, Orion-Pharma
- Becas: Novartis

CARDIORENTIS NOVARTIS ORION PHARMA

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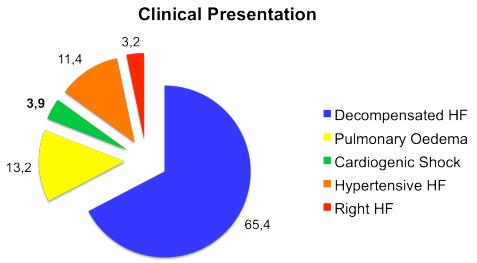
¿De Que Estamos Hablando?

- Disfunción miocárdica que resulta en la incapacidad del corazón para mantener un volumen latido adecuado a pesar de una precarga normal o elevada
- Hipotensión arterial persistente (> 30 min) (PAS < 90 mmHg) o necesidad de fármacos para mantener PAS > 90 mmHg
- Congestión pulmonar (crepitantes, R3, Rx tórax)
- Signos de hipoperfusión tisular con almenos uno de los siguientes:
  - (i) Alteración del estado mental
  - (ii) Frialdad de extremidades
  - (iii) Oliguria (< 30 mL/h)
  - (iv) Lactato > 2 mmol/L

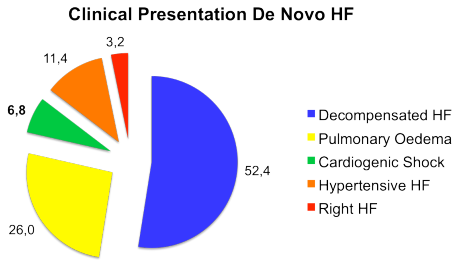
3

Clinical Presentation AHF
EHS-HF II



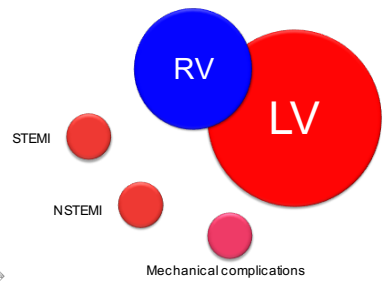
Nieminen M. Eur Heart J. 2006;27(22):2725-36 4

Clinical Presentation AHF
EHS-HF II



Nieminen M. Eur Heart J. 2006;27(22):2725-36 5

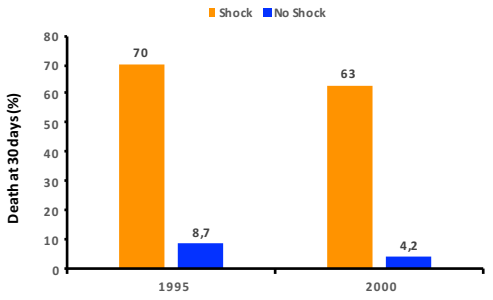
Cardiogenic Shock: Etiology



6

In-hospital Mortality

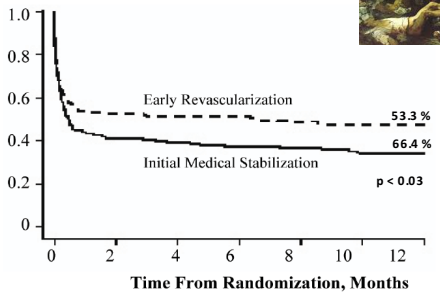
USIK 1995, USIC 2000, FAST-MI France National Registry



Aissaoui et al. Eur Heart J 2012;33:2535[7]

The Shock Trial: a Revolution

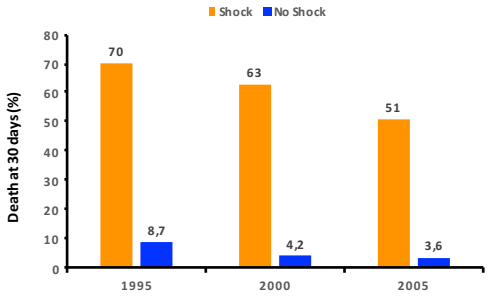
Mortality in the SHOCK Trial (n = 302)



Hochman JS. NEJM 1999;341:625 [8]

In-hospital Mortality

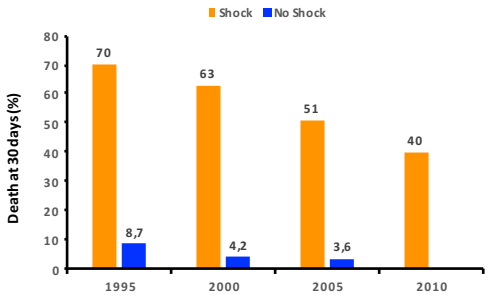
USIK 1995, USIC 2000, FAST-MI France National Registry



Aissaoui et al. Eur Heart J 2012;33:2535[9]

In-hospital Mortality

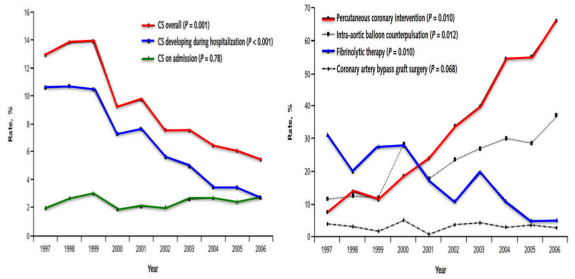
USIK 1995, USIC 2000, FAST-MI and IABP-II



Aissaoui et al. Eur Heart J 2012;33:2535
Thiele H. NEJM 2012;367:1287-1296 10

Temporal Trends in CS Incidence

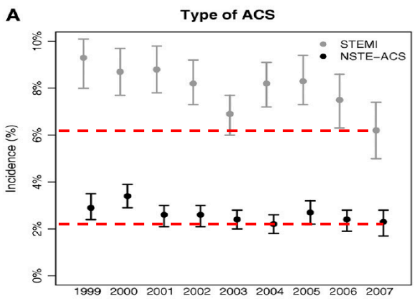
Swiss ICU Registry with 23,696 CS patients (1997-2006)



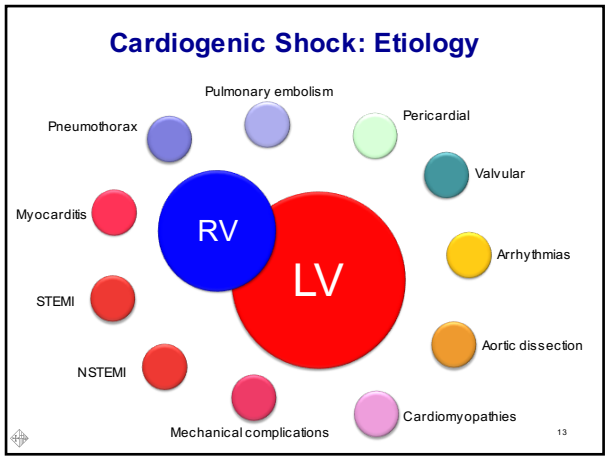
Jeger RV et al. Ann Inter Med 2008;149:618-626 11

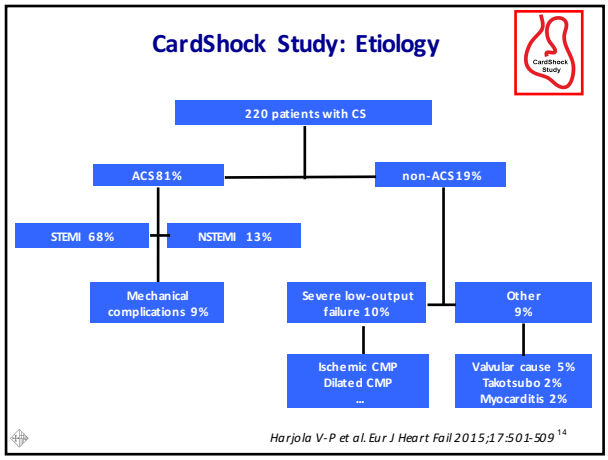
Data from the Grace Registry (1999-2007)

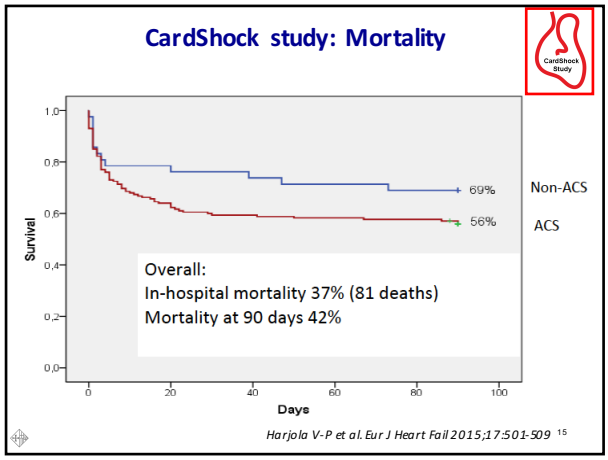
Incidence according to type of ACS



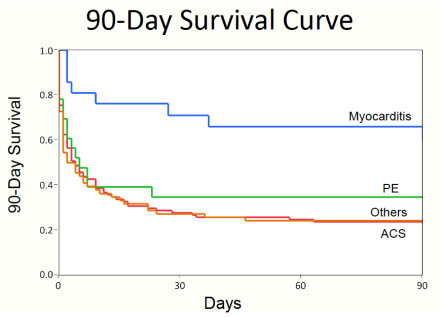
Awad H et al. Am Heart J 2012;163:963-71[12]


Cardiogenic Shock: Etiology
Pulmonary embolism
Pneumothorax
Pericardial
Valvular
Myocarditis
RV
LV
Arrhythmias
STEMI
Aortic dissection
NSTEMI
Cardiomyopathies
Mechanical complications
13


CardShock Study: Etiology
220 patients with CS
ACS 81%
non-ACS 19%
STEMI 68%
NSTEMI 13%
Mechanical complications 9%
Severe low-output failure 10%
Other 9%
Ischemic CMP
Dilated CMP
...
Valvular cause 5%
Takotsubo 2%
Myocarditis 2%
Harjola V-P et al. Eur J Heart Fail 2015;17:501-509 14


CardShock study: Mortality
1,0
0,8
0,6
0,4
0,2
0,0
Survival
69%
56%
Non-ACS
ACS
Overall:
In-hospital mortality 37% (81 deaths)
Mortality at 90 days 42%
0
20
40
60
80
100
Days
Harjola V-P et al. Eur J Heart Fail 2015;17:501-509 15

Survival CS Patients Treated With ECMO According to Shock Aetiology

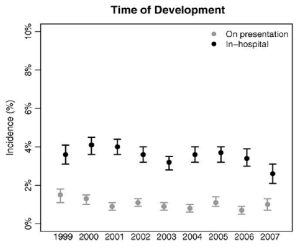


Kagawa E et al. ESC 2015

16

Data from the Grace Registry (1999-2007)

Onset of Cardiogenic Shock



Highest risk subgroups:

- Older
- Female
- Diabetic
- Chronic heart failure
- STEMI
- Cardiac arrest

- 8.3% of ACS patients develop CS
- Vast majority develop CS during hospitalisation (71.5%) ?

Awad H et al. Am Heart J 2012;163:963-71
Jeger RV etal. Ann Inter Med 2008;149:618-626

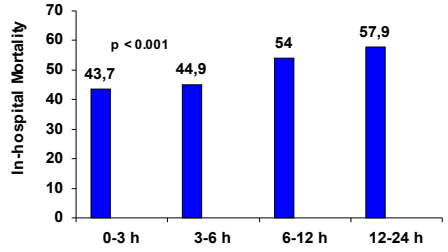
17

Identifying Patients at Risk

ALKK PCI Registry

n = 9422 pts → 1333 (14.2%) CS

Influence of "symptoms onset to hospital admission" time



Lindholm MG. Eur Heart Journal 2003; 24258

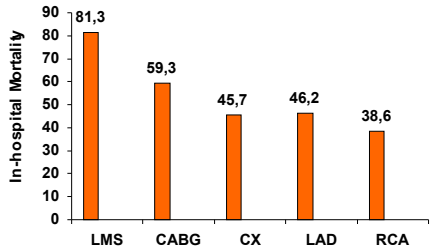
18

Identifying Patients at Risk

ALKK PCI Registry

n = 9422 pts → 1333 (14.2%) CS

In-hospital mortality related to culprit vessel



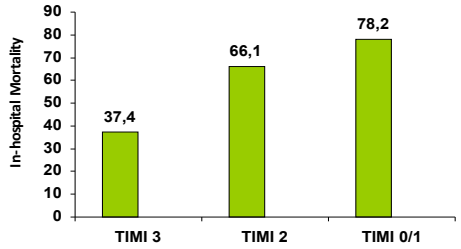
Lindholm MG. Eur Heart Journal 2003; 24:258[19]

Identifying Patients at Risk

ALKK PCI Registry

n = 9422 pts → 1333 (14.2%) CS

Postprocedural TIMI flow grade and mortality

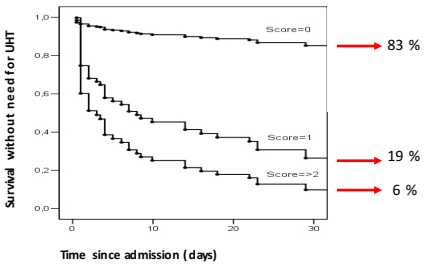


Lindholm MG. Eur Heart Journal 2003; 24:258 20

Identifying Patients at Risk

Age > 75, LMS disease, LVEF <30% and postprocedural TIMI flow grade <3

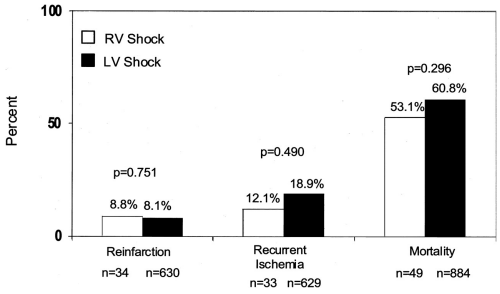
1-y survival w/o urgent heart trasplantation



Garcia A. Am J Cardiol 2009;103(8):1073 21

RV Dysfunction

RV dysfunction may cause or contribute to CS

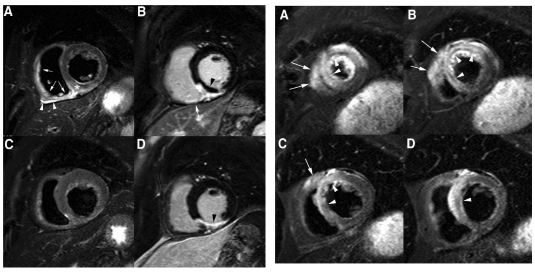


In-hospital events in patients with predominant LV or RV CS

Jacobs AK. J Am Coll Cardiol 2003;41:1273 22

RV Matters

RV injury not limited to inferior STEMI

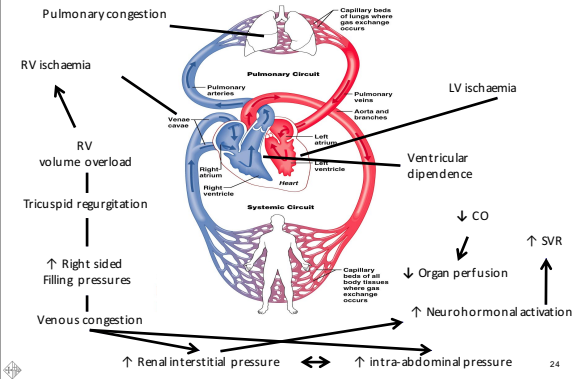


RV involvement 33% in inferior MI

RV involvement 12% in non-inferior MI

Masci PG. Circulation 2010;122(14):1405-12 23

RV: Not Only The Heart



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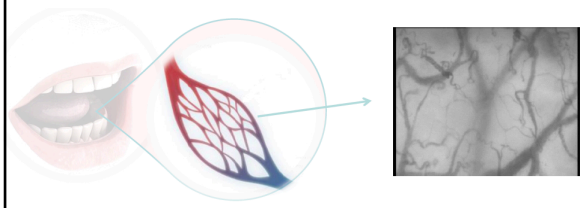
Microcirculation

Ultimate therapeutic goal in CS is to restore microcirculatory function (adequate oxygen supply to sustain cellular function)



Active recruitment of microcirculation is essential
Orthogonal polarisation spectral (OPS) imaging allows direct visualization of sublingual microcirculation

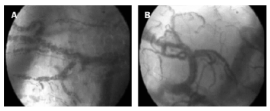
Ince C. Crit Care Med 1999;27:1369-1377 25

Microcirculation

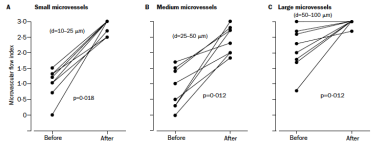
Microcirculatory shutdown

- Increased oxygen consumption and impaired oxygen delivery and extraction due to microcirculatory shutdown and shunting

Before and after nitroglycerin



Orthogonal polarisation spectral imaging (OPS)



During sepsis (and CS) microvasculature is the first to go and the last to recover

Spronk PE. Lancet 2001;360:1395-1396[26]

Microcirculation

European Heart Journal (2010) **31**, 3032–3039
doi:10.1093/eurheartj/ehq324

CLINICAL RESEARCH
Coronary heart disease

Impaired microcirculation predicts poor outcome of patients with acute myocardial infarction complicated by cardiogenic shock

Corstiaan A. den Uil[1]*, Wim K. Lagrand[2], Martin van der Ent[1], Lucia S.D. Jewbali[1], Jin M. Cheng[1], Peter E. Spronk[3], and Maarten L. Simoons[1]

[1]Department of Cardiology, Thoraxcenter, Erasmus Medical Center, Room V-017, s-Gravendijkwal 230, Rotterdam NL-3015 CE, The Netherlands; [2]Department of Intensive Care Medicine, Academic Medical Center, Amsterdam, The Netherlands; and [3]Department of Intensive Care Medicine, Gelre Hospitals, Apeldoorn, The Netherlands

Received 8 April 2010; revised 2 July 2010; accepted 23 July 2010; online publish-ahead-of-print 9 September 2010

Sublingual perfused capillary density measured with sidestream dark-field imaging

den Uil CA. Eur Heart Jour 2010;31:3032-3039 27

Microcirculation

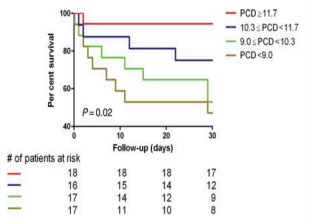
Table 2 Baseline haemodynamic parameters

	All patients (n = 68)	PCD ≤ median[a] (n = 35)	PCD > median[a] (n = 33)	P-value
HR (b.p.m.)	93 (72–104)	92 (71–106)	93 (72–104)	0.80
MAP (mmHg)	69 (61–70)	66 (58–70)	70 (64–70)	0.07
CVP (mmHg)	15 (12–18)	16 (12–19)	14 (13–16)	0.23
PCWP (mmHg)[b]	21 (16–24)	23 (18–25)	18 (14–22)	0.04
MPAP (mmHg)[b]	28 (24–34)	30 (24–37)	27 (24–30)	0.18
CI (L min^{-1} m^{-2})	2.5 (2.1–2.9)	2.4 (1.8–2.9)	2.7 (2.1–2.9)	0.44
CPI (W m^{-2})	0.35 (0.26–0.42)	0.33 (0.24–0.39)	0.38 (0.30–0.42)	0.11
SVR (dynes s cm^{-5})	1075 (825–1242)	1075 (798–1237)	1052 (850–1256)	0.79
SvO_2 (%)	66 (61–73)	65 (60–70)	68 (62–75)	0.12
Lactate (mmol L^{-1})	2.8 (2.0–4.3)	2.9 (1.8–4.5)	2.8 (2.2–4.8)	0.58

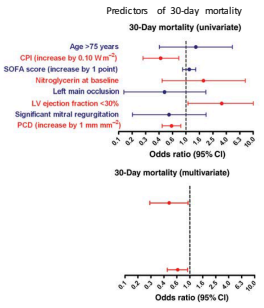
HR, heart rate; NS, non-significant; MAP, mean arterial pressure; CVP, central venous pressure; PCWP, pulmonary capillary wedge pressure; MPAP, mean pulmonary artery pressure; CI, cardiac index; CPI, cardiac power index; SVR, systemic vascular resistance; SvO2, central-venous oxygen saturation.
[a]Median PCD = 10.3 mm mm^{-2}.
[b]Data available in 48 (71%) of the patients.

den Uil CA. Eur Heart Jour 2010;31:3032-3039 28

Microcirculation



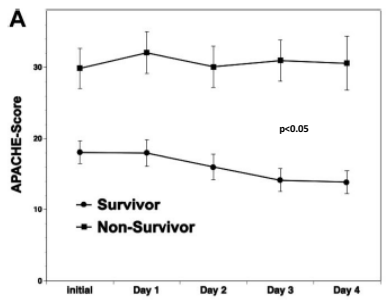
Survival stratified according to quartile of baseline sublingual PCD



den Uil CA. Eur Heart Jour 2010;31:3032-3039 29

IABP Shock Trial

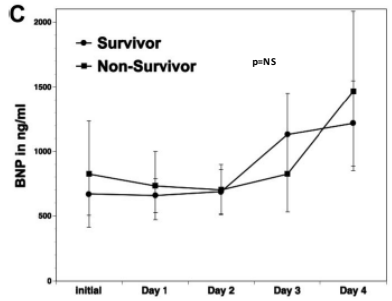
APACHE II Score and Mortality



Prondzinsky R et al. Crit Care Med 2010;38:152–160 30

IABP Shock Trial

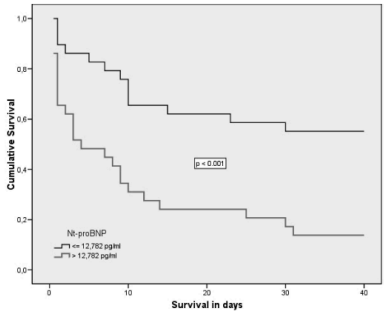
BNP and Mortality



Prondzinsky R et al. Crit Care Med 2010;38:152–160 [31]

Biomarkers: Natriuretic Peptides

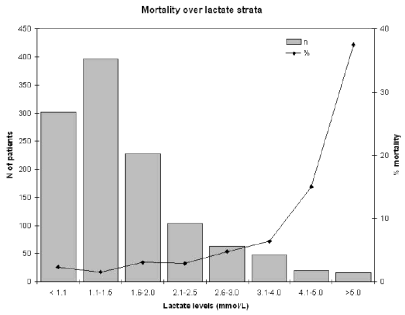
Survival according to NT-proBNP



Jarai R. et al. Crit Care Med 2009;37:1837 [32]

Biomarkers: Lactate

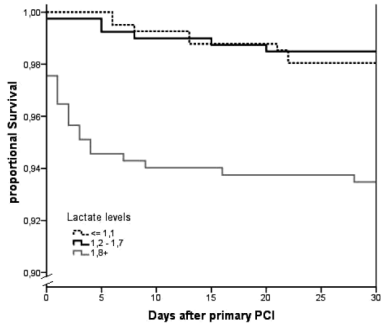
Admission lactate and 30-day mortality (1997-2007)



Vermeulen et al. Critical Care 2010;14:R164 [33]

Biomarkers: Lactate

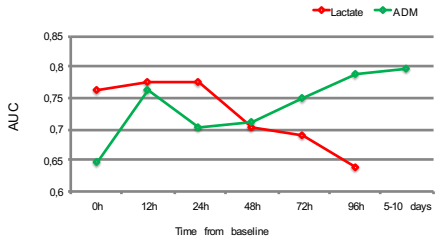
30-day survival after PCI according to lactate levels (>1,8 mmol/L)



Vermeulen et al. Critical Care 2010;14:R164 34

Biomarkers: Adrenomedulin

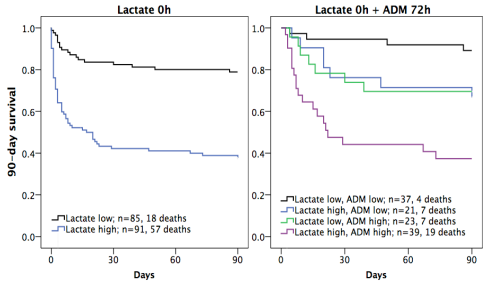
AUC for 90-day mortality for lactate and ADM



Tolppanen H, Rivas-Lasarte M et al. Unpublished data 35

Biomarkers: Adrenomedulin

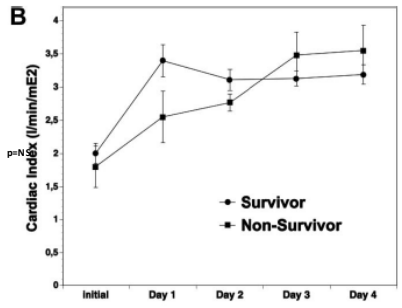
90-day survival curves for lactate and ADM



Tolppanen H, Rivas-Lasarte M et al. Unpublished data 36

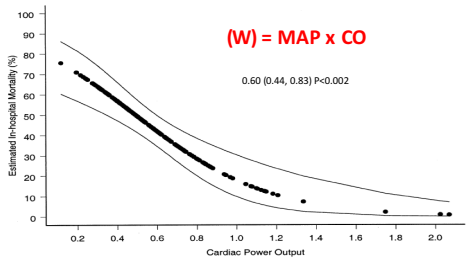
IABP Shock Trial

CI and Mortality



Prondzinsky R et al. Crit Care Med 2010; 38:152–160[37]

Cardiac Power Output (CPO) and CP Index (CPI)



- Couples Pressure (MAP) and Flow (CO) = Cardiac Pumping
- Cutoff 0.53 W (PPV 56%; NPV 78%).)

Fincke R et al. J Am Coll Cardiol 2004;44:340-8[38]

Predictors of In-Hospital Mortality

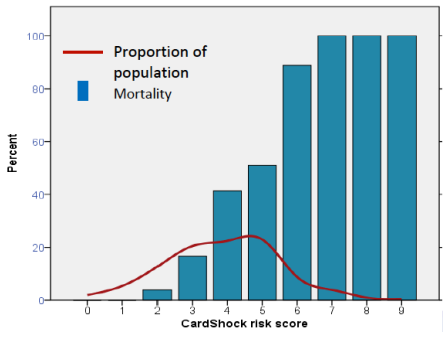
Variable*	Adjusted OR (95% CI)	p-value
Age (per year)	1.04 (0.99-1.08)	0.09
Confusion at presentation	3.3 (1.2-9.0)	0.02
Previous MI	3.2 (1.3-8.4)	0.02
Previous CABG	12.5 (2.0-77.4)	0.007
ACS etiology	7.8 (1.9-32.6)	0.005
LVEF (per % decrease)	1.06 (1.02-1.09)	0.001
Blood lactate (per mmol/L)	1.4 (1.2-1.6)	<0.001
Systolic BP (per mmHg decr.)	1.03 (0.99-1.06)	0.11

*Model also included variable adjusting for gender and center

Variable	CardShock risk score
Age > 75 years	1
Confusion	1
Previous MI or CABG	1
ACS etiology	1
LVEF <40%	1
B- Lactate < 2 mmol/L	0
2-4 mmol/L	1
> 4 mmol/L	2
eGFR >60 ml/min	0
30-60 ml/min	1
<30 ml/min	2
Maximum points	9

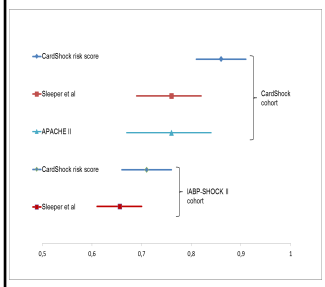
Harjola V-P et al. Eur J Heart Fail 2015;17:501-509[39]

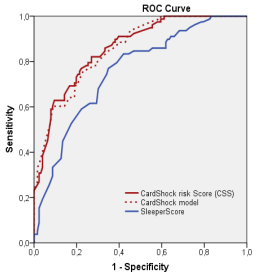
CardShock Risk Score



Harjola V-P et al. Eur J Heart Fail 2015;17:501-509 40

Performance compared to other scores in derivation and validation cohorts





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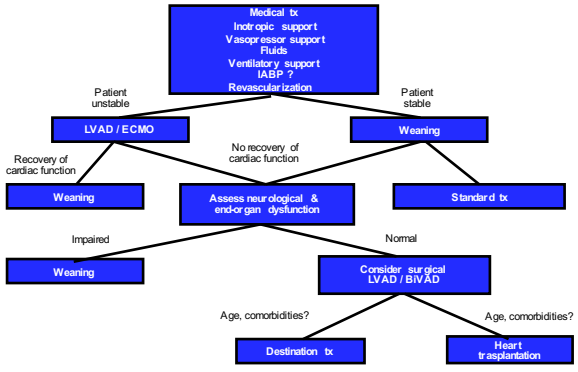

Thiele et al. EAPCI Textbook 2012; Chapter 23 42

Gaps In Knowledge

- Definition of pre-shock
- Definition of refractory shock
- Best approach to MVD (CVLPRIT-SHOCK ongoing)
- Myocardial protection strategies
- New biomarkers for early diagnosis of end-organ damage and risk stratification
- New pharmacological therapies
- Treatment of SIRS
- Equipoise in access to best treatment

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Equipoise in Access to Treatment in CS

VIEWPOINT

Call for Organized Statewide Networks for Management of Acute Myocardial Infarction-Related Cardiogenic Shock

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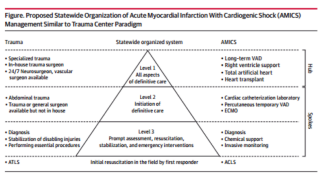
The current state of acute cardiogenic shock management very much resembles trauma management that existed prior to the development of Advanced Trauma Life Support. Organization of the trauma system evolved after the 1976 plane crash of James Stryner, MD.[1] By adopting many of the educational concepts from the Advanced Cardiac Life Support protocol, a similar, systemized approach was developed for treating trauma patients.[2] In particular, the time immediately following the inciting event would have had the highest likelihood of prevention of death with appropriate intervention—a concept that became known as the "golden hour."[3]

Acute myocardial infarction with cardiogenic shock (AMICS) in the current era is still associated with nearly 50% mortality[4] despite advances in early revascularization. While modern advances in mechanical circulatory support (MCS) have greatly improved the survival of patients with chronic heart failure,[5] its application in AMICS is based on empiric data from individual and institutional experiences in a haphazard manner. The majority of clinical trials concerning the newer technology have been designed for patients with chronic heart failure, not the AMI population.

the health care professional can follow. As the concept of "golden hour" dictates, one must recognize reversible causes that can be fixed, and intervene. When patient need exceeds local resources, only essential procedures should be performed followed by transfer to the closest, appropriate facility for definitive care.

Based on these concepts, we define 3 levels of AMICS care within a statewide hub-and-spoke net-

Figure. Proposed Statewide Organization of Acute Myocardial Infarction With Cardiogenic Shock (AMICS) Management Similar to Trauma Center Paradigm



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¡Necesitamos Un Consenso Sobre Redes de Atención al Shock Cardiogénico!

CURRENT OPINION

Recommendations on pre-hospital and early hospital management of acute heart failure: a consensus paper from the Heart Failure Association of the European Society of Cardiology, the European Society of Emergency Medicine and the Society of Academic Emergency Medicine – short version

Alexandre Mebazaa[1*], M. Birkan Tïmïsit[2], Phillip Levy[3], Piotr Ponikowski[4], W. Frank Peacock[5], Said Laribi[6], Arsen D. Ristic[7], Ekaterini Lambrinou[8], Josep Masip[9], Jillian P. Riley[10], Theresa McDonagh[11], Christian Mueller[12], Christopher deFilippi[13], Veli-Pekka Harjola[14], Holger Thiele[15], Massimo F. Piepoli[16], Marco Metra[17], Aldo Maggioni[18], John J.V. McMurray[19], Kenneth Dickstein[20], Kevin Damman[21], Peter M. Seferovic[22,23], Frank Ruschitzka[24], Adelino F. Leite-Moreira[25,26], Abdelouahab Belkou[27,28], Stefan D. Anker[29,30], and Gerasimos Filippatos[31]

CURRENT OPINION

Management of antithrombotic therapy in atrial fibrillation patients presenting with acute coronary syndrome and/or undergoing percutaneous coronary or valve interventions: a joint consensus document of the European Society of Cardiology Working Group on Thrombosis, European Heart Rhythm Association (EHRA), European Association of Percutaneous Cardiovascular Interventions (EAPCI) and European Association of Acute Cardiac Care (ACCA) endorsed by the Heart Rhythm Society (HRS) and Asia-Pacific Heart Rhythm Society (APHRS)

Task Force Members: Gregory Y.H. Lip* (UK, Chairman), Stephan Windecker (Switzerland), Kurt Huber (Austria), Fausto Kirchhof (UK), Francisco Marín (Spain), Jurrién M. Ten Berg (Netherlands), Karl-Georg Haeusler (Germany), Giuseppe Boriani (Italy), Nicolas Capucci (France), Jean-Philippe Collet (France), Uwe Zeymer (Germany), Deirdre Lane (UK), Patrick Rossello (France)
Document Reviewers: Robert F. Storey (Review Co-ordinator), Hector Bueno, Jean-Philippe Collet, Laurent Fauchier, Sigrun Halvorsen, Madalena Lobba, Jean Marais, Christian Mueller, Tatjana S. Potpara, Lars Hellund Rasmussen, Andrea Rubboli, Juan Tamargo, Marco Valgimigli, and Jose L. Zamorano

Invasive coronary treatment strategies for out-of-hospital cardiac arrest: a consensus statement from the European Association for Percutaneous Cardiovascular Interventions (EAPCI)/Stent for Life (SFL) groups

Marko Noc[1], MD; Jean Fajadet[2], MD; Jens F. Lassen[3], MD; Petr Kala[4], MD; Philip MacCarthy[5], MD; Goran K. Olivecrona[6], MD; Stephan Windecker[7], MD; Christian Spaulding[8*], MD

Special Report

Standardized Bleeding Definitions for Cardiovascular Clinical Trials

A Consensus Report From the Bleeding Academic Research Consortium

Roxana Mehran, MD; Sunil V. Rao, MD; Deepak L. Bhatt, MD, MPH; C. Michael Gibson, MS, MD; Adriano Caixeta, MD, PhD; John Eikelboom, MD, MBBS; Sanjay Kaul, MD; Stephen D. Wiviott, MD; Yona Menon, MD; Eugenia Nikolsky, MD, PhD; Victor Serebruany, MD, PhD; Marco Valgimigli, MD, PhD; Pascal Vranckx, MD; David Taggart, MD, PhD; Joseph P. Sabik, MD; Donald E. Cutlip, MD; Mitchell W. Krucoff, MD; E. Magnus Ohman, MD; Philippe Gabriel Steg, MD; Harvey White, MB, ChB, DSc

Updated standardized endpoint definitions for transcatheter aortic valve implantation: The Valve Academic Research Consortium-2 consensus document*

A. Pieter Kappetein, Stuart J. Head, Philippe Généreux, Nicolo Piazza, Nicolas M. van Mieghem, Eugene H. Blackstone, Thomas G. Brott, David J. Cohen, Donald E. Cutlip, Gerrit-Anne van Es, Rebecca T. Hahn, Ajay J. Kirtane, Mitchell W. Krucoff, Susheel Kodali, Michael J. Mack, Roxana Mehran, Josep Rodés-Cabau, Pascal Vranckx, John G. Webb, Stephan Windecker, Patrick W. Serruys, and Martin B. Leon

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