XI congresso nazionale
simeu
ROMA 24-26 MAGGIO 2018

•SIGNIFICATO PROGNOSTICO
•DEI MARKERS BIOUMORALI
•NELLO SCOMPENSO CARDIACO

•Antonio Bonora

•DAI Emergenza e Terapie Intensive

•Azienda Ospedaliera Universitaria di Verona

Azienda Ospedaliera
Universitaria Integrata
Verona

•epidemiologia

•prevalenza nella popolazione adulta 1-2%
•Moster A, Hoes AW. Heart 2007

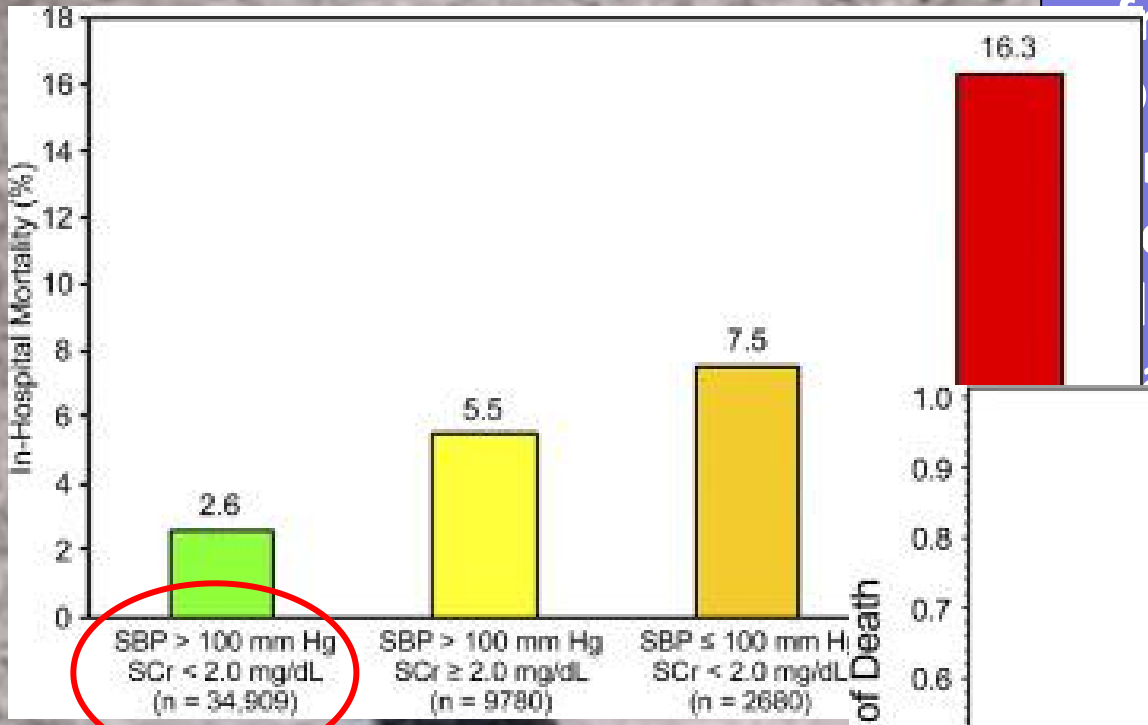
•prevalenza nella popolazione > 70: ≥10%
•Ponikowski P, Voors AA, Anker SD et al.
•Eur Heart J 2016

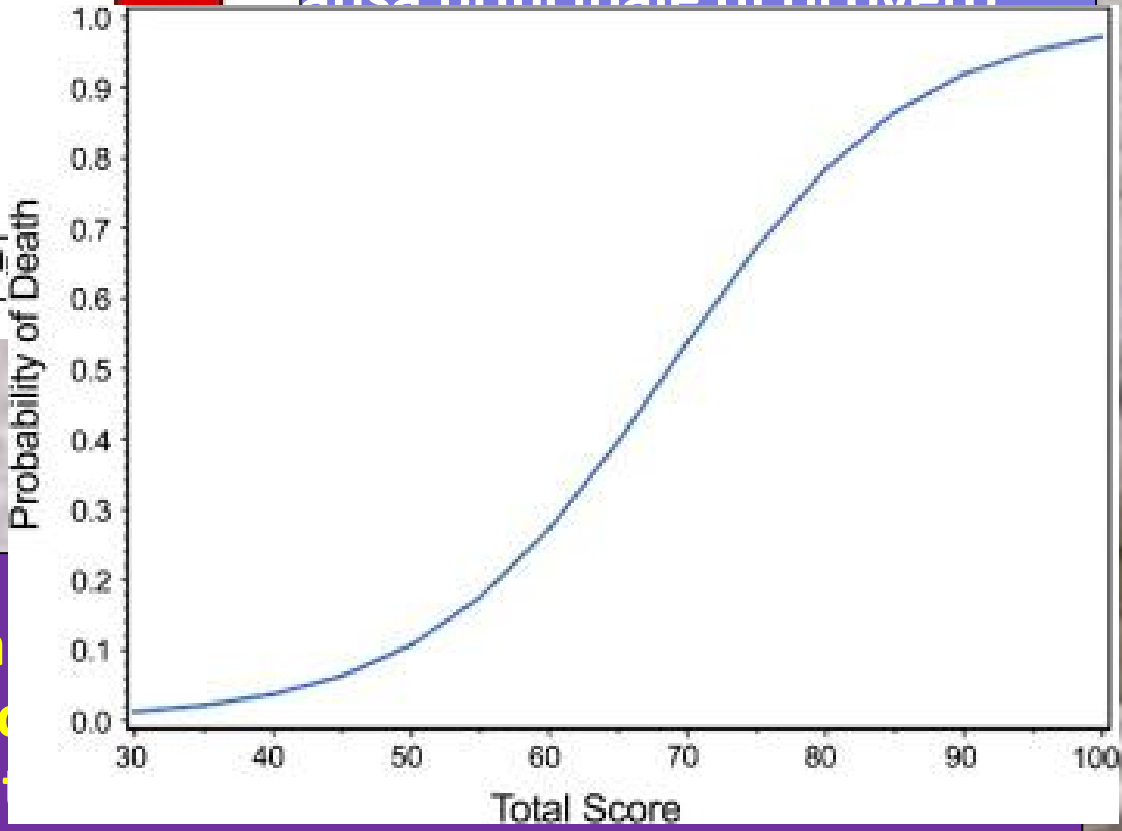
•oltre 1 milione di ricoveri all'anno
•Roger VL, Go AS, Lloyd-Jones DM. Circulation 2011

•mortalità ancora assai elevata
•Zile MR, Bennett TD, St John Sutton M et al. Circulation 2008
•Lassus JP, Siirilä-Waris K, Nieminen MS et al. Int J Cardiol 2013

•fattori predittivi

- età
- frequenza cardiaca
- pressione arteriosa
- creatinina
- sodiemia
- disfunzione ventricolare sin
- causa principale di ricovero

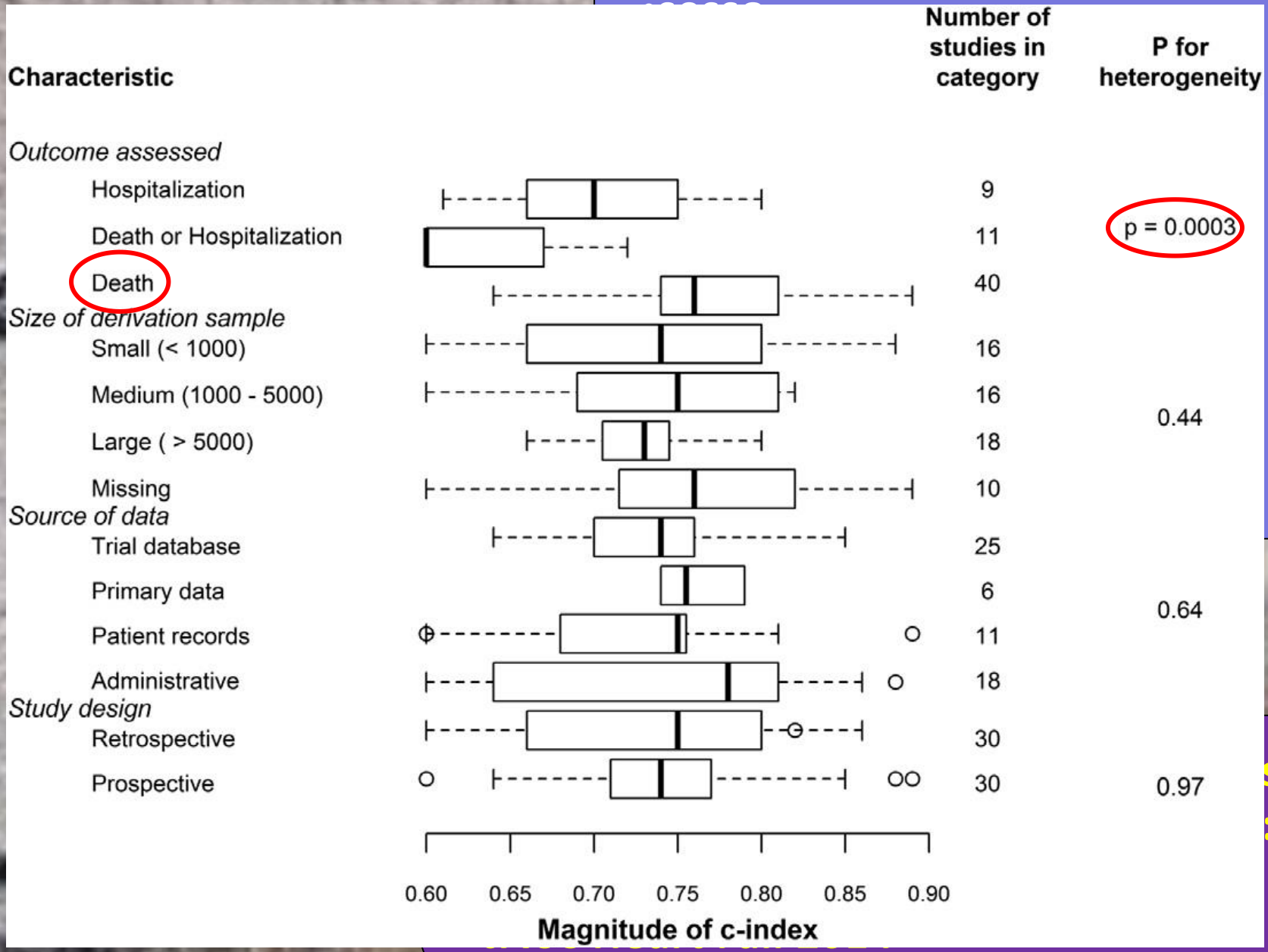




- Abra
- Predi
- hospit

•fattori predittivi

•età



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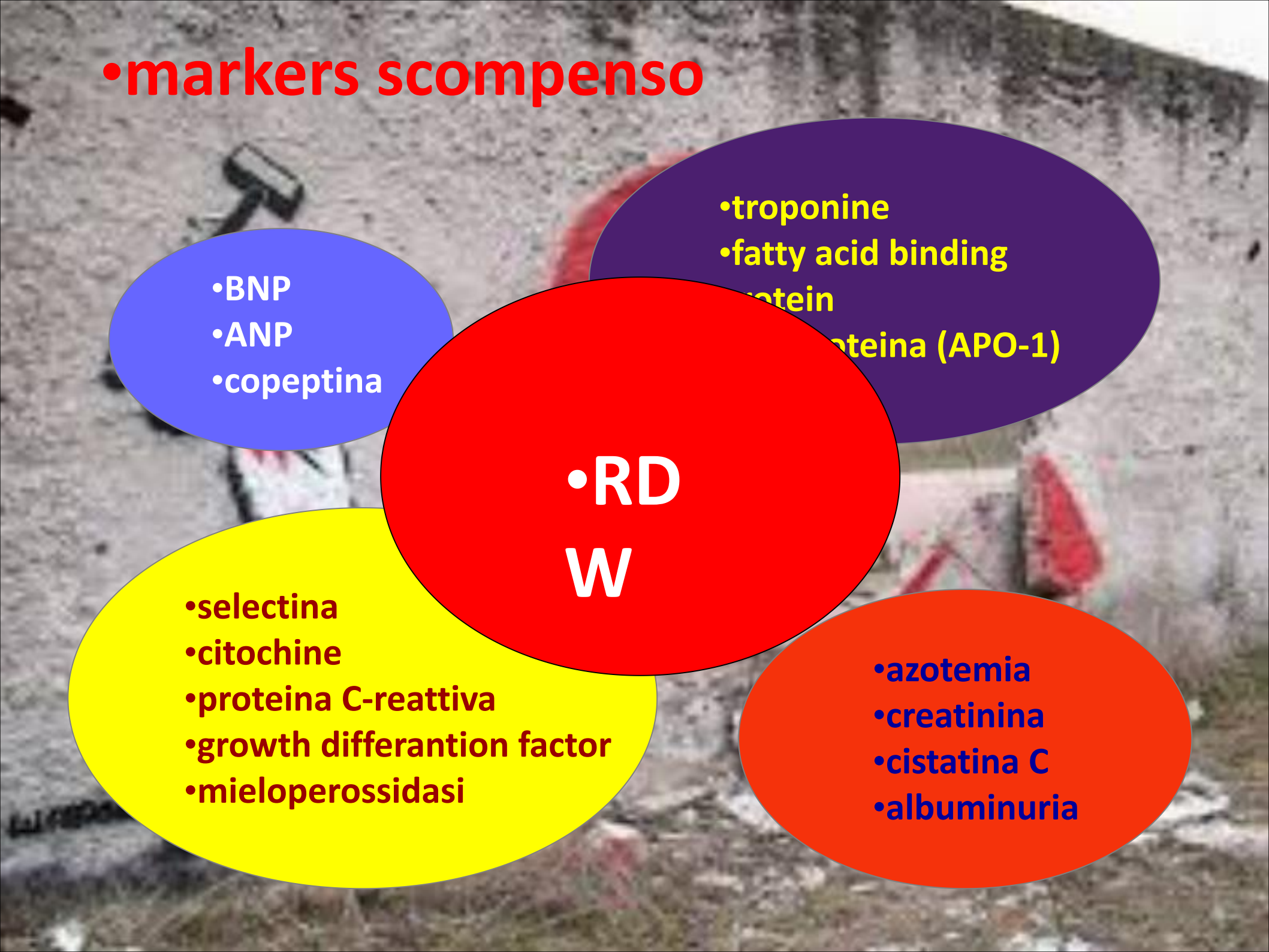

•markers scompenso
•troponine
•fatty acid binding
•BNP
•ANP
•copeptina
•RD
W
•selectina
•citochine
•proteina C-reattiva
•growth differantion factor
•mieloperossidasi
•azotemia
•creatinina
•cistatina C
•albuminuria

•RDW: un “nuovo” marker

•l'RDW (red blood cell distribution width) è indice della variabilità del volume eritrocitario, definita convenzionalmente anisocitosi

•Salvagno GL, Sanchis-Gomar F, Picanza A, Lippi G. Red blood cell distribution width: A simple parameter with multiple clinical applications. Crit Rev Clin Lab Sci 2015

•Lippi G, Mattiuzzi C, Cervellin G. Learning more and spending less with neglected laboratory parameters: the paradigmatic case of red blood cell distribution width. Acta Biomed 2017

•RDW: marker p

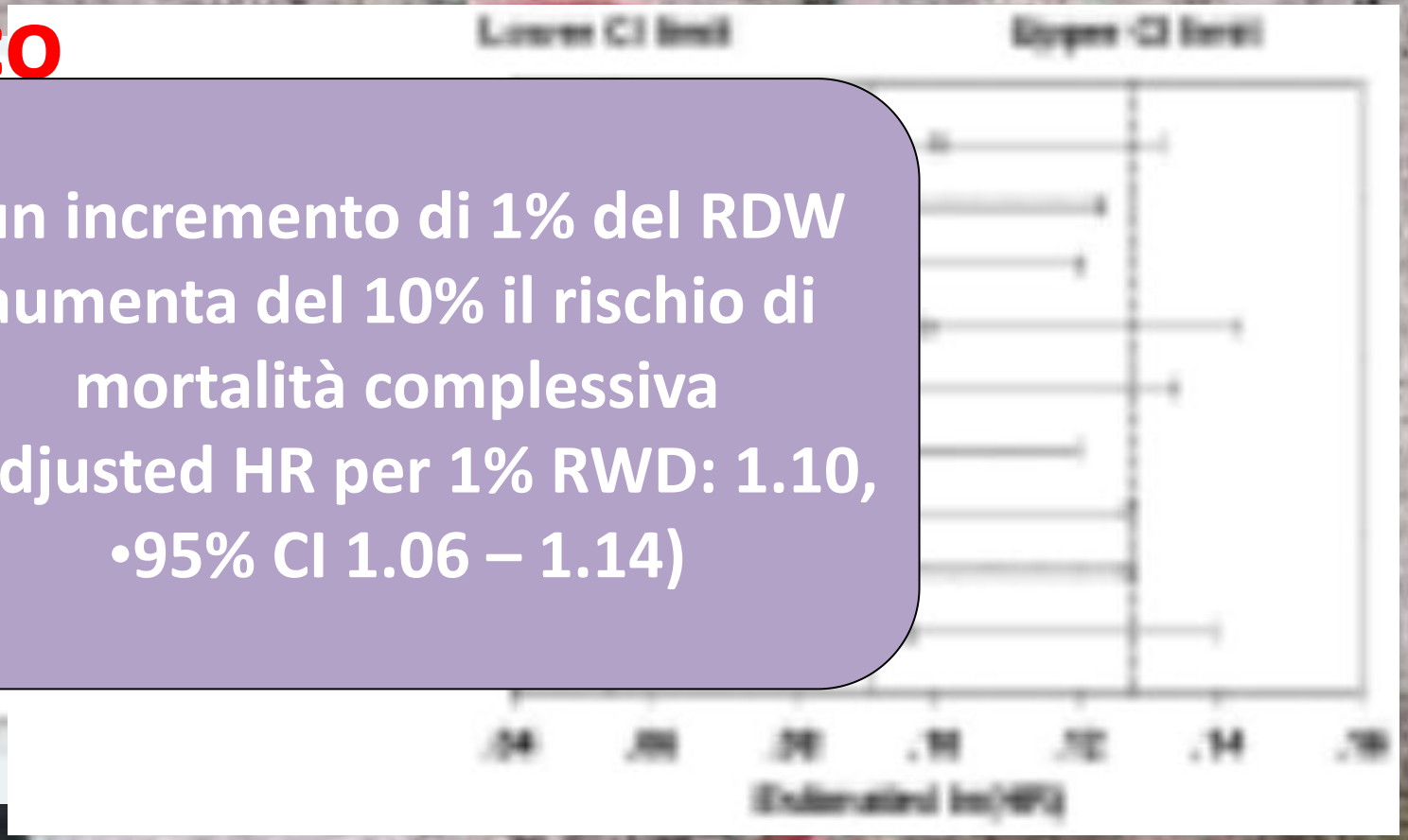
•STUDI CON
•43

INSERITI
ETANALISI
9

•mortalità complessiva
•mortalità per cause cardiache
•ricoveri complessivi
•ricoveri per scompenso cardiaco
•mortalità a 1 anno per
•scompenso cardiaco

•Huang YL, Hu ZD, Liu SJ et al. Prognostic Value of Red Blood Cell Distribution Width for Patients with Heart Failure: A Systematic Review and Meta-Analysis of Cohort Studies. PLoS One 2014

•RDW: marker prognostico



•un incremento di 1% del RDW aumenta del 10% il rischio di mortalità complessiva
•(adjusted HR per 1% RWD: 1.10,
•95% CI 1.06 – 1.14)

•Huang YL, Hu ZD, Liu SJ et al. Prognostic Value of Red Blood Cell Distribution Width for Patients with Heart Failure: A Systematic Review and Meta-Analysis of Cohort Studies. PLoS One 2014

•RDW: marker prognostico

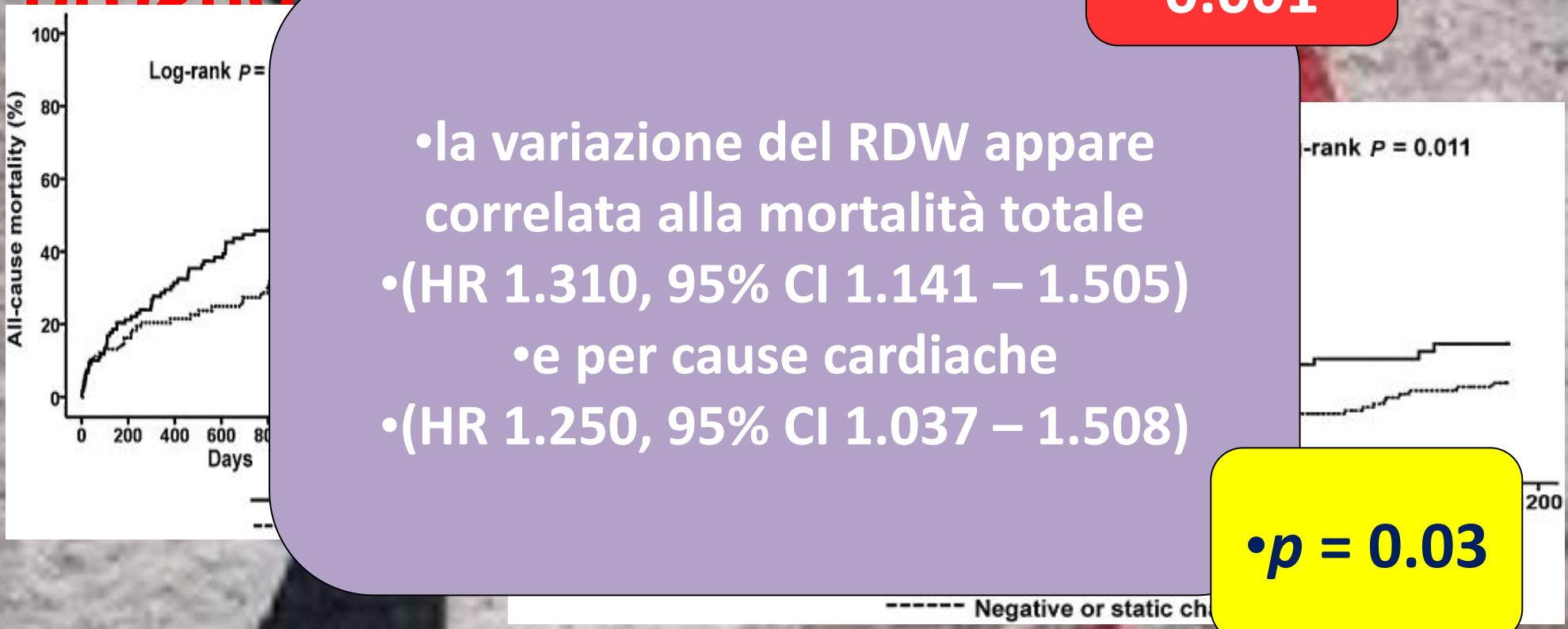
•229 pazienti
•età media 76 ± 12
•NYHA III e IV

•RDW basale 15 ± 1.9
•> 14.5 52.4%
•< 14.5 47.6%
•RDW dimissione 15.4 ± 2.5
•> RDW 36% paz
• < RDW 64% paz
•Variazione media 0.0 ± 1.2%

•Uemura Y, Shibata R, Takemoto K et al. Elevation of red blood cell distribution width during hospitalization predicts mortality in patients with acute decompensated heart failure. J Cardiol 2016

•RDW: marker prognostico

•*p* = 0.001



•la variazione del RDW appare correlata alla mortalità totale

•(HR 1.310, 95% CI 1.141 – 1.505)

•e per cause cardiache

•(HR 1.250, 95% CI 1.037 – 1.508)

•*p* = 0.03

•Uemura Y, Shibata R, Takemoto K et al. Elevation of red blood cell distribution width during hospitalization predicts mortality in patients with acute decompensated heart failure. J Cardiol 2016

- Early in-hospital variation of red blood cell distribution width predicts mortality in patients with acute heart failure

- Turcato G, Zorzi E, Prati D, Ricci G, Bonora A, Zannoni M, Maccagnani A, Salvagno GL, Sanchis-Gomar F, Lippi G
- Int J Cardiol 2017

•popolazione d

•CRITERI DI
•ESCLUSIONE

•1242 pazienti
osservati in D
per scompe
cardiaco ac
•gen – dic 2

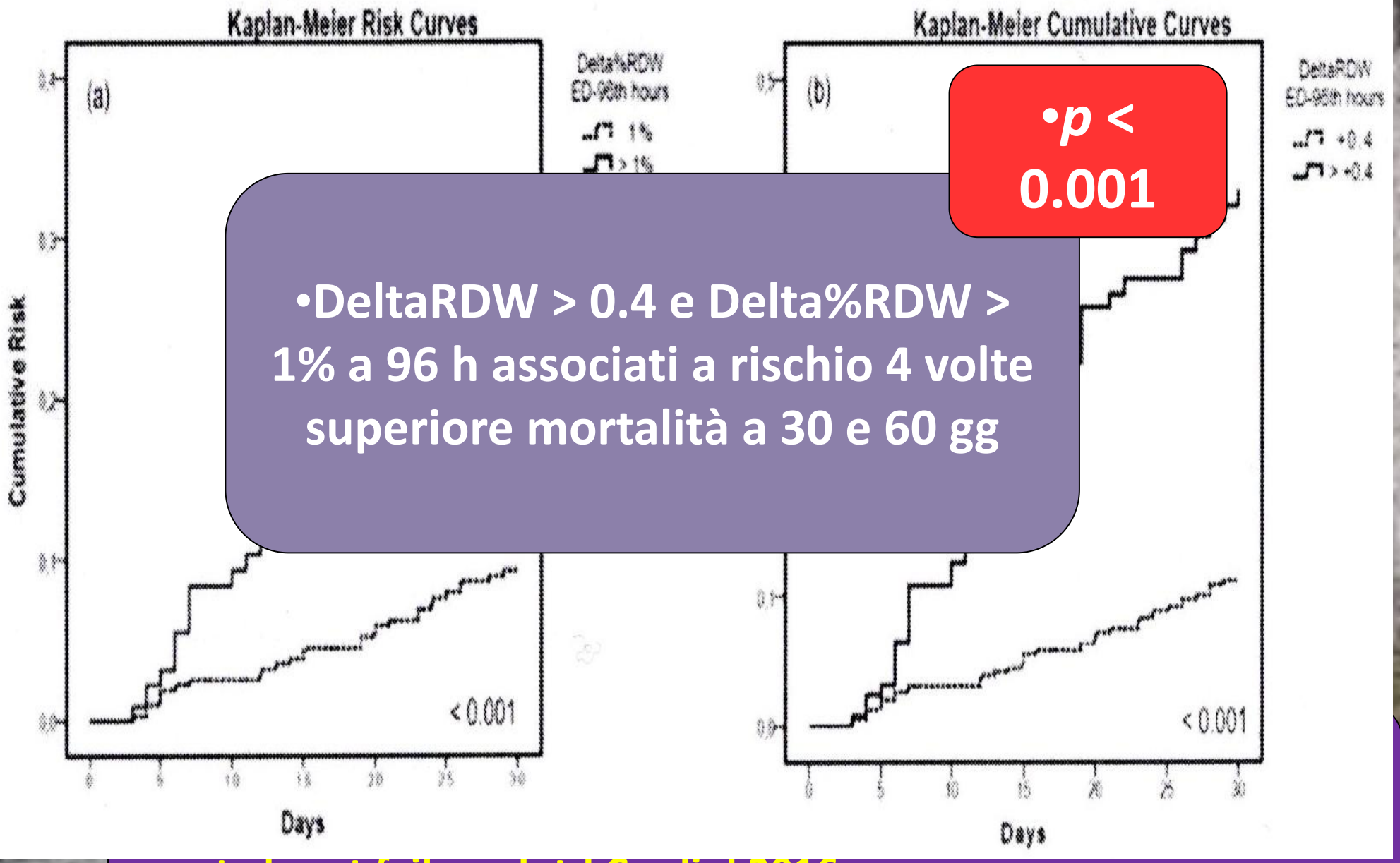
- età < 65 anni
- sintomi da > 5 gg
- diagnosi di infezione polmonare
- diagnosi di SCA
- patologia neopla
aspettativa di vita
- anemia se

•588 pazienti
•319 maschi
•269 femmine
•età media 83.5 anni
•(range 74 – 91)

•Turcato G, Zorzi L, Prati D et al. L
blood cell distribution width prec
acute heart failure. Int J Cardiol 201

Relationship between 30-day mortality and variation of red blood cell distribution width (RDW) between measurement obtained at ED admission and after 48 or 96 hours of hospital stay

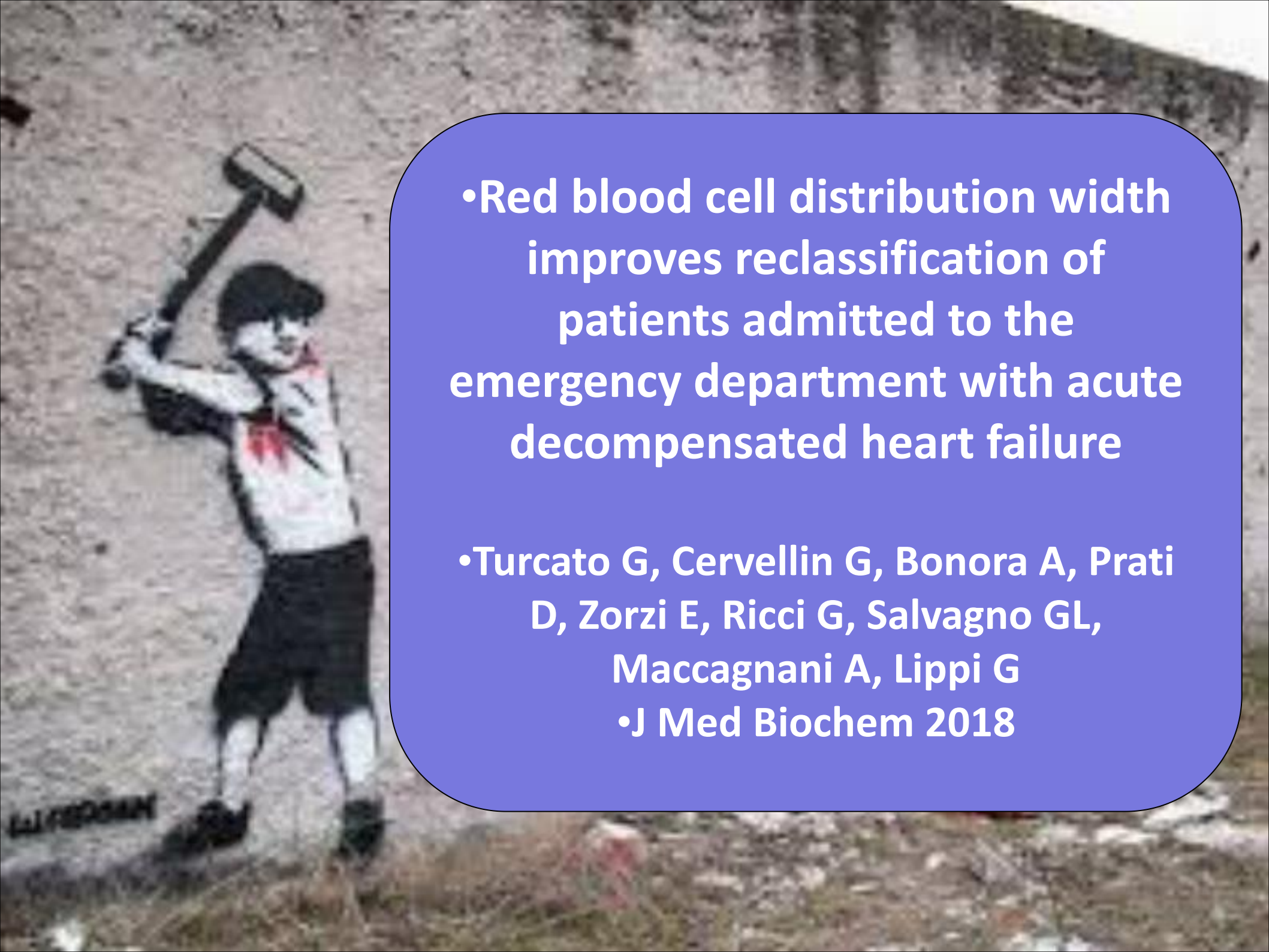
30-day mortality	Univariate analysis Odds Ratio (95% CI)	p	Multivariate analysis Adjusted odds ratio (95% CI)	p
ED admission and after 48 hours of hospital stay				
As continuous variable				
DeltaRWD	1.711 (1.25-2.35)	<0.001	1.46 (1.05-2.03)	0.024
Delta%RDW	1.09 (1.03-1.14)	<0.001	1.07 (1.01-1.19)	0.036
As categorical variable				
DeltaRWD >0.4%	3.54 (2.01-6.25)	<0.001	3.04 (1.56-5.94)	0.001
Delta%RDW >1%	1.85 (1.17-2.94)	0.009	1.59 (1.01-2.68)	0.048
ED admission and after 96 hours of hospital stay				
As continuous variable				
DeltaRWD	2.29 (1.71-3.07)	<0.001	1.96 (1.45-2.65)	<0.001
Delta%RDW	1.15 (1.09-1.20)	<0.001	1.12 (1.07-1.18)	<0.001
As categorical variable				
DeltaRWD >0.4%	4.34 (2.66-7.09)	<0.001	3.65 (2.02-6.15)	<0.001
Delta%RDW >1%	3.67 (2.25-5.99)	<0.001	2.86 (1.67-4.91)	<0.001



•$p <$ 0.001

•DeltaRDW > 0.4 e Delta%RDW > 1% a 96 h associati a rischio 4 volte superiore mortalità a 30 e 60 gg

acute heart failure. Int J Cardiol 2016



- Red blood cell distribution width improves reclassification of patients admitted to the emergency department with acute decompensated heart failure

- Turcato G, Cervellin G, Bonora A, Prati D, Zorzi E, Ricci G, Salvagno GL, Maccagnani A, Lippi G
- J Med Biochem 2018

•popolazione dello studio

•2278 pazienti osservati in DEA per scompenso cardiaco acuto
•gen 2013 – dic 2016

•554 esclusi

•1704 pazienti
•824 maschi
•880 femmine
•età media 84 anni
•(range 76 – 92)

•Turcato G, Cervellin G, Bonora A et al. Red blood cell distribution width improves reclassification of patients admitted to emergency department with acute decompensated heart failure. J Med Biochem 2016

Table II Multivariable logistic regression analysis for prediction of 30-day mortality in patients with acute decompensated heart failure (BNP, creatinine, serum natrium and chloride are considered as continuous variables).

Coefficient	Standard error	Odds ratio	95% CI	p	
Final model					
BNP	0.511	0.088	1.666	1.403–1.979	<0.001
Creatinine	0.331	0.071	1.392	1.212–1.599	<0.001
Hypernatremia	0.323	0.110	1.381	1.112–1.715	0.003
Hypochloremia	0.509	0.111	1.665	1.340–2.068	<0.001
Final model + RDW					
BNP	0.460	0.088	1.584	1.333–1.882	<0.001
Creatinine	0.278	0.072	1.321	1.148–1.520	<0.001
Hypernatremia	0.306	0.110	1.358	1.094–1.686	0.006
Hypochloremia	0.496	0.111	1.642	1.322–2.039	<0.001
RDW	0.379	0.074	1.461	1.263–1.690	<0.001

BNP, B-type natriuretic peptide; RDW, red blood cell distribution width.

Turcato G, Cervellin G, Bonora A et al. Red blood cell distribution width improves reclassification of patients admitted to emergency department with acute decompensated heart failure. J Med Biochem 2016

•modello predittivo

•AUC modello finale 0.701
•(95% CI 0.662 – 0.738)

•*p* = 0.001

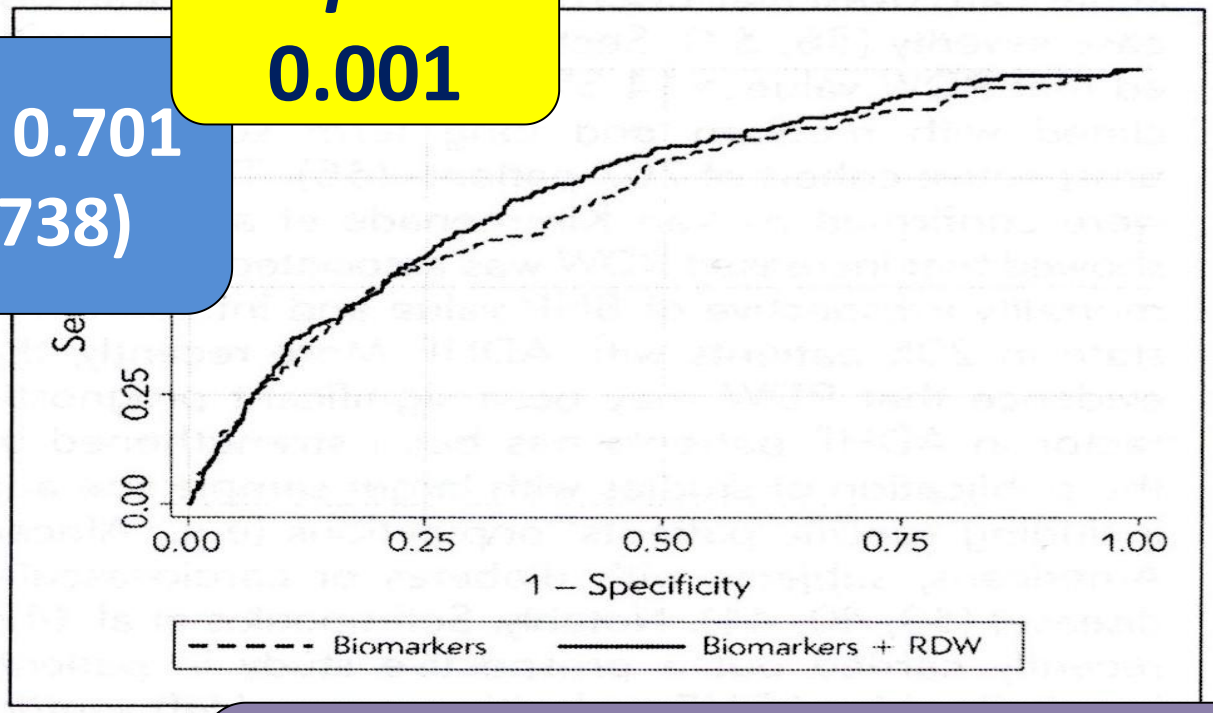


Figure 1
analysis of
with acute

•AUC modello finale + RDW 0.723
•(95% CI 0.662 – 0.738)

•*p* < 0.001

•Turcato G, Cervellin G, Bonora A et al. Red blood cell distribution width improves reclassification of patients admitted to emergency department with acute decompensated heart failure. J Med Biochem 2016

•net reclassification improvement (N

Table III Results of net reclassification improvement (NRI) obtained by combining red blood cell distribution width (RDW) with conventional laboratory tests (B-type natriuretic peptide, creatinine, sodium and chloride).

Patients d	
< 5%	
5–10%	
> 10%	
Total	
Patients s	
< 5%	
5–10%	
> 10%	
Total	

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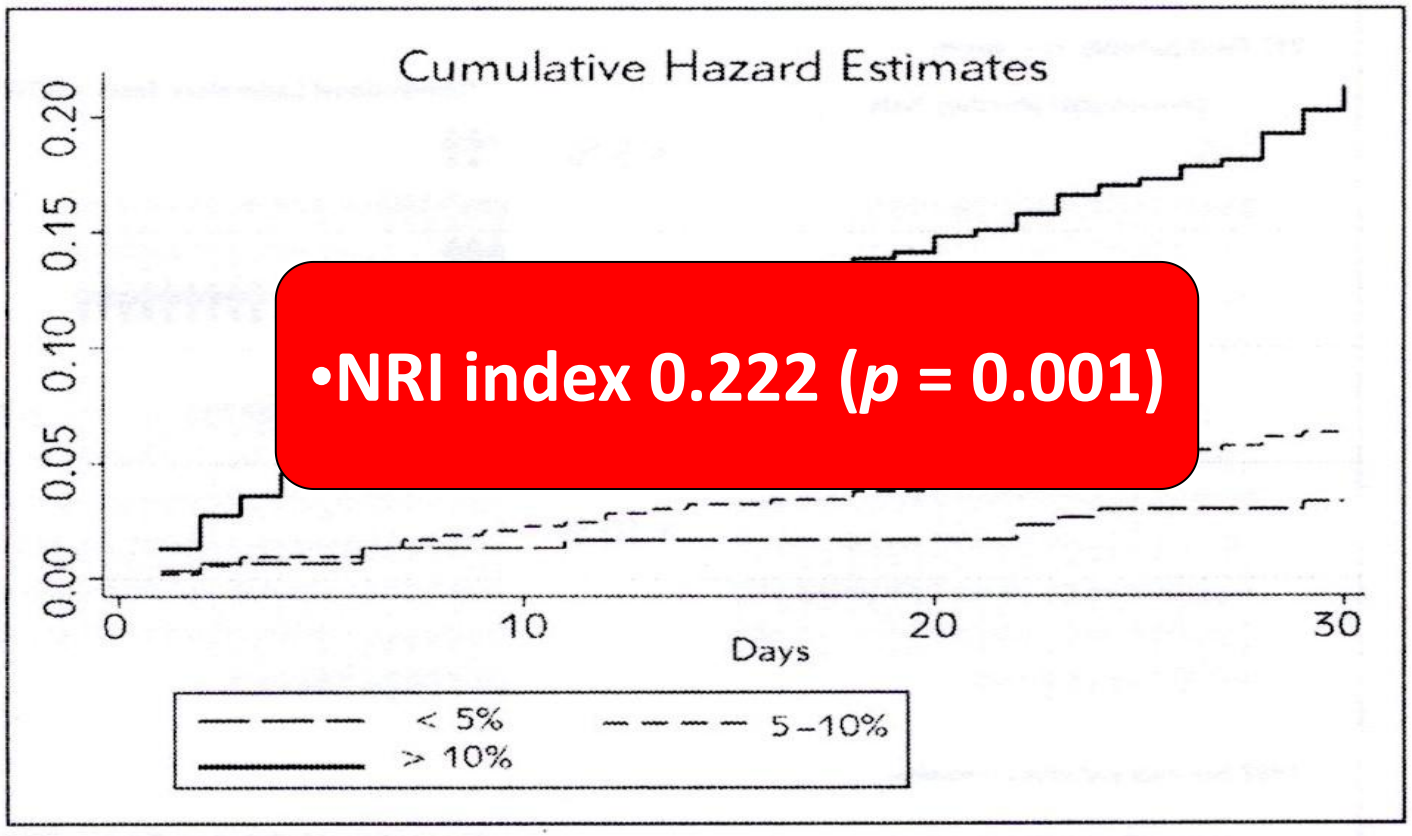
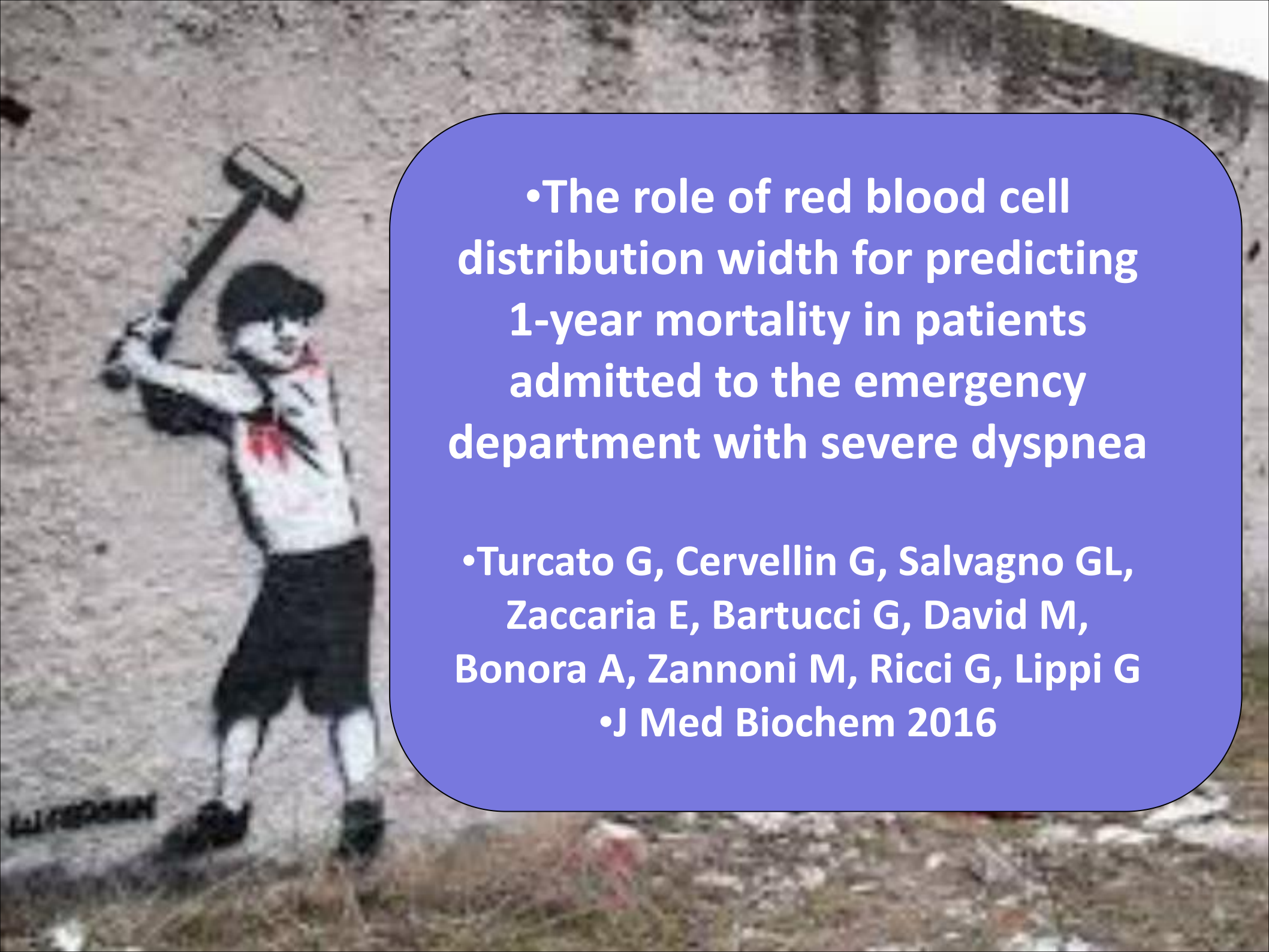


Figure 3 Survival curve analysis after including red blood cell distribution width (RDW) in a predictive model based on conventional laboratory tests (i.e., B-type natriuretic peptide, creatinine, sodium and chloride).

•**NRI index 0.222 (*p* = 0.001)**

•**Turcato G width improves reclassification of patients admitted to emergency department with acute decompensated heart failure. J Med Biochem 2016**



- The role of red blood cell distribution width for predicting 1-year mortality in patients admitted to the emergency department with severe dyspnea

- Turcato G, Cervellin G, Salvagno GL, Zaccaria E, Bartucci G, David M, Bonora A, Zannoni M, Ricci G, Lippi G
- J Med Biochem 2016

Table III Multivariate analysis including the significant predictors of 1-year mortality after emergency department (ED) admission for severe dyspnoea from the univariate analysis.

Variables			% CI	p
RDW			–2.162	0.001
Lactate	0.411	1.508	1.174–1.937	0.001
Heart rate >100	0.855	2.352	0.884–6.260	0.087
SpO_2 < 90%RDW	0.992	2.696	1.017–7.144	0.046

- mortalità a 1 anno
- 36 paz (12.5%)

- Turcato G, Cervellin G, Salvagno GL et al. The role of red blood cell distribution for predicting 1-year mortality in patients admitted to emergency department with severe dyspnoea. J Med Biochem 2016

•modello predittivo

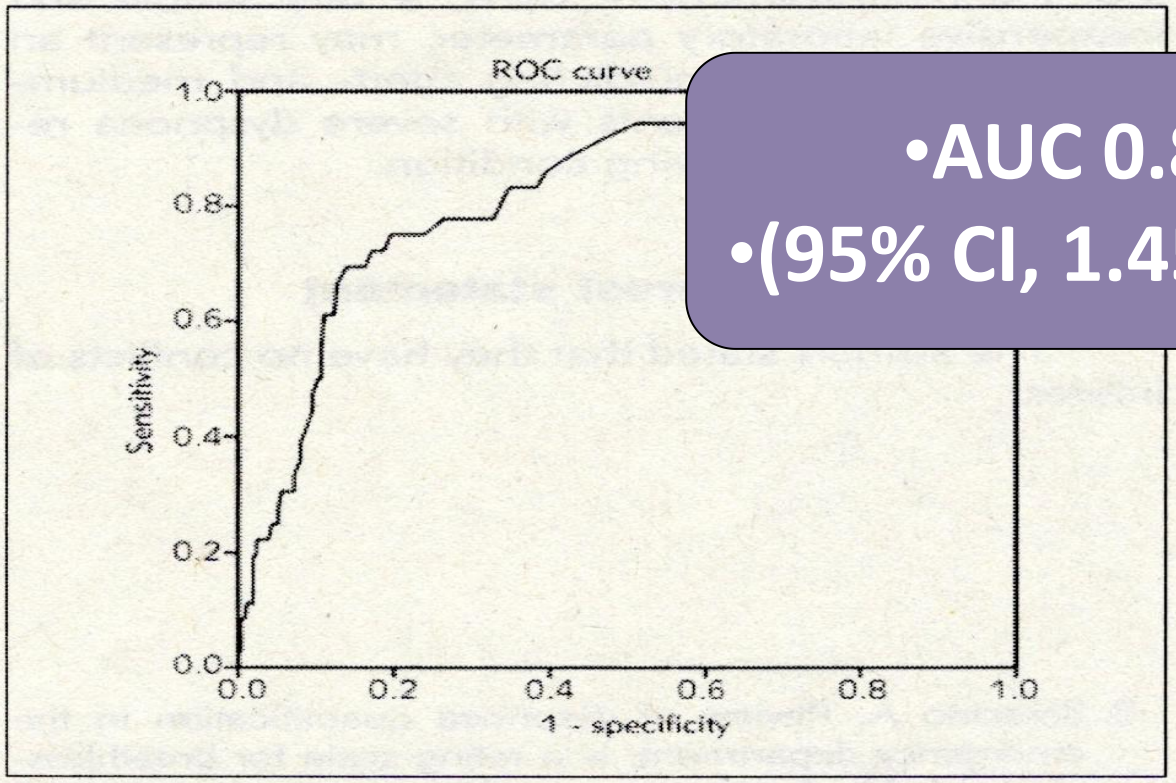


Figure 1 Receiver operating characteristics (ROC) curve analysis of red blood cell distribution width (RDW) for predicting 1-year mortality in patients admitted to the emergency department with severe dyspnoea.

•AUC 0.828

•(95% CI, 1.45 – 2.10)

•Turcato G, Cervellin G, Salvagno GL et al. The role of red blood cell distribution for predicting 1-year mortality in patients admitted to emergency department with severe dyspnoea. J Med Biochem 2016

•outcome mortalità

•sensibilità 87%

•specificità 59%

•RDW ≥ 15%

•adjusted OR 1.72

•(95% CI 1.37 – 2.16)

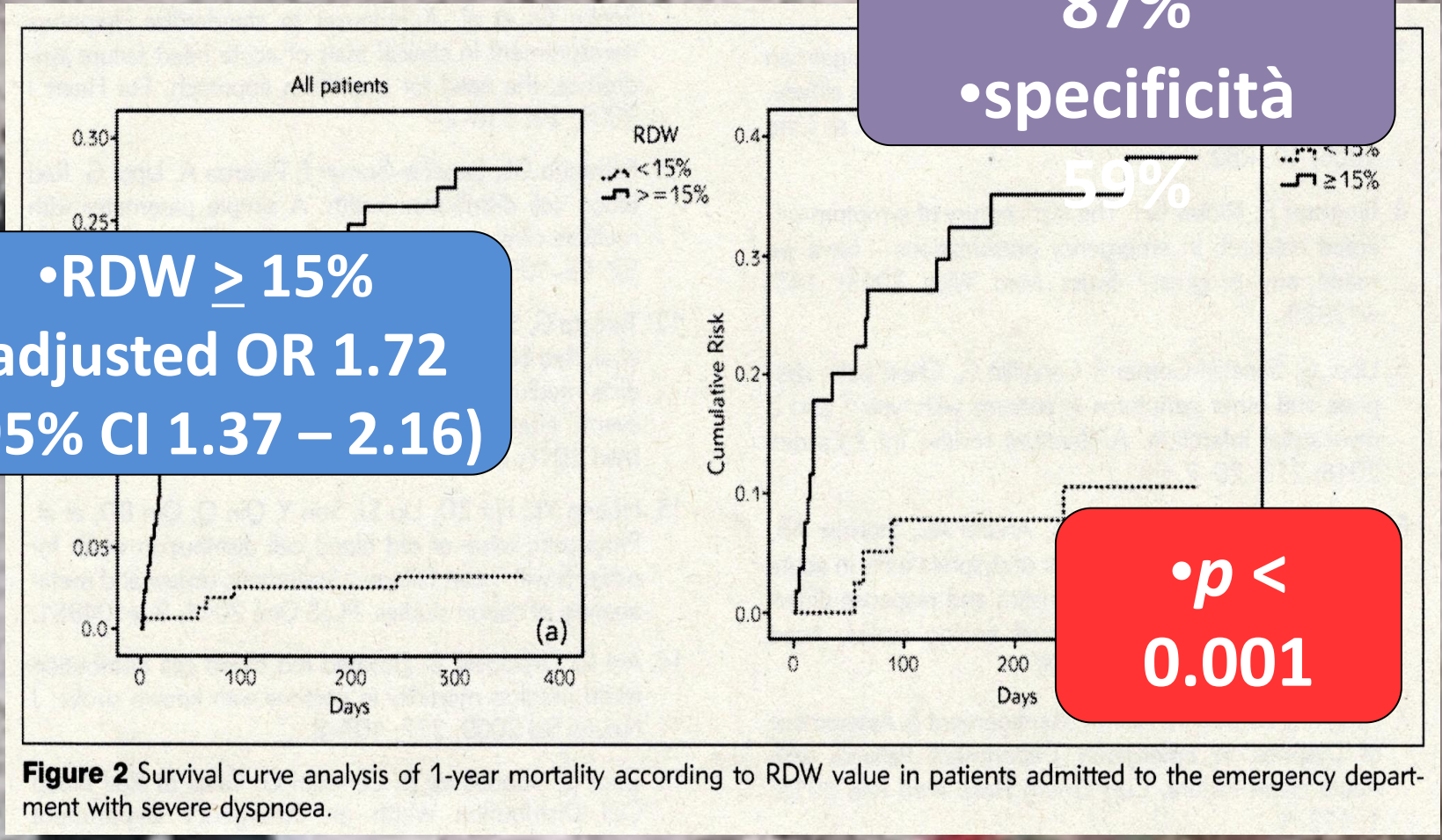


Figure 2 Survival curve analysis of 1-year mortality according to RDW value in patients admitted to the emergency department with severe dyspnoea.

•*p* < 0.001

•Turcato G, Cervellin G, Salvagno GL et al. The role of red blood cell distribution for predicting 1-year mortality in patients admitted to emergency department with severe dyspnoea. J Med Biochem 2016

RDW

A SIMPLE KIND OF MAN

MARKER