



Sindrome Coronarica Acuta nel diabetico: gestione dell' iperglicemia in Ospedale, dall' accesso alla dimissione



Roma,
9-11 novembre 2012

LA TERAPIA IN AREA INTENSIVA

Angelo Lauria Pantano (RM)

a.lauria@unicampus.it

PerCorso Diabete 3

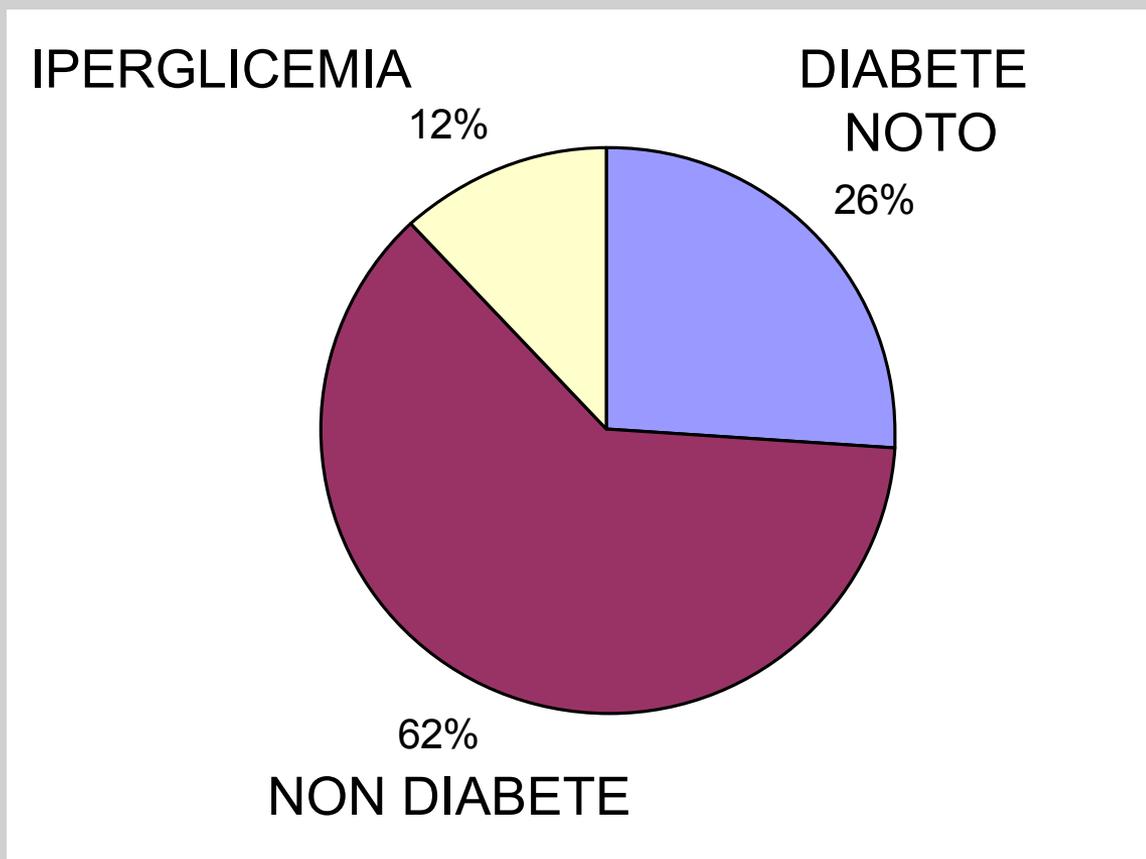
INDICE



- 1. VALORE PROGNOSTICO DELLA GLICEMIA**
- 2. TRATTAMENTO INTENSIVO**
- 3. QUALI TARGET**
- 4. COME TRATTARE**
- 5. PROSPETTIVE FUTURE**

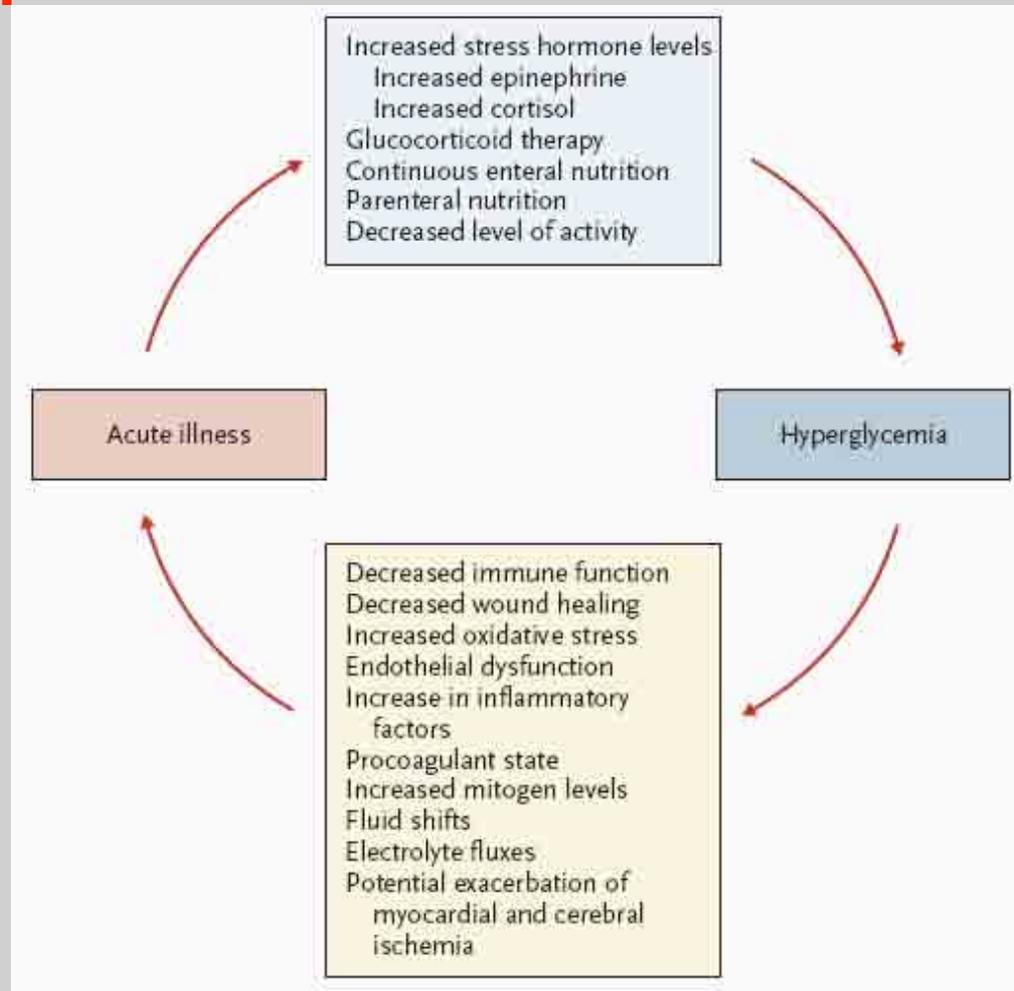
1. VALORE PROGNOSTICO DELLA GLICEMIA

PREVALENZA DELL'IPERGLICEMIA IN OSPEDALE



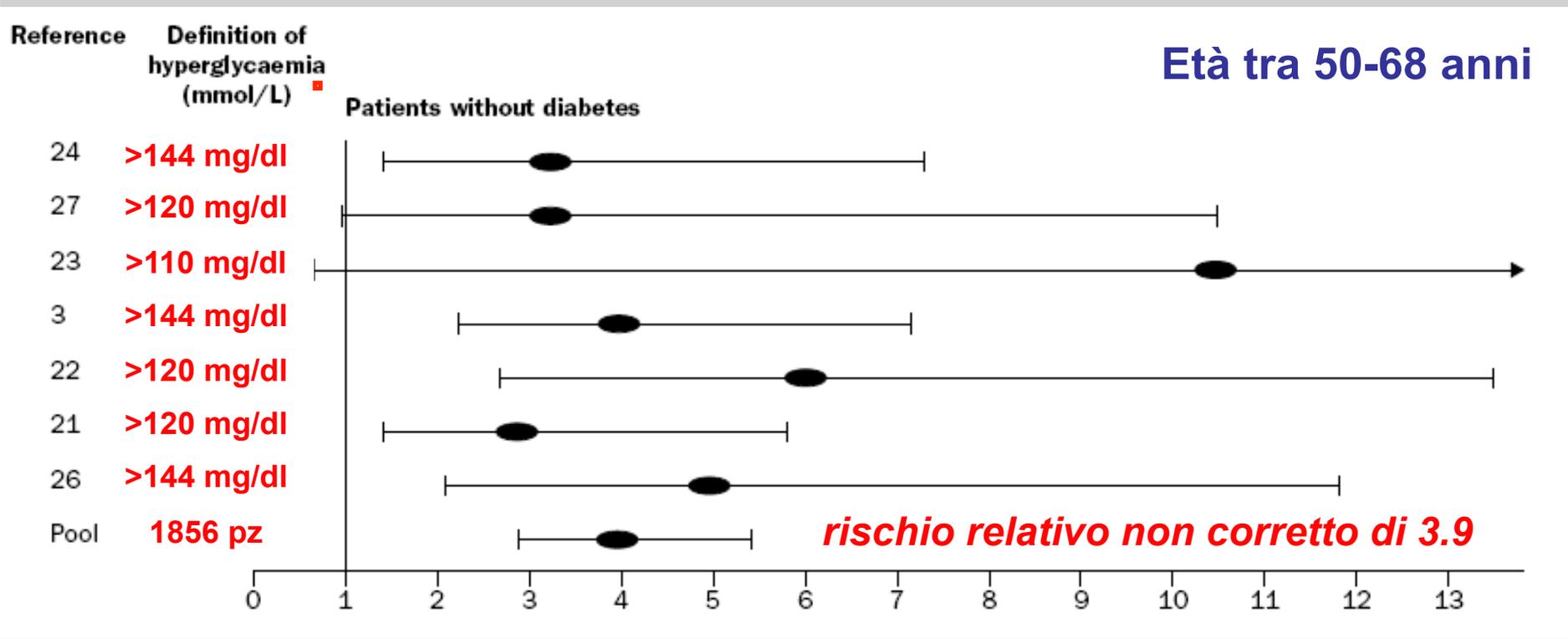
1. VALORE PROGNOSTICO DELLA GLICEMIA

IPERGLICEMIA DA “STRESS” E PATOLOGIE ACUTE



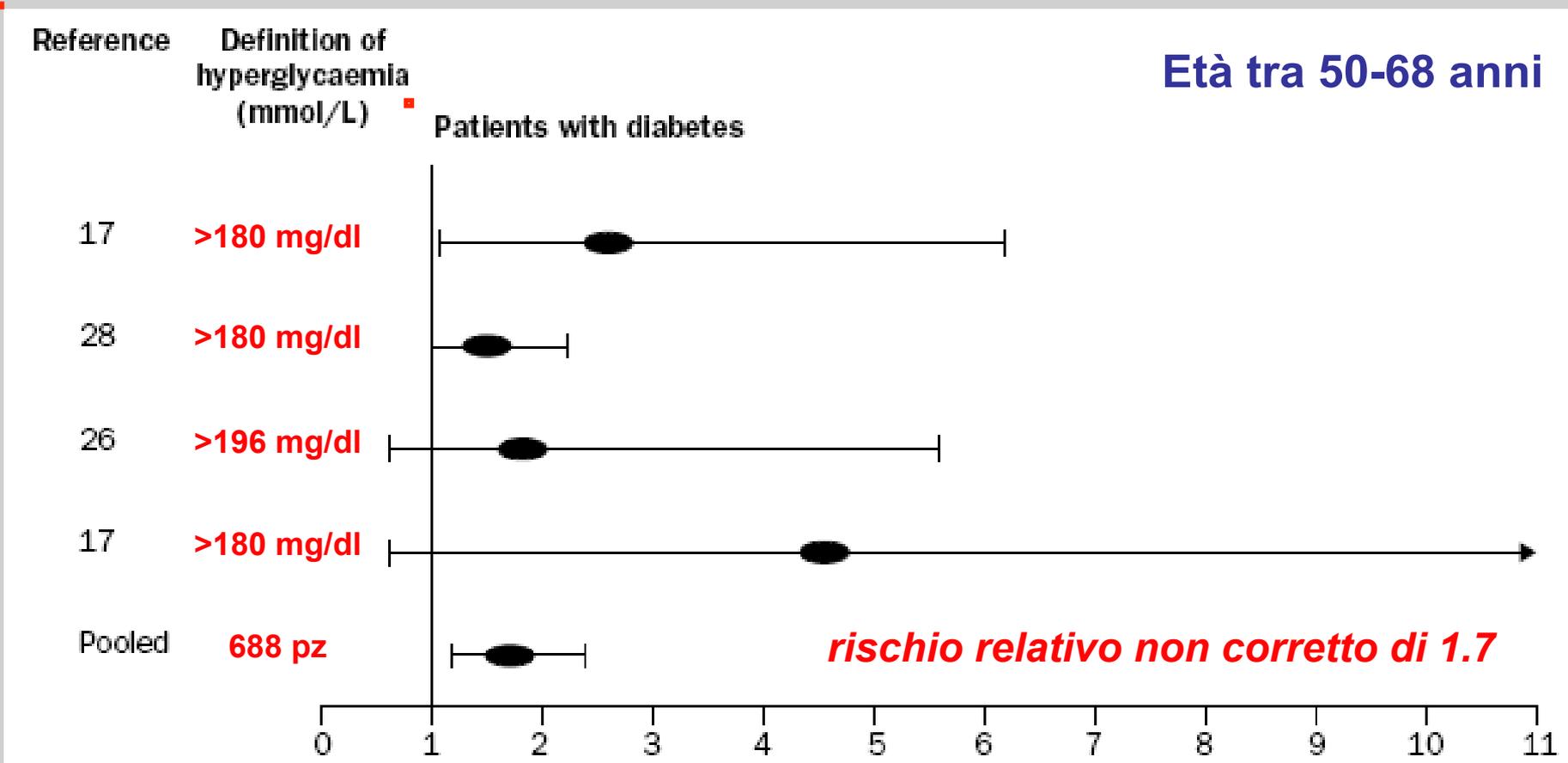
1. VALORE PROGNOSTICO DELLA GLICEMIA

IPERGLICEMIA AL MOMENTO DEL RICOVERO E MORTALITÀ OSPEDALIERA



1. VALORE PROGNOSTICO DELLA GLICEMIA

IPERGLICEMIA AL MOMENTO DEL RICOVERO E MORTALITÀ OSPEDALIERA



1. VALORE PROGNOSTICO DELLA GLICEMIA

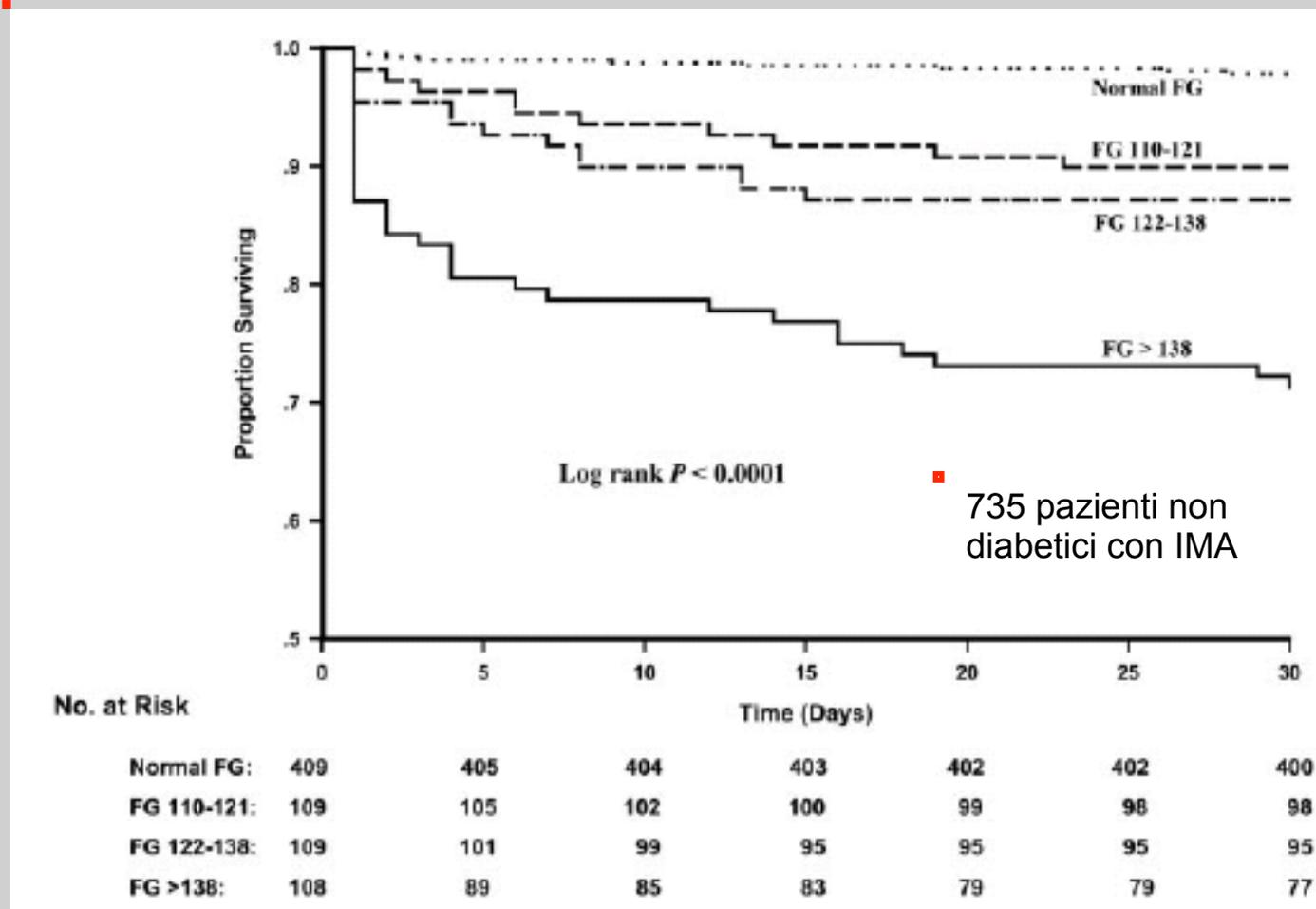
IPERGLICEMIA AL MOMENTO DEL RICOVERO E SCOMPENSO CARDIACO

Study	Outcome (CHF/Shock)	Definition of hyperglycaemia (mmol/L)	Unadjusted relative risk (95% CI)
Patients without diabetes			
Bellodi (22)	CHF	>10 >180mg/dl	2.98 (2.33–3.82)
Leor (25)	Shock	>10 >180 mg/dl	8.82 (5.39–14.43)
Lewandowicz (27)	CHF or shock	>8 >144 mg/dl	1.51 (0.77–2.98)
O'Sullivan (24)	CHF or shock	>8 >144 mg/dl	2.16 (1.48–3.15)
Patients with diabetes			
Leor (25)	Shock	>10 >180 mg/dl	0.97 (0.43–2.22)

CHF=congestive heart failure; Shock=cardiogenic shock.

1. VALORE PROGNOSTICO DELLA GLICEMIA

IPERGLICEMIA A DIGIUNO E MORTALITA' A 30 GIORNI



1. VALORE PROGNOSTICO DELLA GLICEMIA

IPERGLICEMIA A DIGIUNO O AL MOMENTO DEL RICOVERO?

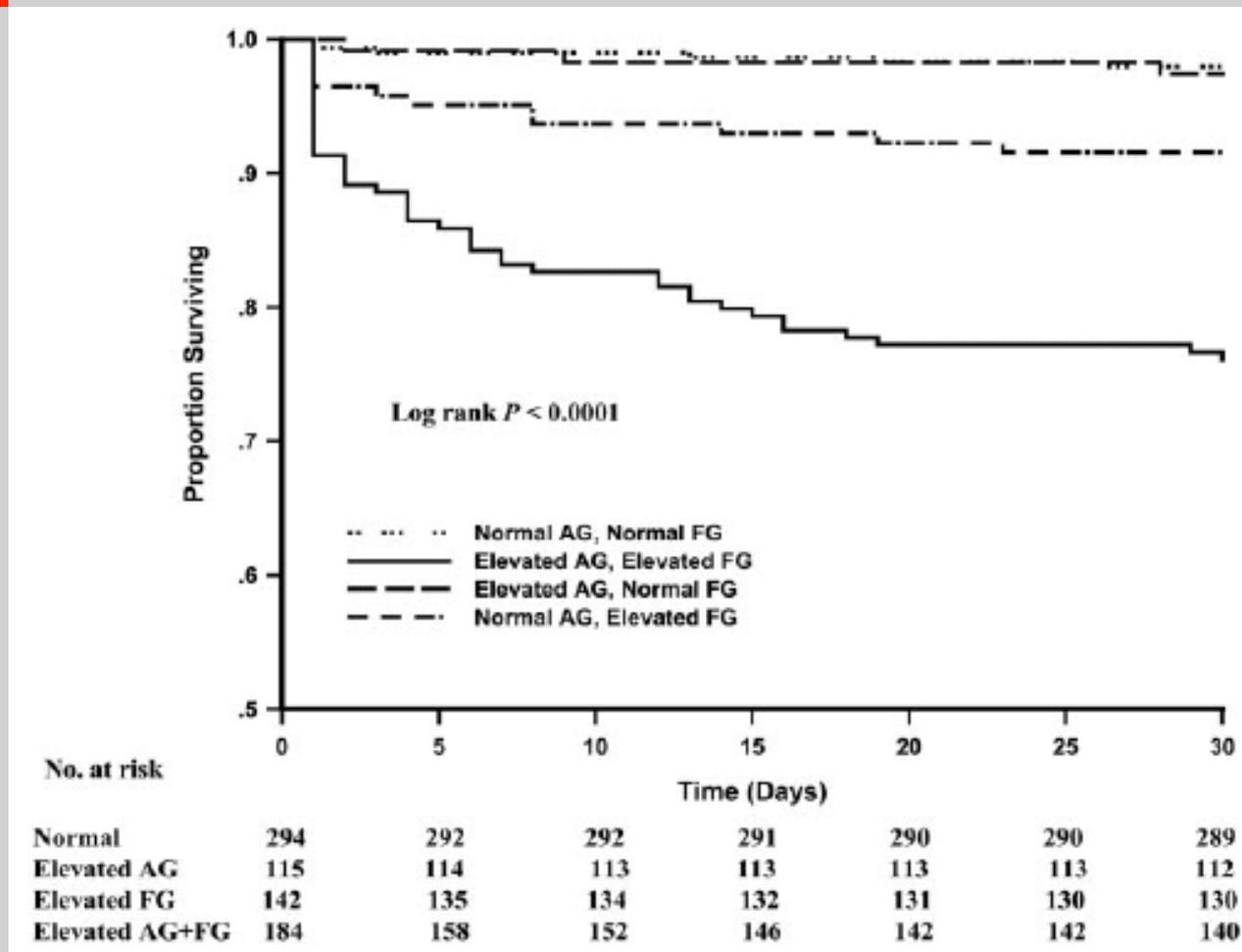
735 non diabetici con IMA

AG: glicemia al ricovero

Elevated AG: >140 mg/dl

FG: glicemia a digiuno

Elevated FG: > 110 mg/dl



1. VALORE PROGNOSTICO DELLA GLICEMIA

IPERGLICEMIA O EMOGLOBINA GLICOSILATA? (808 pazienti diabetici con IMA)

Variables	Predictor	Odds Ratio (95% CI)	p Value
Age (yrs) (mean ± SD)	Age	1.06 (1.03–1.09)	<0.0001
African-American	Systolic blood pressure	0.98 (0.97–0.99)	<0.0001
Women	Heart rate/5 beats	1.13 (1.05–1.21)	<0.001
Current smoker	Current smoker	0.29 (0.10–0.85)	0.02
Hypertension	Previous aspirin use	0.35 (0.18–0.67)	0.002
Previous myocardial infarction	Peak troponin/10 U	1.02 (1.01–1.03)	0.02
Previous coronary angioplasty	Admission glucose*		
Previous coronary bypass	Quartile 1	1.0	—
Previous congestive heart failure	Quartile 2	1.14 (0.37–3.46)	0.82
Previous stroke	Quartile 3	2.84 (1.04–7.76)	0.04
Previous peripheral vascular disease	Quartile 4	5.03 (1.90–13.26)	0.001
Previous renal insufficiency			
Average HbA1c within 2 yrs	* Admission glucose concentration from quartile 1 to 4: <161, 162 to 217, 218 to 300, and >301 mg/dl.		
Values at admission (mean ± SD)			
Systolic blood pressure (mm Hg)	136 ± 30	119 ± 34	<0.0001
Heart rate (beats/min)	84 ± 19	95 ± 22	<0.0001
Glucose (mg/dl)	234 ± 117	316 ± 143	<0.0001
Peak troponin I (ng/L)	111 ± 164	179 ± 215	0.0026

1. VALORE PROGNOSTICO DELLA GLICEMIA

FATTORI PREDDITTORI DI IPERGLICEMIA AL MOMENTO DEL RICOVERO NEI DIABETICI

Predictor	Admission Glucose Quartile (mg/dl)				Odds Ratio (95% CI)	p Value
	1 (<161) (n = 205)	2 (161–217) (n = 202)	3 (218–300) (n = 199)	4 (>301) (n = 202)		
Baseline insulin therapy (%)	55 (27)	69 (34)	78 (39)	95 (47)	1.72 (1.33–2.22)	<0.0001
Average glycohemoglobin within 2 yrs	7.7 ± 1.5	8.3 ± 1.7	8.5 ± 1.3	8.9 ± 1.8	1.36 (1.20–1.53)	<0.001
Admission heart rate/5 beats	79 ± 16	85 ± 22	85 ± 19	92 ± 19	1.11 (1.08–1.15)	<0.0001
Peak Troponin 1/10 U	88 ± 123	117 ± 163	120 ± 174	151 ± 209	1.02 (1.10–1.03)	<0.001
Current smoker (%)	57 (28)	40 (20)	44 (22)	38 (19)	0.73 (0.54–0.98)	0.04

1. VALORE PROGNOSTICO DELLA GLICEMIA

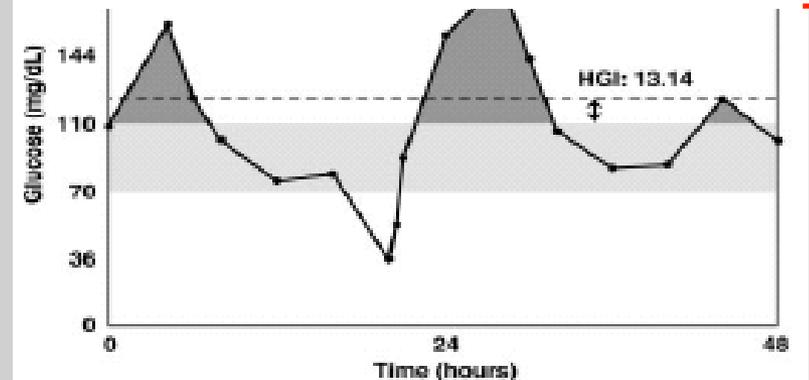
VS GLICEMIA

Glucose Metrics	All Patients		
	Died, n	Survived, n	Mortality Rate, %
Admission glucose, mg/dL			
<110	166	3204	4.93
110-<140	256	4592	5.28
140-<170	230	2629	8.04
170-<200	140	1491	8.58
≥200	539	3624	12.95
<i>P</i>			<0.001
Hospitalization mean glucose, mg/dL			
<110	113	3788	2.90
110-<140	293	5721	4.87
140-<170	296	2744	9.74
170-<200	187	1402	11.77
≥200	442	1885	18.99
<i>P</i>			<0.001

Glucose Metrics	All Patients		
	Died, n	Survived, n	Mortality Rate, %
A Hospitalization TAG, mg/dL			
<110	122	4326	2.74
110-<140	332	5722	5.48
140-<170	279	2511	10.00
170-<200	194	1337	12.67
≥200	404	1644	19.73
<i>P</i>			<0.001
B Hospitalization HGI			
0	55	1748	3.05
0-<30	382	8138	4.48
30-<60	288	2616	9.92
60-<90	201	1377	12.74
≥90	405	1661	19.60
<i>P</i>			<0.001

Table 1. Matrix of Glucose Metric–Time Window Combinations Evaluated

Time Window	Glucose Metric			
	Single Value	Mean	TAG	HGI
Admission	X			
First 24 h		X	X	X
First 48 h		X	X	X
Entire hospitalization		X	X	X



1. VALORE PROGNOSTICO DELLA GLICEMIA

POSSIBILE MECCANISMO PATOGENETICO

460 pazienti con STEMI sottoposti a PTCA primaria

Table 2. Initial TIMI Flow Grade According to Admission Glucose

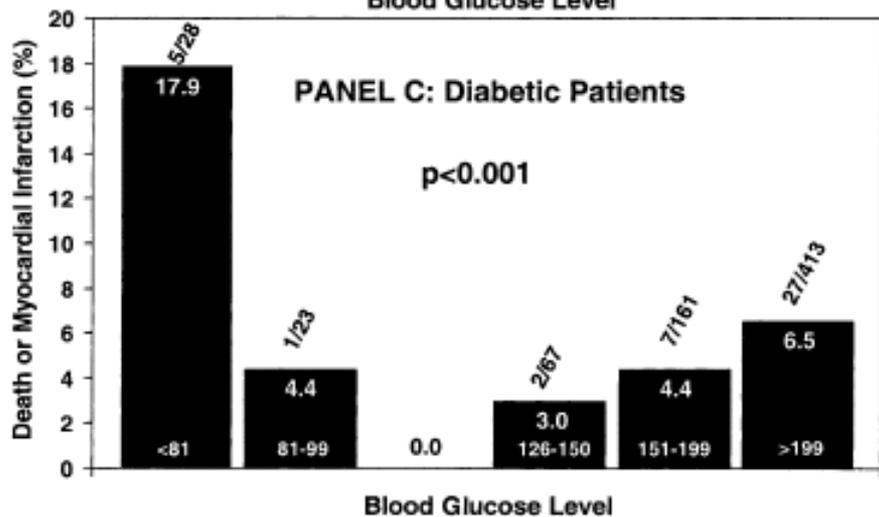
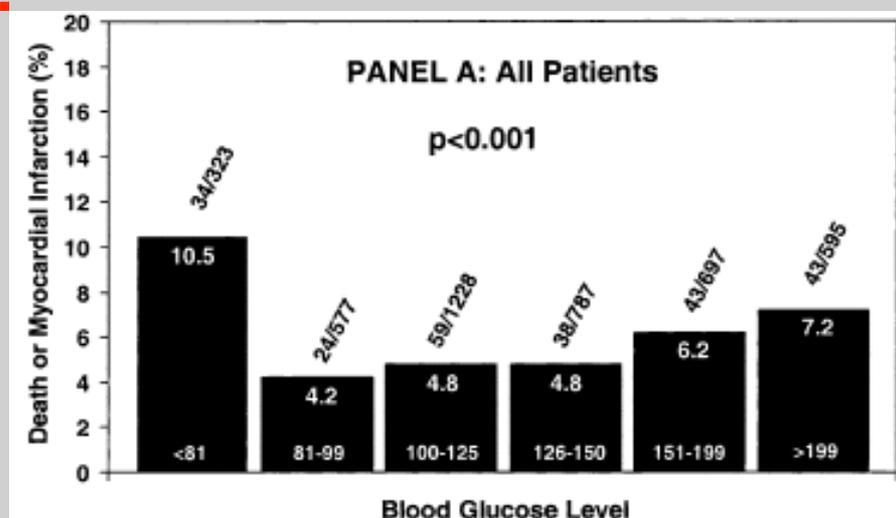
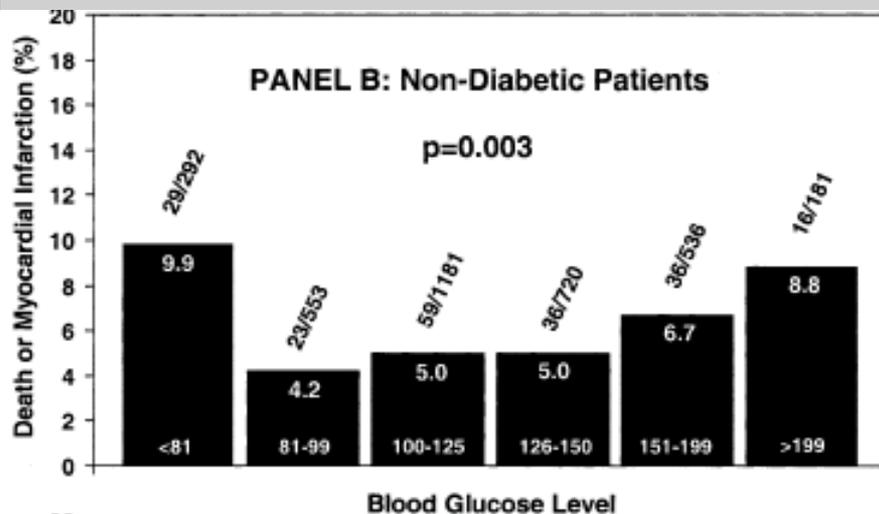
	Glucose <7.8 mmol/l (<140 mg/dl)	Glucose ≥7.8 mmol/l (≥140 mg/dl)	p Value
TIMI flow grade 3	38 (28%)	38 (12%)	<0.001*
TIMI flow grade 2	32 (23%)	65 (20%)	
TIMI flow grade 1	7 (5%)	42 (13%)	
TIMI flow grade 0	61 (44%)	177 (55%)	0.03†

Table 3. Multivariate Analysis of Initial TIMI Flow Grade 0 to 2

	Odds Ratio	95% CI	p Value
Hyperglycemia*	2.6	1.5–4.5	0.001
Non-smoking	1.6	0.9–3.0	0.13
Male gender	1.1	0.5–2.1	0.96
Age (per yr)	1.0	0.9–1.0	0.17
Diabetes	0.5	0.2–1.3	0.15

1. VALORE PROGNOSTICO DELLA GLICEMIA

U-SHAPED CURVE



4224 pazienti con STEMI.

Suddivisi arbitrariamente in:

Rischio Medio : glicemia tra 126 e 149 mg/dl

Rischio Moderato: glicemia tra 150 e 199 mg/dl

Rischio Alto: glicemia >199 mg/dl

Ipoglicemia: glicemia <81 mg/dl

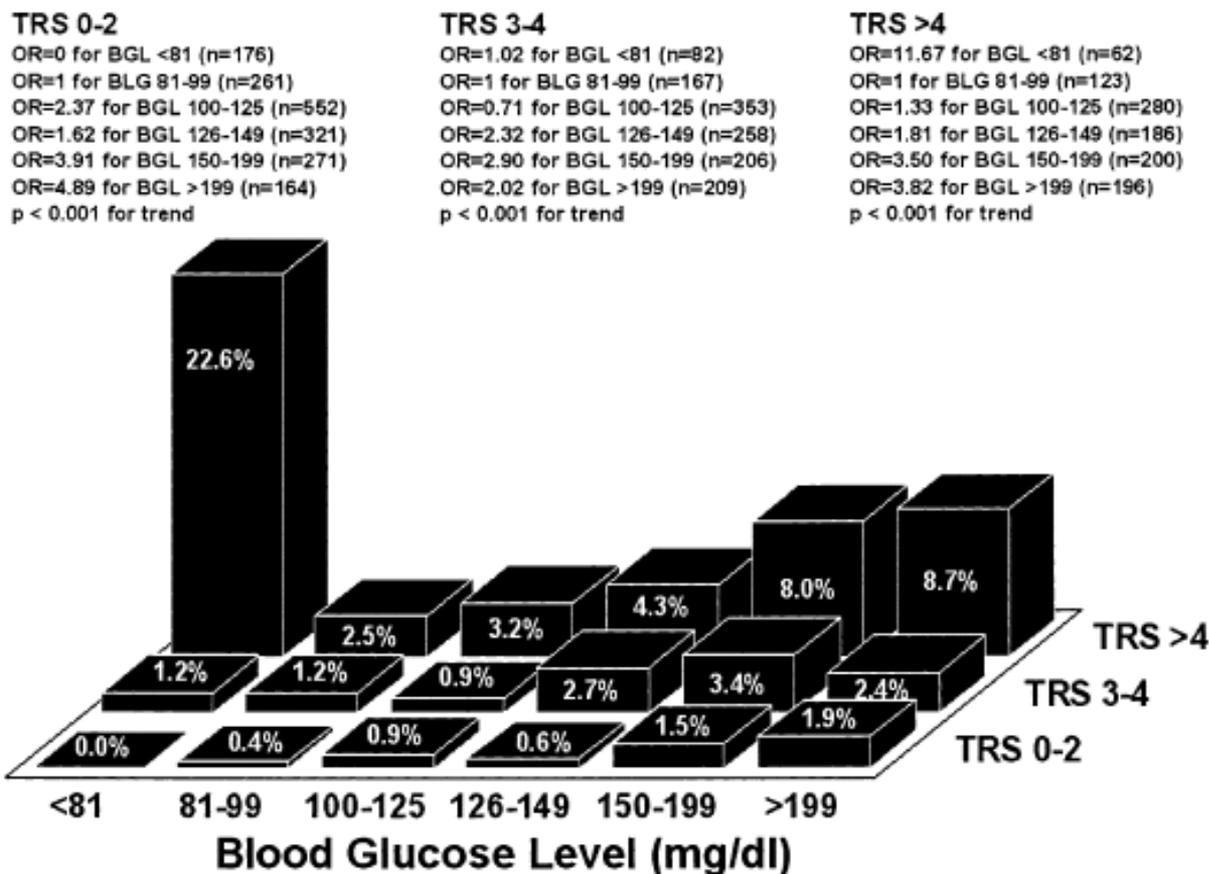
1. VALORE PROGNOSTICO DELLA GLICEMIA

RELAZIONE TRA GLICEMIA E MORTALITÀ A 30 GIORNI STRATIFICATA PER TIMI RISK SCORE

TIMI Risk Score (TRS) for Unstable Angina/Non-STEMI:

- Età ≥ 65 anni
- ≥ 3 fattori di rischio CAD
- CAD nota $\geq 50\%$
- Aspirina 7 giorni precedenti
- ≥ 2 angine 24 h precedenti
- Aumento enzimi cardiaci
- Elevazione ST ≥ 0.5 mm

Antman et al. JAMA 2000

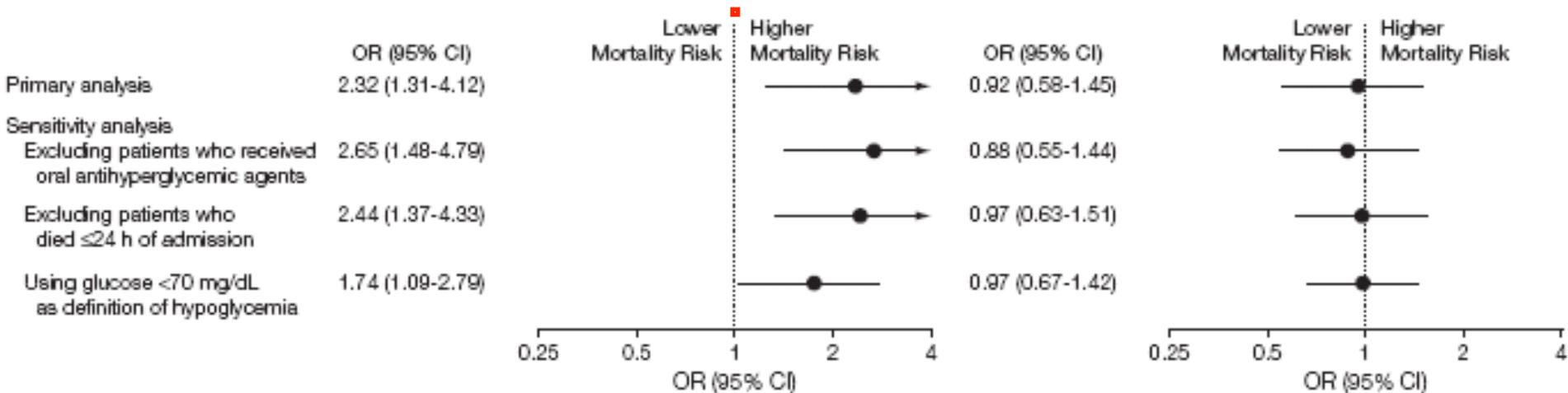


1. VALORE PROGNOSTICO DELLA GLICEMIA

IPOGLICEMIA SPONTANEA vs IATROGENA

Patients Not Treated With Insulin
(Hypoglycemia vs No Hypoglycemia)

Patients Treated With Insulin
(Hypoglycemia vs No Hypoglycemia)





1. VALORE PROGNOSTICO DELLA GLICEMIA



Roma,
9-11 novembre 2012

IPERGLICEMIA FATTORE PREDITTIVO DI MORTALITÀ NEI PAZIENTI CON SINDROME CORONARICA ACUTA:

- pazienti non diabetici > pazienti diabetici
- glicemia media > glicemia a digiuno > glicemia al ricovero
- indipendentemente dal valore di HbA1c

IPOGLICEMIA FATTORE PREDITTIVO DI MORTALITÀ NEI PAZIENTI CON SINDROME CORONARICA ACUTA:

- maggior peso rispetto all' iperglicemia nei diabetici
- ipoglicemia spontanea > iatrogena

INDICE



1. VALORE PROGNOSTICO DELLA GLICEMIA
2. TRATTAMENTO INTENSIVO
3. QUALI TARGET
4. COME TRATTARE
5. PROSPETTIVE FUTURE

2. TRATTAMENTO INTENSIVO



IL TRATTAMENTO INTENSIVO È EFFICACE NEL RIDURRE LA MORTALITÀ?

- TRIAL CLINICI IN PAZIENTI CON SCA
- TRIAL CLINICI IN PAZIENTI CRITICI
- STUDI OSSERVAZIONALI

2. TRATTAMENTO INTENSIVO

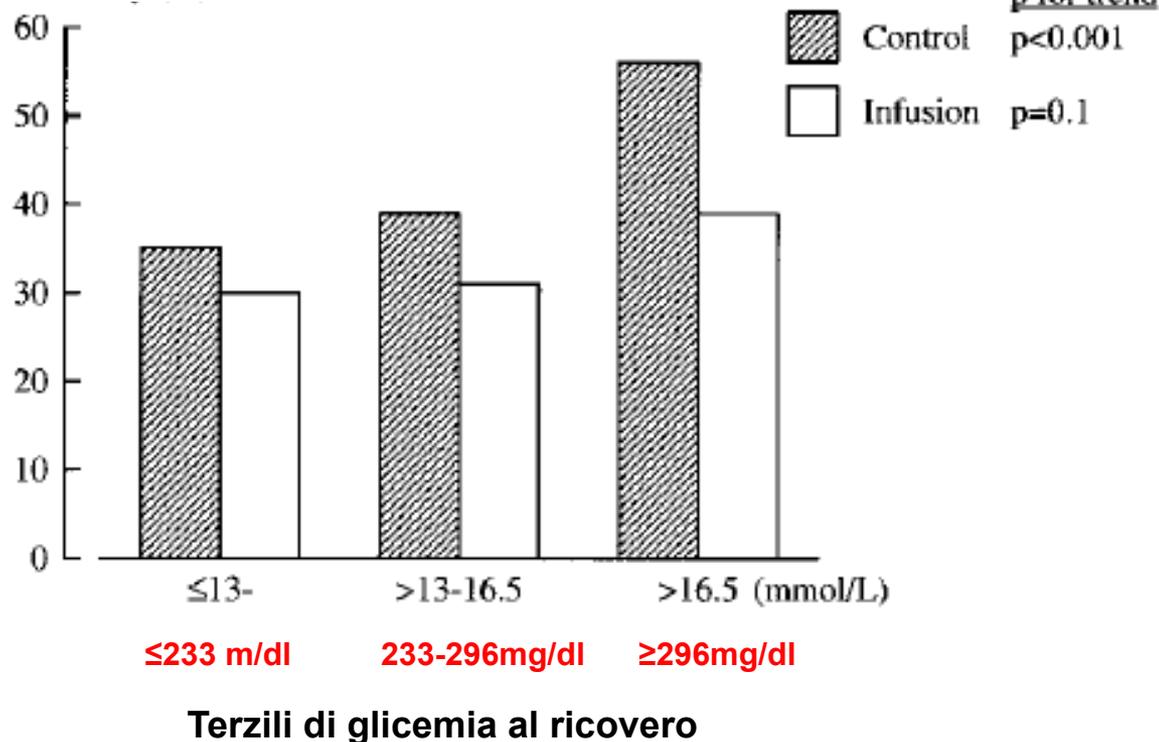
DIGAMI TRIAL

620 diabetici con IMA
66 (11%) con Diabete non noto

306 randomizzati a trattamento
 insulinico intensivo (**target
 glicemico 126-196 mg/dl**)

304 trattamento standard

Mortalità a lungo termine % (media 3.6 anni)



2. TRATTAMENTO INTENSIVO

DIGAMI TRIAL

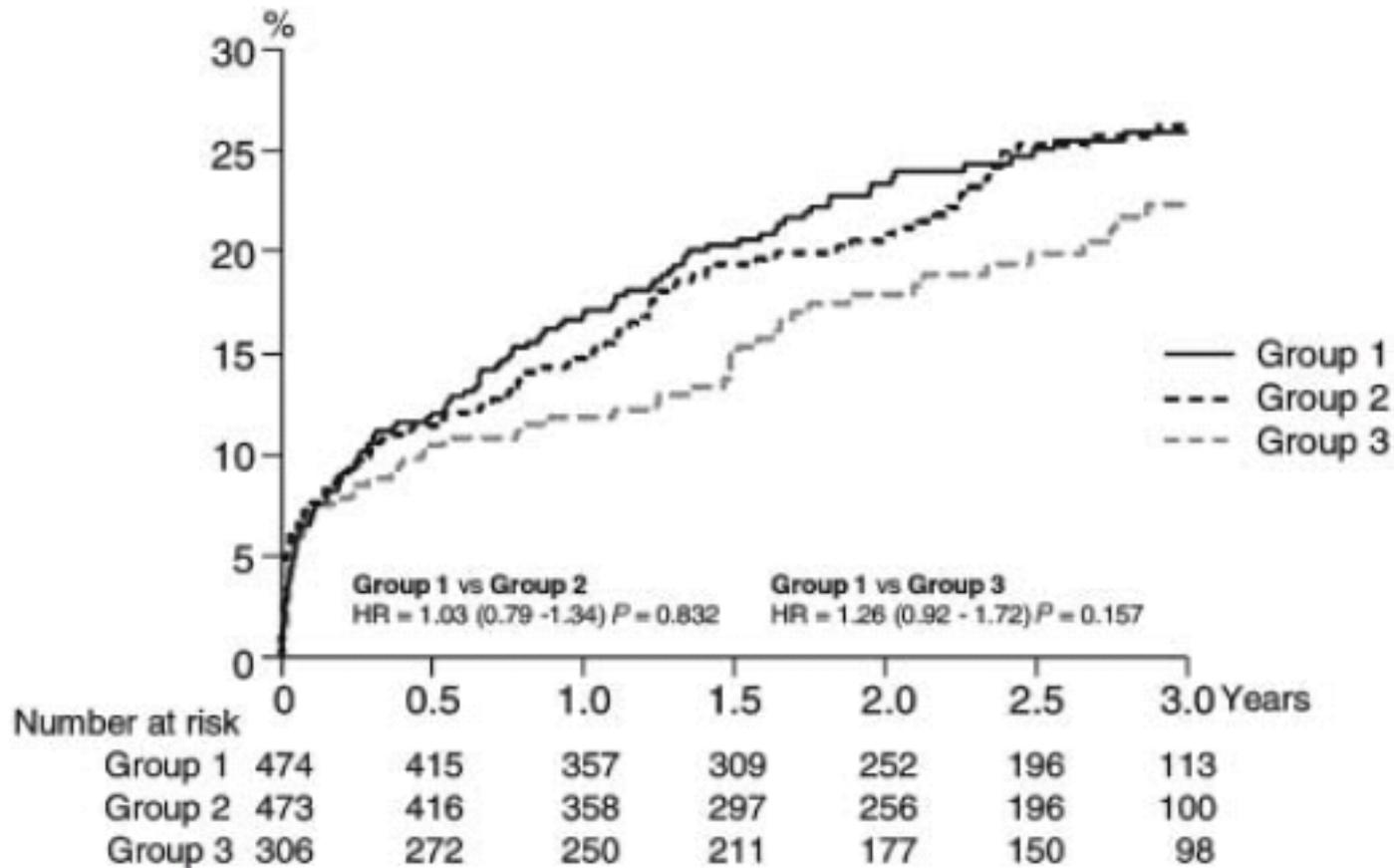
TABLE 4. Independent Associations Between Cardiovascular Risk Factors and Glucometabolic Markers With Long-Term Mortality by Multivariate Cox Regression Analysis

Parameter	Patient Groups					
	All (240 of 620)		Control (138 of 314)		Intensive Insulin (102 of 306)	
	RR (95% CI)	P	RR (95% CI)	P	RR (95% CI)	P
Age (1 added y)	1.08 (1.06–1.11)	<0.001	1.09 (1.06–1.12)	<0.001	1.08 (1.05–1.12)	<0.001
Male sex	1.12 (0.82–1.54)	0.46	0.97 (0.63–1.49)	0.88	1.44 (0.88–2.32)	0.15
Previous disease						
Myocardial infarction	1.22 (0.87–1.70)	0.25	1.10 (0.69–1.77)	0.68	1.40 (0.86–2.28)	0.16
Congestive heart failure	2.24 (1.60–3.14)	<0.001	2.37 (1.50–3.74)	<0.001	2.28 (1.33–3.73)	<0.01
Hypertension	1.01 (0.75–1.35)	0.96	1.15 (0.78–1.71)	0.48	0.86 (0.55–1.36)	0.52
Smoker	1.08 (0.69–1.68)	0.74	1.05 (0.57–1.93)	0.87	1.25 (0.62–2.52)	0.53
Diabetes duration (1 added y)	1.02 (1.01–1.03)	<0.01	1.01 (0.99–1.03)	0.21	1.03 (1.01–1.05)	<0.01
Admission						
Blood glucose, +1 mmol/L	1.06 (1.03–1.10)	<0.01	1.06 (1.01–1.11)	<0.05	1.05 (0.99–1.11)	0.065
Hb A _{1c} , +1%	1.09 (1.00–1.18)	0.054	1.15 (1.03–1.29)	<0.05	1.03 (0.90–1.17)	0.66

See Table 2 for explanation.

2. TRATTAMENTO INTENSIVO

DIGAMI-2 TRIAL



HI-2 TRIAL

240 pazienti con IMA e diabete o glicemia al ricovero >140 mg/dl

Intervento (ITG): an insulin/dextrose infusion to maintain the blood glucose between 72 and 180 mg/dL for at least 24 hours.

Controllo (CTG): standard therapy.

Risultati: nessuna differenza significativa in termini di mortalità ospedaliera (ITG 4.8%, CTG 3.5%, P 0.75), a 3 mesi (7.1 vs. 4.4%, P 0.42), o a 6 mesi (7.9 vs. 6.1%, P 0.62).

Più bassa incidenza di scompenso cardiaco durante il ricovero (12.7 vs. 22.8%, P 0.04) e di reinfarto a 3 mesi (2.4 vs. 6.1%, P 0.05) nel gruppo ITG.

	24-h mean blood glucose ≤144 mg/dl	24-h mean blood glucose level ≥8.1 mmol/l	Signifi- cance	Adjusted odds ratio (95% CI)*	P
Inpatient mortality	0%	7%	0.05	7.2 (0.9–58.9)	0.07
3-month mortality	2%	9%	0.05	4.7 (1.0–22.4)	0.05
6-month mortality	2%	11%	0.02	5.6 (1.2–26.1)	0.03

*Adjusted for age, sex, and cardiac intervention (PTCA or thrombolysis).

2. TRATTAMENTO INTENSIVO

CREATE-ECLA Randomized Controlled Trial

Outcome	No. (%)		Hazard Ratio (95% Confidence Interval)	P Value
	Usual Care Only (n = 10 107)	Glucose-Insulin-Potassium Infusion (n = 10 088)		
30 Days				
Death	976 (9.7)	1004 (10.0)	1.03 (0.95-1.13)	.45
Nonfatal cardiac arrest	151 (1.5)	139 (1.4)	0.93 (0.74-1.17)	.51
Cardiogenic shock	640 (6.3)	667 (6.6)	1.05 (0.94-1.17)	.38
Reinfarction	246 (2.4)	236 (2.3)	0.98 (0.82-1.17)	.81
Death or cardiac arrest	1108 (11.0)	1119 (11.1)	1.01 (0.93-1.10)	.73
Death or cardiogenic shock	1182 (11.7)	1212 (12.0)	1.03 (0.95-1.12)	.45
Death or reinfarction	1154 (11.4)	1179 (11.7)	1.03 (0.95-1.12)	.49
7 Days				
Death	771 (7.6)	816 (8.1)	1.06 (0.96-1.17)	.22
Nonfatal cardiac arrest	139 (1.4)	126 (1.2)	0.91 (0.72-1.16)	.45
Cardiogenic shock	608 (6.0)	628 (6.2)	1.04 (0.93-1.16)	.49
Reinfarction	202 (2.0)	190 (1.9)	0.96 (0.79-1.17)	.70
Death or cardiac arrest	900 (8.9)	926 (9.2)	1.03 (0.94-1.13)	.48
Death or cardiogenic shock	1012 (10.0)	1056 (10.5)	1.06 (0.97-1.16)	.18
Death or reinfarction	920 (9.1)	965 (9.6)	1.06 (0.97-1.16)	.23

Table 1. Summary of randomized clinical trials of management of hyperglycemia with insulin therapy in ACS and non-ACS patients

Clinical trial	Year	Study population	Intervention	n	Primary endpoint	Results (intensive vs control)	P value
DIGAMI [38]	1995	ACS	Intensive IV insulin (24 h) followed by SC insulin vs conventional treatment	620	Mortality at 3 months	12.4 % vs 15.6 %	NS
Fath-Ordoubadi et al (meta-analysis) [39]	1997	ACS	GIK therapy vs placebo	1932	In-hospital mortality	16.1 % vs 21.0 %	0.004
ECLA-GIK [40]	1998	ACS	High-dose GIK vs low-dose GIK vs no GIK (control)	407	In-hospital mortality	6.7 % (both GIK arms) vs 11.5 %	NS
GIPS [42]	2003	STEMI	GIK infusion (8-12 h) vs no GIK infusion	940	Mortality at 30 days	4.8 % vs 5.8 %	0.50
CREATE-ECLA [43]	2005	STEMI	GIK infusion (24 h) vs no GIK infusion	20201	Mortality at 30 days	10.0 % vs 9.7 %	0.45
DIGAMI-2 [44•]	2005	ACS	Intensive IV insulin (24 h) followed by SC insulin vs IV insulin (24 h) only vs conventional treatment	1253	Mortality during follow-up (median 2.1 years)	23.4 % vs 22.6 % vs 19.1 %	NS
GIPS-2 [45]	2006	STEMI (Killip Class I)	GIK infusion (8-12 h) vs no GIK infusion	889	Mortality at 30 days	2.9 % vs 1.8 %	0.27
HI-5 [46]	2006	ACS	Intensive IV insulin therapy 24 h (glucose 72-180 mg/dL) vs standard care	244	In-hospital mortality	4.8 % vs 3.5 %	0.75
Van den Berghe et al. (medical) [47]	2006	Medical patients admitted to ICU	Intensive IV insulin (target 80-110 mg/dL) vs conventional treatment (target 180-200 mg/dL)	1200	In-hospital mortality	37.3 % vs 40.0 %	0.33
OASIS-6 GIK [48]	2007	STEMI	GIK infusion (24 h) vs no GIK infusion	2748	Mortality at 30 days	7.6 % vs 6.7 %	0.36
Wiener et al. (meta-analysis) [50]	2008	Intensive care patients	Tight vs usual glucose care control	8432	In-hospital mortality	21.6 % vs 23.3 %	NS
NICE-SUGAR [51••]	2009	Patients admitted to ICU	Intensive IV insulin therapy (glucose 81-108 mg/dL) vs conventional (glucose <180 mg/dL)	6104	Mortality at 90 days	27.5 % vs 24.9 %	0.02
CHIPS [36]	2010	ACS	IV insulin (glucose 80-120 mg/dL) vs SC insulin (glucose <180 mg/dL)	115	Platelet reactivity at discharge (following stimuli with 20 μM ADP)	47.9 % vs 59.1 %	0.002
IMMEDIATE [52•]	2012	ACS	Prehospital GIK therapy vs placebo	911	Progression to MI	48,7 vs 52,6 %	0.28

- 3.1.3.1 *Very low-quality evidence from three studies, with a total of 1640 patients, showed that intensive insulin did not significantly reduce overall mortality compared with standard care after a follow-up of up to 3.4 years (RR 1.03, 95% confidence interval [CI] 0.65 to 1.62).*
- 3.1.3.2 *Very low-quality evidence from two studies, with a total of 860 patients, showed that intensive insulin did not significantly reduce inpatient mortality compared with standard care (RR 0.87, 95% CI 0.56 to 1.36).*
- 3.1.3.3 *Very low-quality evidence from two studies, with a total of 860 patients, showed that intensive insulin did not significantly reduce mortality compared with standard care at a 3-month follow-up (RR 0.95, 95% CI 0.52 to 1.76).*
- 3.1.3.6 *Very low-quality evidence from two studies, with a total of 1401 patients, showed that hypoglycaemic events were significantly more likely in the intensive insulin group than in the standard care group during the initial 24 hours of treatment (RR 19.32, 95% CI 5.79 to 64.41).*

Issue date: October 2011

Hyperglycaemia in acute coronary syndromes

Management of hyperglycaemia in people with acute coronary syndromes

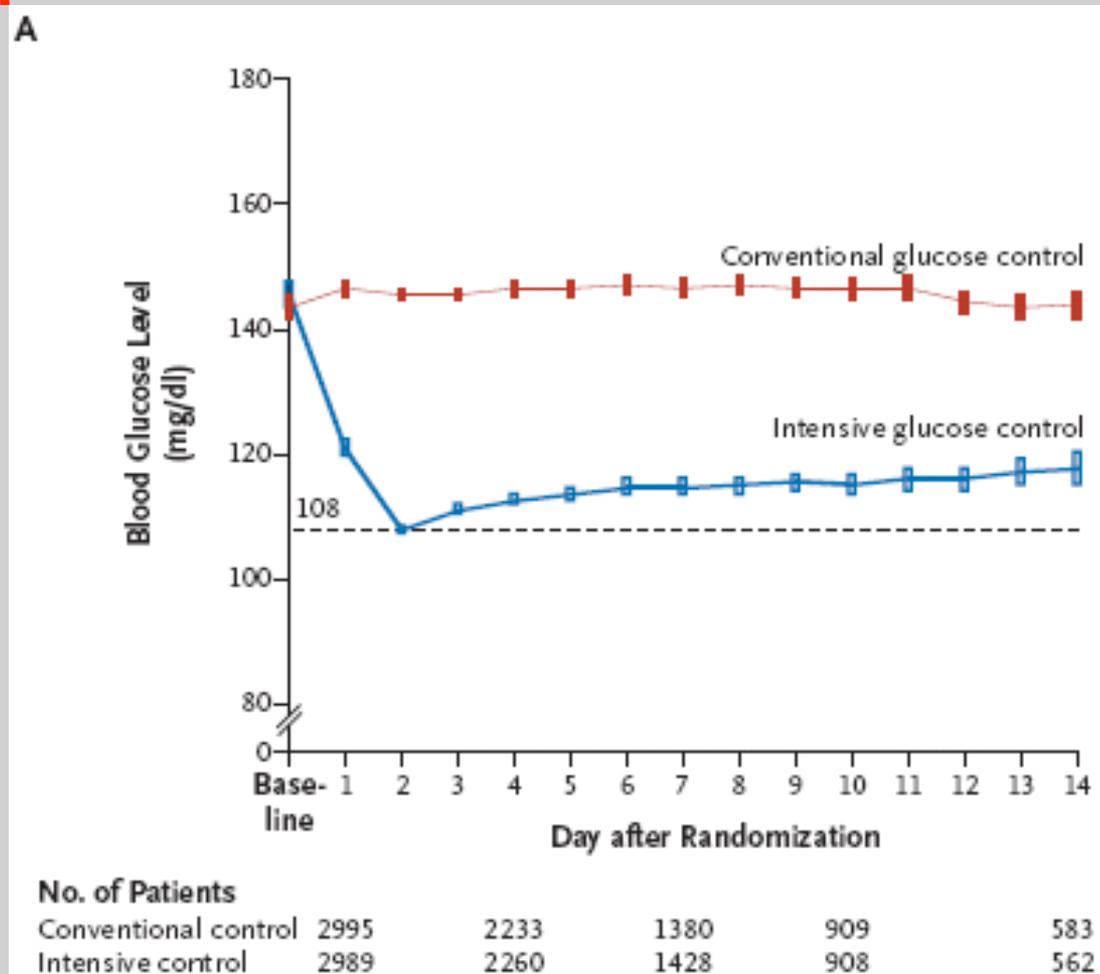
INDICE



1. VALORE PROGNOSTICO DELLA GLICEMIA
2. TRATTAMENTO INTENSIVO
3. QUALI TARGET
4. COME TRATTARE
5. PROSPETTIVE FUTURE

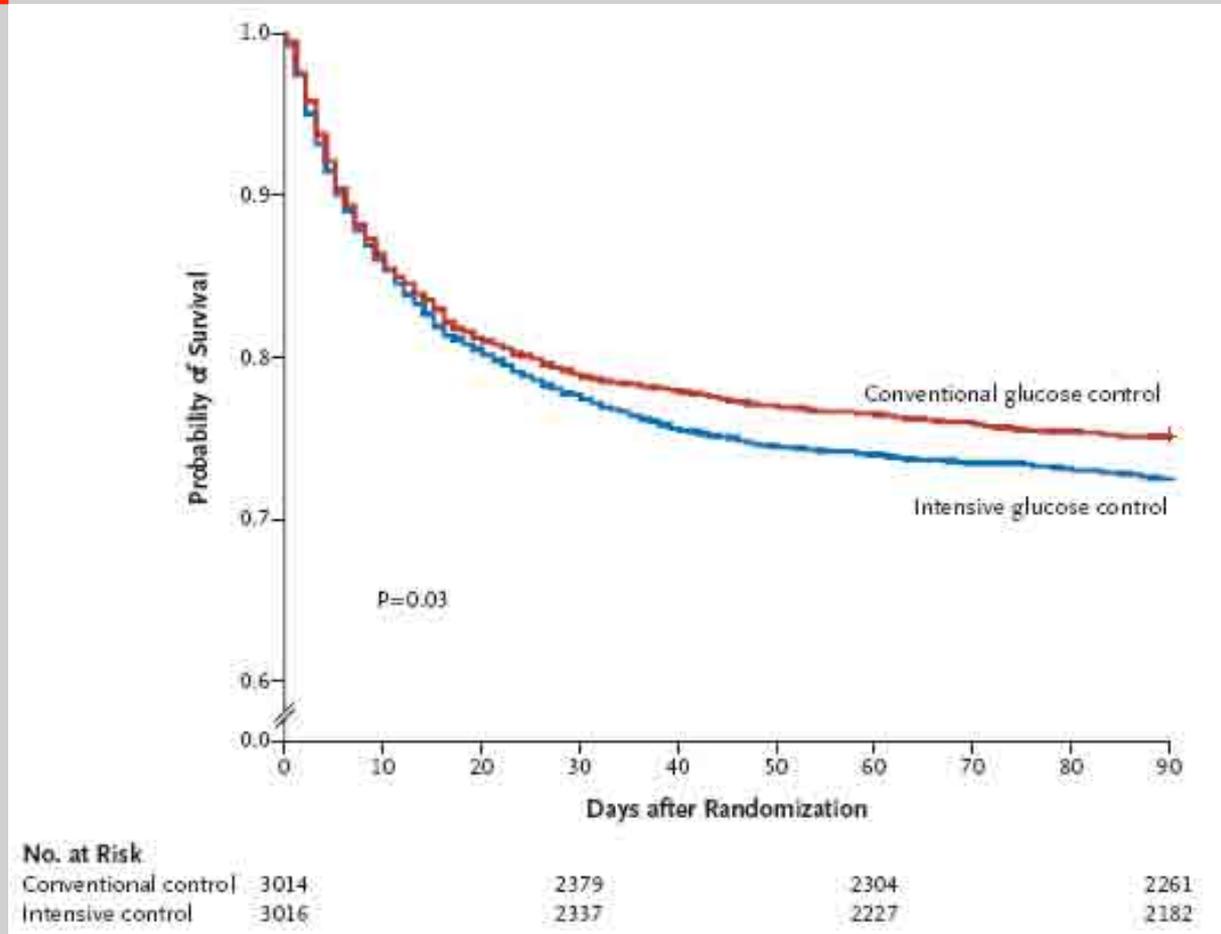
3. QUALI TARGET

NICE-SUGAR TRIAL



2. TRATTAMENTO INTENSIVO

NICE-SUGAR TRIAL



3. QUALI TARGET

1. INIZIARE LA TERAPIA INSULINICA PER VALORI GLICEMICI SUPERIORI A 180 mg/dl

2. MANTENERE I VALORI GLICEMICI IN UN RAGE COMPRESO TRA 140-180 mg/dl

3. TARGET INFERIORI (110-140 mg/dl) SONO ACCETTABILI IN PAZIENTI SELEZIONATI

**4. OBIETTIVI PIÙ RIGIDI (<110 mg/dl) NON SONO SICURI;
VALORI >180 (200) mg/dl NON SONO ACCETTABILI.**

INDICE



- 1. VALORE PROGNOSTICO DELLA GLICEMIA**
- 2. TRATTAMENTO INTENSIVO**
- 3. QUALI TARGET**
- 4. COME TRATTARE**
- 5. PROSPETTIVE FUTURE**

4. COME TRATTARE

Reviews/Commentaries/ADA Statements

CONSENSUS STATEMENT

American Association of Clinical Endocrinologists and American Diabetes Association Consensus Statement on Inpatient Glycemic Control

European Guidelines on cardiovascular disease prevention in clinical practice (version 2012)

The Fifth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of nine societies and by invited experts)

STANDARD ITALIANI
PER LA CURA DEL
DIABETE MELLITO

2009-2010

IV insulin infusions

In the critical care setting, continuous IV insulin infusion has been shown to be the most effective method for achieving specific glycemic targets (8). Because of the very short half-life of circulating insulin, IV delivery allows rapid dosing adjustments to address alterations in the status of patients.

Subcutaneously administered insulin

Scheduled subcutaneous administration of insulin is the preferred method for achieving and maintaining glucose control in non-ICU patients with diabetes or stress hyperglycemia. The recommended

th
ev

In pazienti critici e/o che non si alimentano per os, nel periodo perioperatorio e in situazioni di grave instabilità metabolica, la terapia insulinica deve essere effettuata in infusione venosa continua, applicando algoritmi basati su frequenti controlli dei valori glicemici e validati nel contesto di applicazione. (**Livello della prova VI, Forza della raccomandazione B**)

Consensus statement on the care of the hyperglycaemic/diabetic patient during and in the immediate follow-up of acute coronary syndrome

B. Vergès^{a,*}, A. Avignon^b, F. Bonnet^c, B. Catargi^d, S. Cattan^e, E. Cosson^f, G. Ducrocq^g, M. Elbaz^h, A. Fredenrichⁱ, P. Gourdy^j, P. Henry^k, O. Lairez^h, A.M. Leguerrier^c, C. Monpère^l, P. Moulin^m, B. Vergès-Patoisⁿ, R. Roussel^o, G. Steg^g, P. Valensi^f, Diabetes and Cardiovascular Disease study group of the *Société francophone du diabète* (SFD), in collaboration with the *Société française de cardiologie* (SFC)

Consensus statement (Diabetes care in intensive care unit)

1. In cases of *unknown diabetes*, continuous insulin treatment has to be initiated when admission blood glucose level is greater or equal to 180 mg/dL (10.0 mmol/L; Level A).
2. In cases of *previously known diabetes*:
 - continuous insulin treatment has to be initiated when the admission blood glucose is greater or equal to 180 mg/dL (10.0 mmol/L) and/or preprandial glucose is greater or equal to 140 mg/dL (7.77 mmol/L) during follow-up in an intensive care unit (Level A);
 - all other antidiabetic treatments should be stopped during hospitalization in a cardiology intensive care unit (professional agreement);

- if the patient had known diabetes treated with insulin and admission blood glucose less than 180 mg/dL (10.0 mmol/L) and/or preprandial glucose less than 140 mg/dL (7.7 mmol/L) during follow-up in an intensive care unit, the insulin regimen used prior to hospitalization can be continued (professional agreement).

4. COME TRATTARE

QUALE SCHEMA INSULINICO?

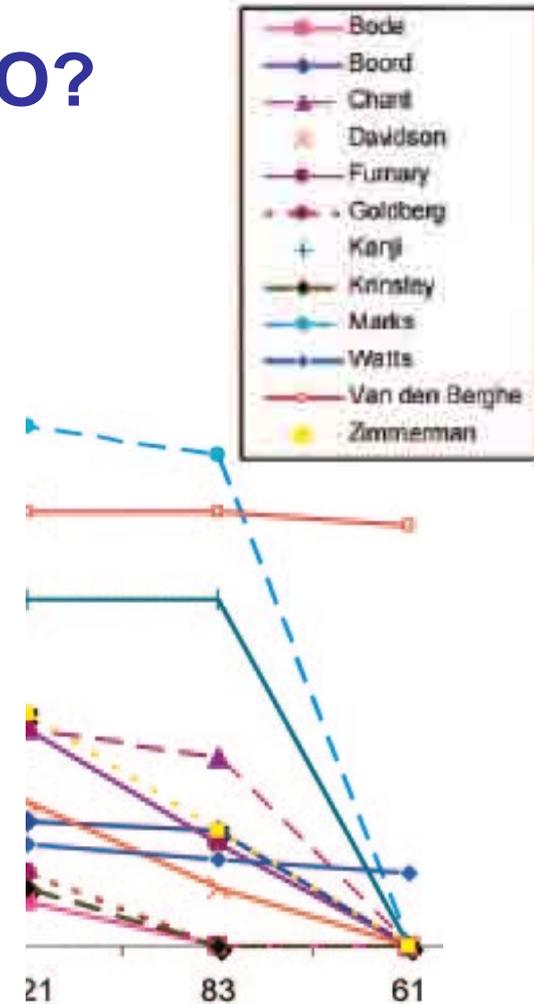
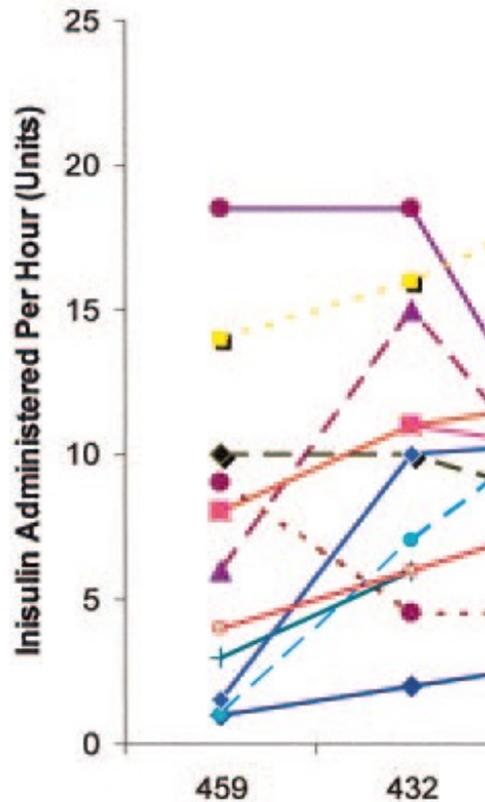
Author	Target glucose (mg/dl)	Bolus (units)	Initial infusion rate (units/h)	Highest hourly dose (units)	Total insulin dose (units)	Steps for insulin adjustment [n/calculations (Y/N)]	Time to goal glucose
Bode	100–150	0*	8	11	45	3/N	NR
Boord	120–180	0	1	4.3	26.9	1/Y	NR
Chant	90–144	0	6	15	63.5	2/Y	15 h
Davidson	<180	0	8	12.3	66.3	3/Y	7.5–10.5 h
Fumary	100–150	12	6.5	18.5	78	2/Y	NR
Goldberg	100–139	4.5	4.5	9	32	3/Y	9.0 h
Kanji	80–110	3	3	12	77	2/Y	11.3 ± 7.9 h
Krinsley	<140	0	10	10	44	1/N	NR
Marks	120–180	0	1	18	107	1/N	NR
Van den Berghe	80–110	0	4	15	98.5	2/Y	12–24 h
Watts	120–180	0	1.5	10.5	49	1/N	8 h
Zimmerman	101–150	10	4	21	115	2/Y	2.1 h

4. COME TRATTARE

QUALE SCHEMA INSULINICO?

Summary

In summary, the ideal insulin infusion protocol should achieve glycemic control in a reasonable timeframe, with minimal hypoglycemia, low operator error rate, and minimal nursing time required. The selection of a protocol requires careful investigation and must take the type of patient into account. The best incorporate bolus doses, adjust for the direction and rate of glucose decline, and permit “off-protocol” adjustments. Comparison of protocol insulin recommendations may be useful, but selection may not be possible short of an actual trial with the protocol. While “one protocol fits all” is a common practice, the diversity of patients call for a reexamination of this approach.



Consensus statement on the care of the hyperglycaemic/diabetic patient during and in the immediate follow-up of acute coronary syndrome

Proposed insulin protocol for cardiology intensive care unit:

- Use rapid-acting insulin analogs (50 units diluted in 50 ml Glucose 5%).
- A parallel infusion of Glucose 5% is also set up.
- A total amount of 150 g of carbohydrates a day has to be given (including both Glucose 5% infusion and oral food).

Initial dose: the initial dose of insulin depends on the admission blood glucose (BG).

Admission BG	Insulin dose
180–300 mg/dL (10–16.6 mmol/L)	2 U/h
300–400 mg/dL (16.6–22.2 mmol/L)	3 U/h
> 400 mg/dL (22.2 mmol/L)	4 U/h

In patients older than 75 years old, insulin dosage could be adapted to BG follows.

BG level	Insulin dose
< 80 mg/dL (4.4 mmol/L)	Stop insulin
80–140 mg/dL (4.4–7.8 mmol/L)	Stop insulin
140–180 mg/dL (7.8–10 mmol/L)	→ unchanged
180–300 mg/dL (10–16.6 mmol/L)	↗ by 0.5 U/h
> 300 mg/dL (16.6 mmol/L)	↗ by 1 U/h

- If the patient eats, a bolus of insulin will be given with an initial bolus dose of 4 units. Thereafter, the bolus dose will be adapted according to the postprandial BG levels.
 - In cases of mild hypoglycaemia (BG < 80 mg/dL [4.4 mmol/L]), insulin infusion is stopped and 15 g oral sugar is given to the patient. BG testing is performed every 30 minutes and insulin infusion is re-started when BG > 140 mg/dL (7.8 mmol/L) with half of the previous insulin infusion rate.
 - In cases of severe hypoglycaemia (BG < 40 mg/dL [2.2 mmol/L]), Glucose 30% is injected into the patient.
6. In patients on continuous IV insulin infusion, blood (capillary) glucose is to be monitored 1 h after initiation, then every 2 h (Level A).
 7. In hyperglycaemic/diabetic patients not on continuous IV insulin infusion, blood (capillary) glucose is to be monitored before each meal, 2 h after meals and at bedtime (professional agreement).

Guidelines for specialized nutritional and metabolic support in the critically-ill patient. Update. Consensus SEMICYUC-SENPE: Cardiac patient

Recommendations

- In critically-ill cardiac patients with hemodynamic failure in stable condition, a **nutritional support of 20-25 kcal/kg/day** is effective for maintaining an adequate nutritional status (B).
- **Nutritional formulae** recommended in other critically-ill patients will be supplied according to the previous nutritional status, with sodium and volume restriction, in relation to the clinical condition of the patient (C).
- **Parenteral nutrition** would be indicated for cardiac cachexia, in case of intolerance to enteral nutrition or as complementary nutrition, particularly in patients with cardiovascular surgery (C).
- In patients with acute coronary syndrome who require enteral nutrition it is recommended to administer at **least 1 g/day EPA + DHA** (C).
- Supplements with vitamin A, C, B complex, vitamin E, and selenium are recommended to improve heart function (C).

INDICE



- 1. VALORE PROGNOSTICO DELLA GLICEMIA**
- 2. TRATTAMENTO INTENSIVO**
- 3. QUALI TARGET**
- 4. COME TRATTARE**
- 5. PROSPETTIVE FUTURE**

Sensor-Augmented Insulin Pump Therapy to Treat Hyperglycemia at the Coronary Care Unit: A Randomized Clinical Pilot Trial

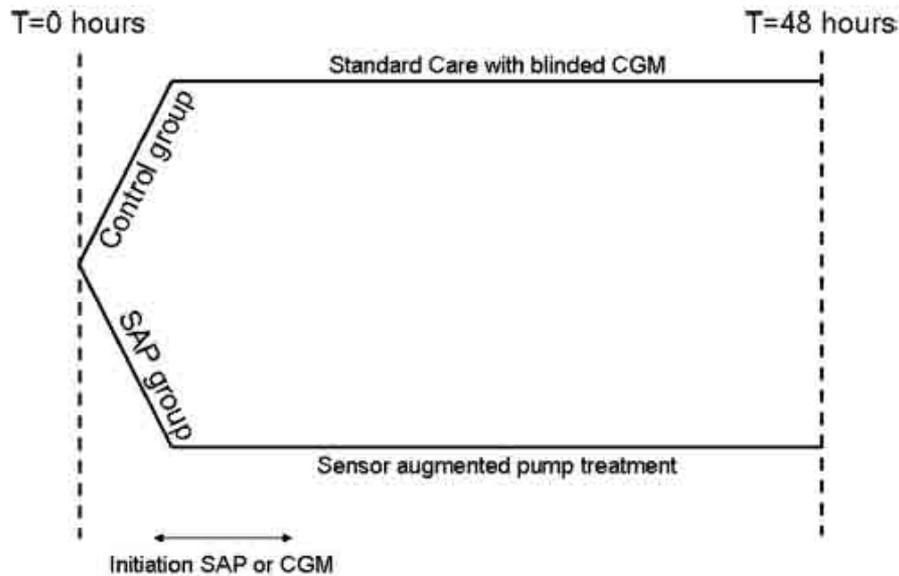
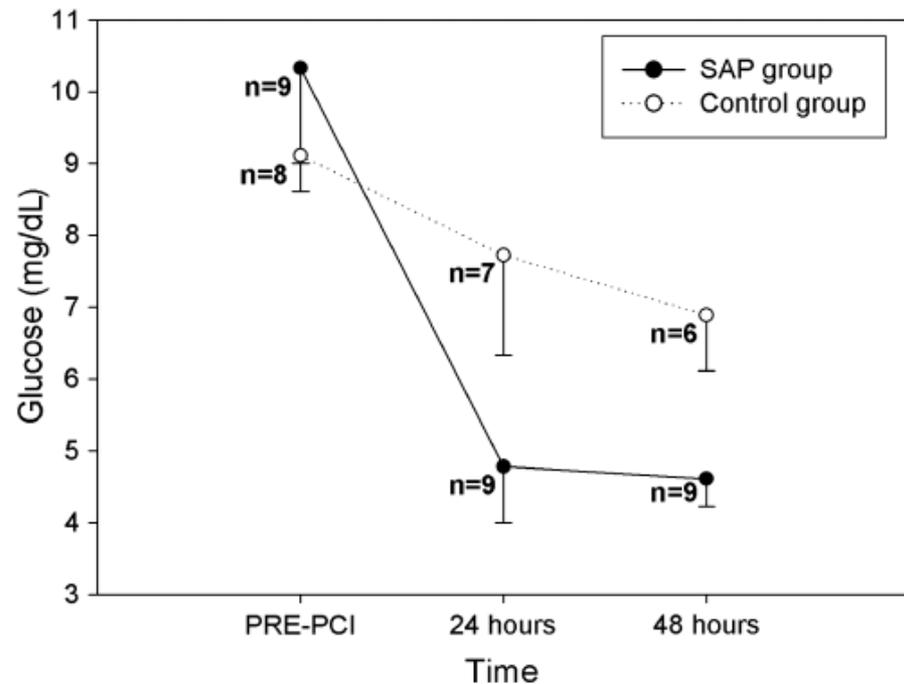
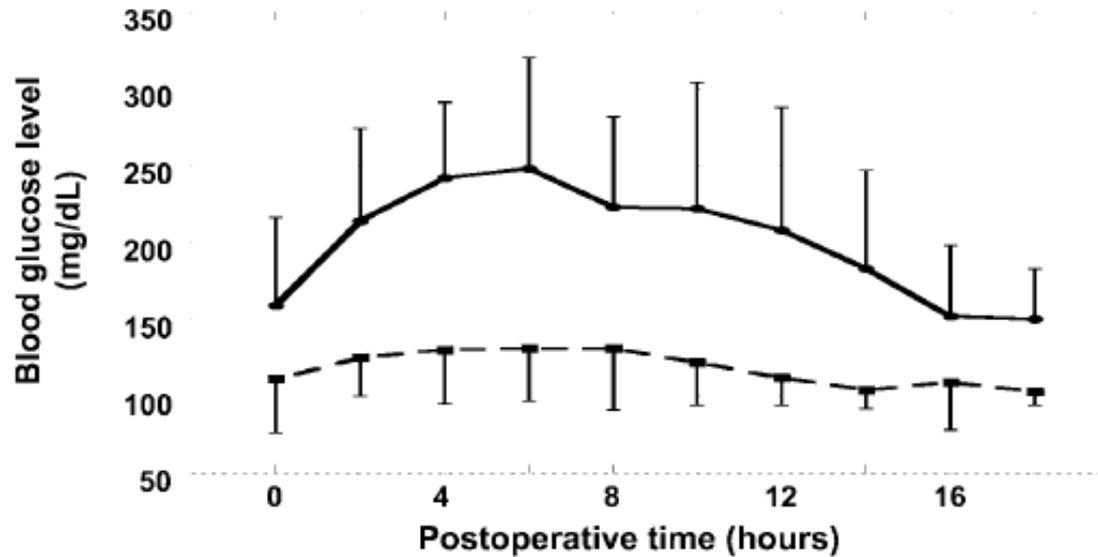


FIG. 1. Study flowchart. CGM, continuous subcutaneous glucose monitor; SAP, sensor-augmented insulin pump.



Perioperative insulin therapy using a closed-loop artificial endocrine pancreas after hepatic resection



80-110 mg/dL	22.7	0.0	0.0	0.0	0.0	0.0	4.5	4.5	4.5	4.5
< 140 mg/dL	45.5	15.9	0.0	0.0	0.0	15.9	22.7	22.7	27.3	34.1
% in target on glycemic levels by sliding scale method										
80-110 mg/dL	75.0	59.1	61.4	61.4	65.9	65.9	75.0	81.8	93.2	100
< 140 mg/dL	90.9	86.4	88.6	81.8	84.1	88.6	97.7	100	97.7	100
% in target on glycemic levels by closed-loop system										

**GRAZIE PER
L'ATTENZIONE!**

1° CORSO NAZIONALE DI AGGIORNAMENTO

Associazione Medici Endocrinologi

I PER[CORSI]AME

ROMA

9_11

NOVEMBRE

2012

**PROGRAMMA
DEFINITIVO**





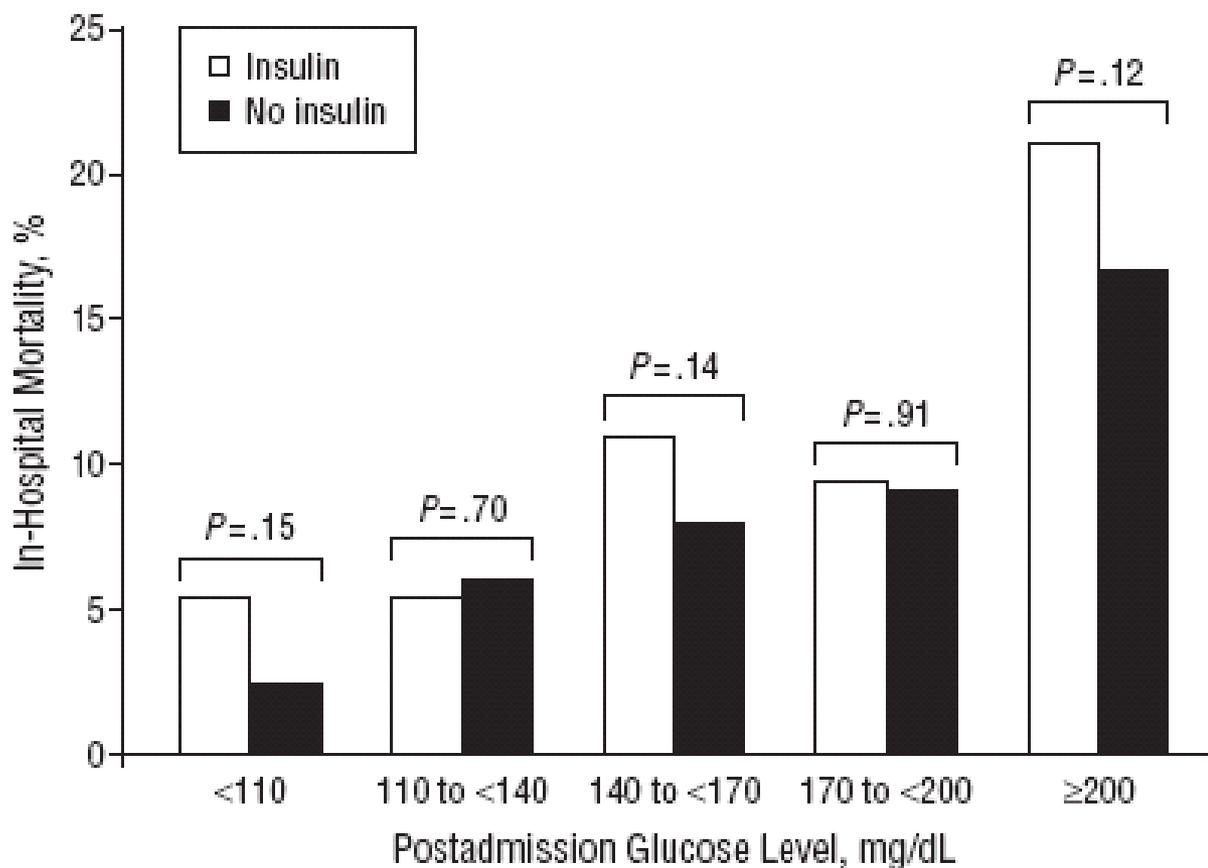
Roma,
9-11 novembre 2012

SLIDE DI SUPPORTO

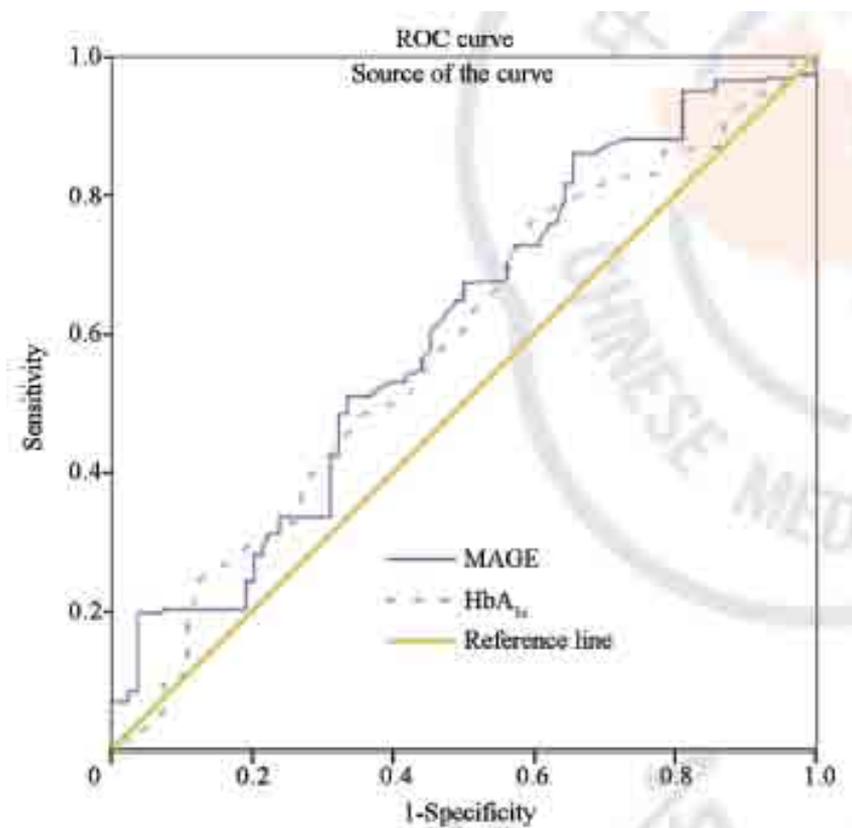
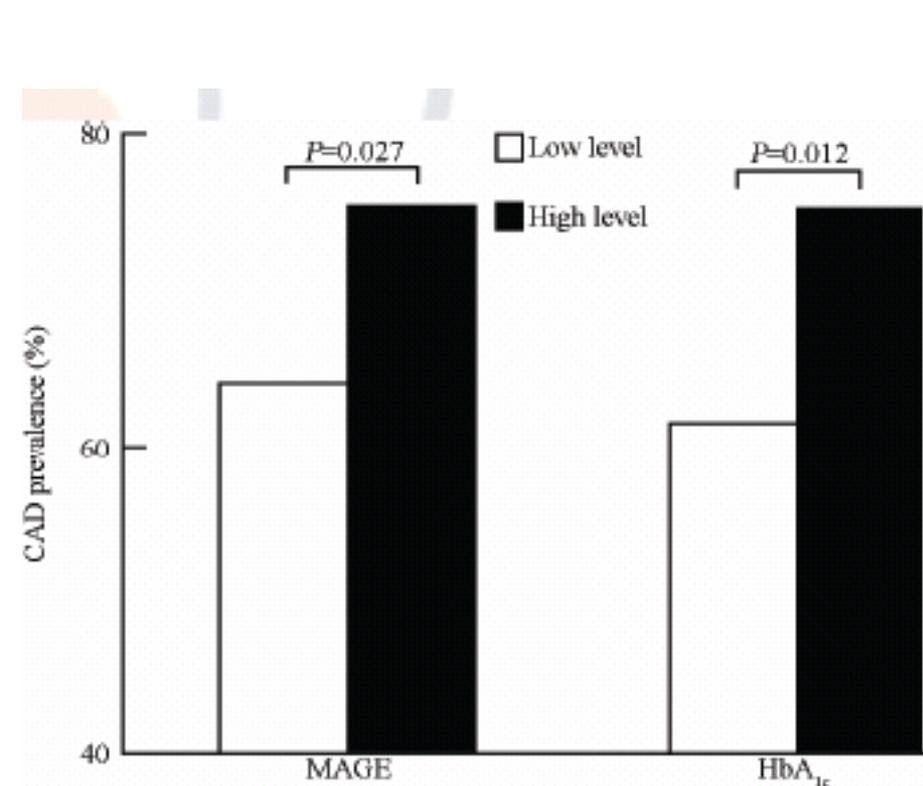
2. TRATTAMENTO INTENSIVO

TRATTAMENTO INSULINICO O NO?

7820 pazienti con glicemia al ricovero > 140 mg/dl e IMA

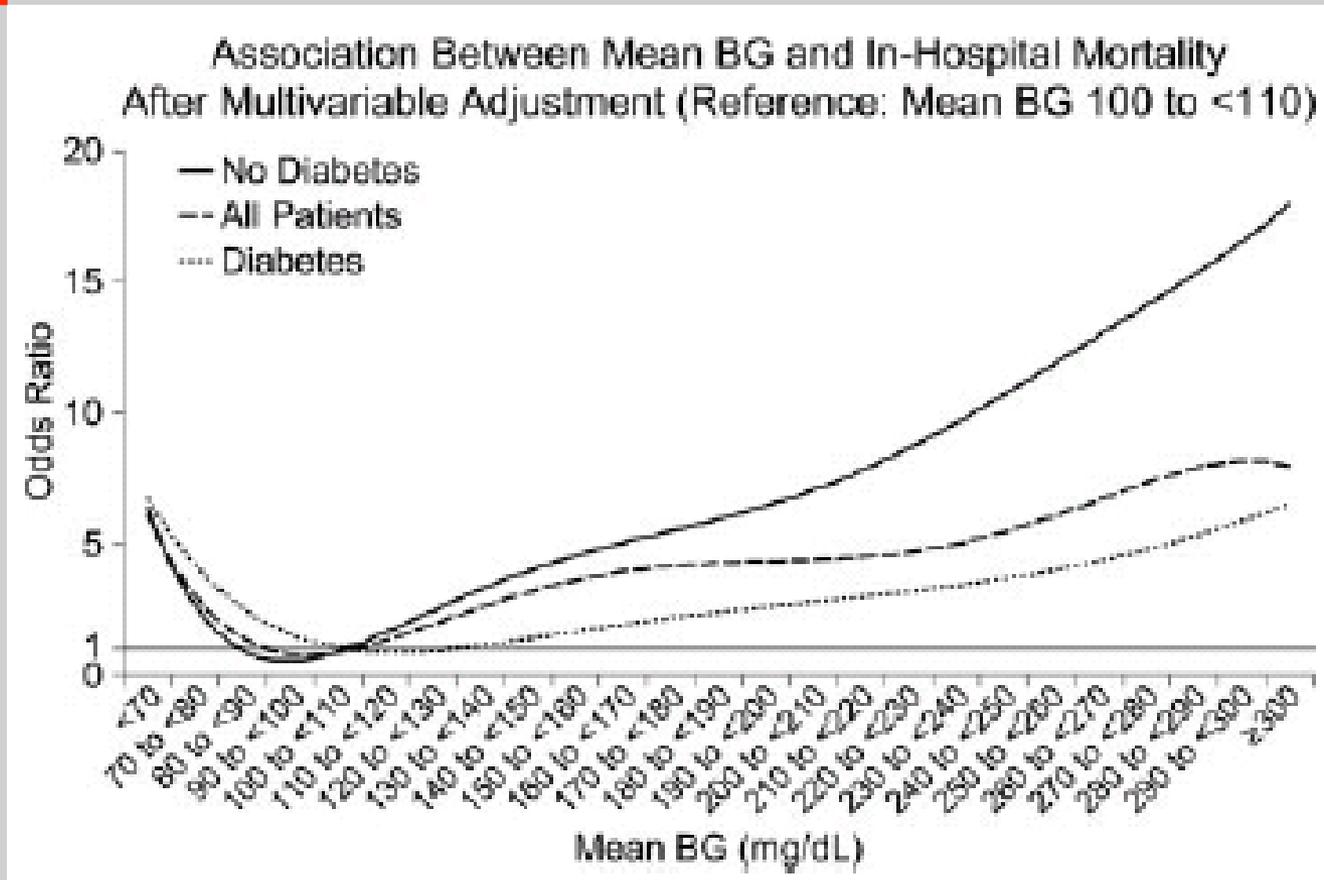


Comparison of glycemic variability and glycated hemoglobin as risk factors of coronary artery disease in patients with undiagnosed diabetes



1. VALORE PROGNOSTICO DELLA GLICEMIA

J-SHAPED CURVE (glicemia media)

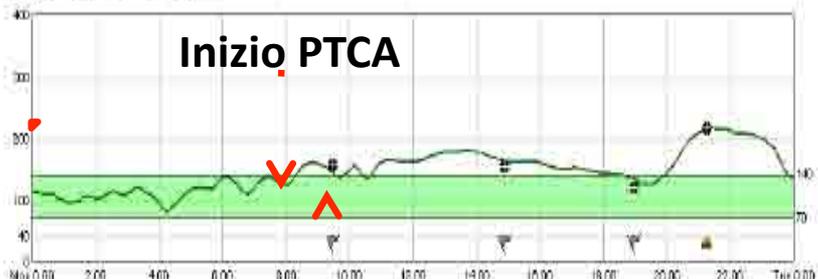


Calibration BG Meter BG Meal Exercise Medication Other Target Range

Sun 13-Mar (mg/dL) Sensor



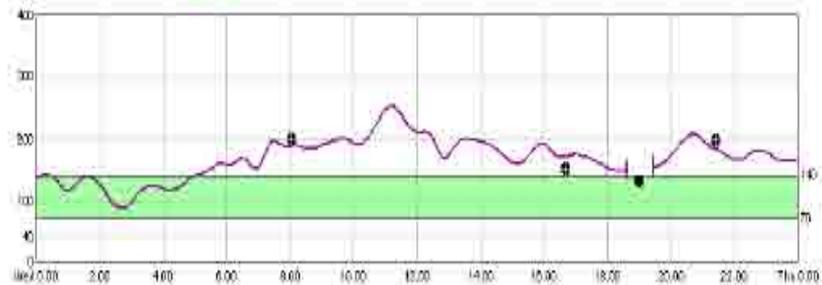
Mon 14-Mar (mg/dL) Sensor



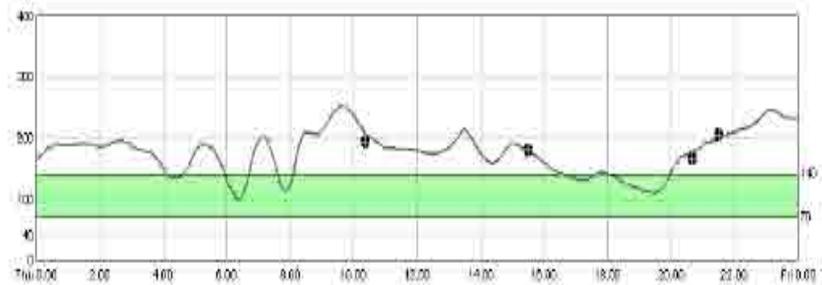
Tue 15-Mar (mg/dL) Sensor Fine PTCA



Wed 16-Mar (mg/dL) Sensor



Thu 17-Mar (mg/dL) Sensor



Fri 18-Mar (mg/dL) Sensor Use Clinical Judgement

