EURHOBOP

"Use of clinical data for risk adjustment: integration of health information systems"

kick-off meeting

28-29 September2009, Barcelona

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Summary

- Clinical Study: IN-ACS
- Hospital Information System: RAD ESITO
- Time Trend Analysis: VLAD
- Proposals

IN-ACS (Italian Network on Acute Coronary Syndromes) Outcome study

OBJECTIVES:

to evaluate the short and mid-term outcomes (at 30 days, 6 and 12 months) in a not selected population of patients admitted to Italian hospitals for an acute coronary syndrome.

Comparing information from Hospital Discharge Records compiled, in the same period, by the centres participating to the study with information from registry can be used as a validation tool.

Using the information from Registry and from Hospital Discharge Records allows to identify what are the clinical variables determining the difference in terms of comparative evaluation of outcomes between risk adjustment model registry-based or health care information system-based.

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Comorbidities. Hospital Information System (HIS)

Malignant neoplasms	Stroke/TIA*
Rheumatic heart disease	Cerebrovascular disease (excl. Stroke/TIA)
Hypertension	Chronic obstructive pulmonary disease (COPD)
Previous myocardial infarction	Lipid metabolism disturbances
Other forms of chronic ischemic heart disease	Chronic renal disease
Acute endocarditis and myocarditis*	Chronic disease (liver, pancreas, intestine)
Diabetes mellitus	Obesity
Cardiomyopathy	Blood disorders
Cardiac arrhythmias*	Previous CABG
Heart failure*	Previous PCI
Ill-defined descriptions and complications of heart disease*	Other heart revascularization*
	Operations of intracranial and other vessels of head and neck*
Other heart conditions	
Peripheral vascular disease	Other operations on vessels *
Vascular disease (excl. peripheral)	

* Only in previous admissions

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Risk factors concordance: HIS vs INACS

Risk factor	Kappa
Dyslipaemia	0.0598
Diabetes	0.3137
Hypertension	0.1027
Previous myocardial infarction	0.4828
Previous CABG	0.6026
Previous PTCA	0.4622
Peripheral artery disease	0.1945
Chronic renal failure	0.3762
COPD	0.2305
Family history of heart failure	0.5038

AMI Mortality. Predictive model - HIS

Factor	crude OR	p	Adj OR	p	lower	upper
Gender (F vs M)	1.91	0.019	0.72	0.261	0.40 -	1.28
Age	1.09	0.000	1.08	0.000	1.05 -	1.12
Peripheral vascular disease	3.61	0.018	3.55	0.074	0.88 -	14.22
Lipid metabolism disturbances	1.05	0.929	2.08	0.317	0.49 -	8.77
Lipid metab.disturb.(index admission	0.05	0.000	0.08	0.001	0.02 -	0.34
Hypertension	0.94	0.890	0.48	0.150	0.18	1.30
Hypertension (index admission)	0.34	0.001	0.37	0.002	0.19 -	0.69
Chronic renal disease	2.85	0.052	2.23	0.243	0.58 -	8.53
Chronic renal disease (index admission)	0.22	0.130	0.08	0.015	0.01 -	0.62

ROC Statistic: 84.4%

AMI Mortality. Predictive model - INACS

Factor	crude OR	p	Adj OR	p	lower	upper
Gender (F vs M)	2.09	0.007	1.40	0.271	0.77 -	2.55
Age	1.09	0.000	1.05	0.001	1.02 -	1.09
Dyslipidemia	0.24	0.000	0.28	0.000	0.14 -	0.56
Previous stroke/TIA	2.72	0.011	2.03	0.100	0.87 -	4.70
Chronic renal failure	1.56	0.285	0.37	0.057	0.13 -	1.03
Systolic blood pressure <=100	5.30	0.000	4.31	0.002	1.70	10.94
Creatinine >1.5	4.29	0.000	3.57	0.002	1.62 -	7.87
Ejection Fraction						
<30	24.32	0.000	16.91	0.000	5.00 -	57.13
30-50	6.62	0.002	4.53	0.016	1.33 -	15.42
>50	1.00		1.00			

ROC Statistic: 86.1%

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AMI Mortality. Predictive model – HIS+INACS

Factor	crude OR	p	Adj OR	p	lower	upper
Gender (F vs M)	1.91	0.019	1.70	0.096	0.91 -	3.16
Age	1.09	0.000	1.05	0.001	1.02 -	1.09
Lipid metabolism disturbances	1.05	0.929	2.82	0.174	0.63 -	12.51
Lipid metab.disturb.(index admission)	0.05	0.000	0.12	0.005	0.03 -	0.52
Hypertension	0.94	0.890	0.53	0.233	0.19 -	1.50
Hypertension (index admission)	0.34	0.001	0.43	0.013	0.22	0.84
Chronic renal disease	2.85	0.052	1.85	0.423	0.41 -	8.26
Chronic renal disease (index admission)	0.22	0.130	0.04	0.002	0.00 -	0.31
Dyslipidemia	0.24	0.000	0.42	0.025	0.19 -	0.90
Systolic blood pressure <=100	5.30	0.000	2.80	0.042	1.04 -	7.55
Creatinine >1.5	4.29	0.000	3.80	0.001	1.74 -	8.30
Ejection Fraction						
<30	24.32	0.000	16.68	0.000	4.86 -	57.19
30-50	6.62	0.002	4.34	0.020	1.26 -	14.90
>50	1.00		1.00			

ROC Statistic: 88.6%

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RAD-Esito

Based on experience in Euphoric and Mattoni-Outcome projects and IN-ACS-Outcome registry, in Lazio region hospital information flow has recently been modified (starting from 2008) for three conditions (CABG, AMI and hip fracture) by adding specific clinical variables.

This information flow is called RAD-ESITO.

IN-ACS: Italian Network on Acute Coronary Syndromes

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RAD-Esito:Clinical variables for AMI

Systolic blood pressure at admission

First Ejection Fraction during hospital admission

Creatinine (first measurement within 24 h after h. admission)

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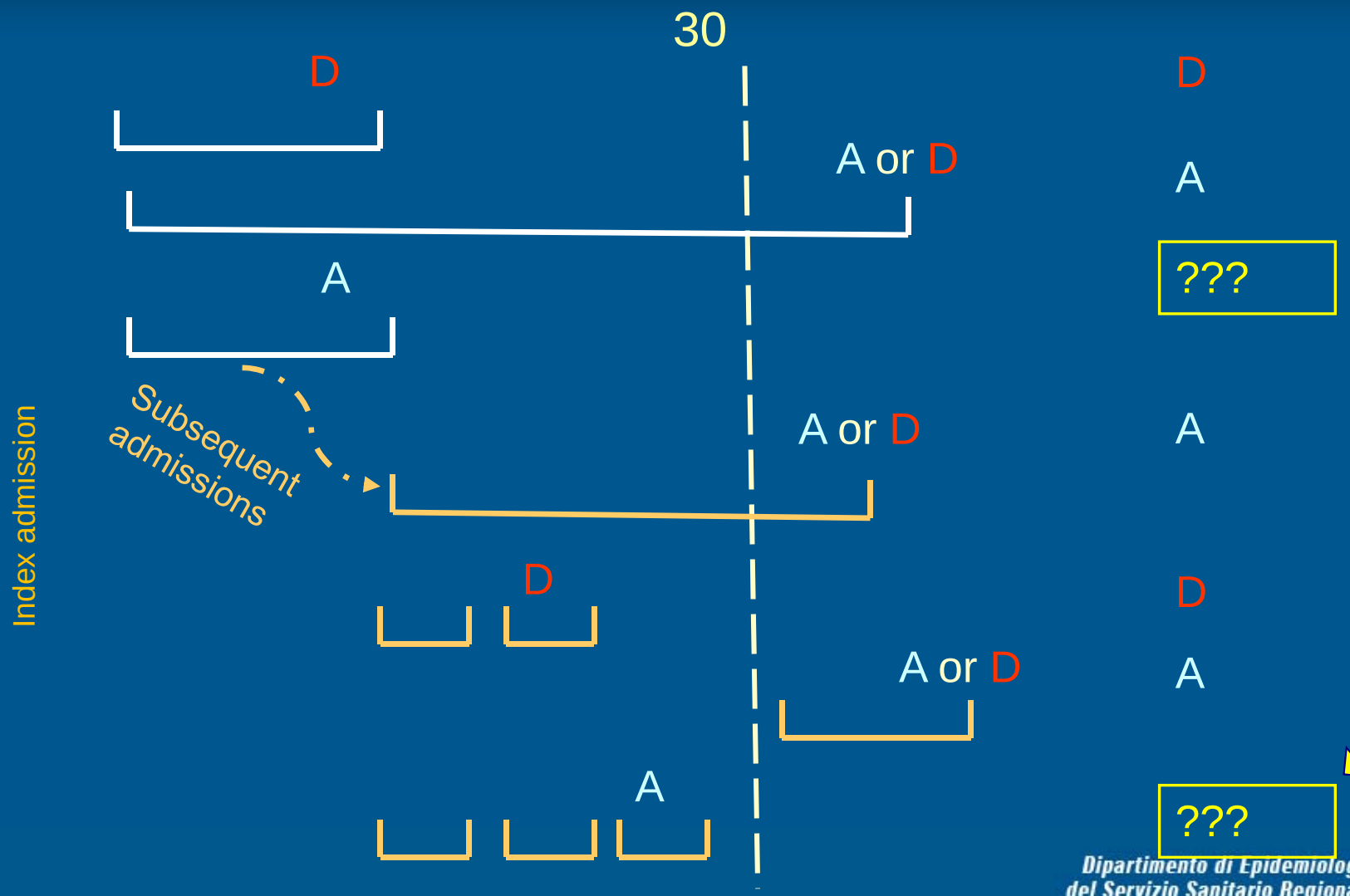
Vital status at 30 days from index and subsequent admissions



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Comparison between intrahospital mortality and vital status at 30 days

intrahospital mortality	Vital Status at 30 days		Totale
	Dead	Alive	
Yes	924	37	961
No	151	9199	9350
Totale	1075	9236	10311

Kappa=0.79

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Reference category (hospitals)

The reference category, represented by the best performing centres, was defined by the following steps:

1. X centre dummies were added to the model and the corresponding adjusted ORs were estimated. At this step the centre with the highest number of AMI was chosen as reference category.

2. After ranking all hospitals by adjusted ORs, X centres with the lowest adjusted mortality were selected as the reference group.

30 day mortality by STEMI and NSTEMI

AMI	N	mortality (%)
NSTEMI	4628	9.33
STEMI	4653	11.30
TOTAL	9281	10.24

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AMI Mortality. Predictive model: HIS

Risk factor	OR	95%CI		p
Gender (Female vs Male)	1.12	0.96	1.31	0.147
Age	1.08	1.07	1.08	0.000
Malignant neoplasms	1.83	1.39	2.39	0.000
Diabetes	1.42	1.11	1.82	0.006
Diabetes (ind. adm.)	0.73	0.60	0.89	0.002
Lipid metabolism disturbances	1.05	0.68	1.56	0.835
Lipid metabolism disturbances (ind. adm.)	0.20	0.12	0.31	0.000
Blood disorders (ind. adm.)	0.67	0.47	0.93	0.019
Blood disorders	0.96	0.69	1.33	0.814
Hypertension	0.84	0.67	1.04	0.113
Hypertension (ind. adm.)	0.32	0.26	0.38	0.000
Previous myocardial infarction	0.57	0.44	0.72	0.000
Heart failure	1.80	1.38	2.32	0.000
Other heart conditions (ind. adm.)	0.38	0.21	0.66	0.001
Other heart conditions	1.62	0.93	2.75	0.081
Cerebrovascular disease	1.35	1.04	1.74	0.025
COPD	1.15	0.87	1.51	0.322
COPD (ind. adm.)	0.70	0.52	0.94	0.019
Other chronic disease (liver, pancreas, intestine)	1.02	0.54	1.80	0.962
Other chronic disease (liver, pancreas, intestine) (ind. adm.)	2.22	0.93	4.88	0.057

roc=0.810

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AMI Mortality. Predictive model: HIS+RAD-ESITO

Risk factor	OR	95%CI		p
Gender (Male vs Female)	0.90	0.77	1.06	0.198
Age	1.08	1.07	1.08	<.0001
Malignant neoplasms	1.91	1.45	2.51	<.0001
Lipid metabolism disturbances (ind. adm.)	0.20	0.12	0.31	<.0001
Lipid metabolism disturbances	0.98	0.63	1.48	0.924
Blood disorders	0.96	0.68	1.33	0.794
Blood disorders (ind. adm.)	0.64	0.45	0.89	0.011
Hypertension (ind. adm.)	0.33	0.27	0.40	<.0001
Hypertension	0.93	0.75	1.16	0.541
Previous myocardial infarction	0.60	0.47	0.76	<.0001
Heart failure	1.62	1.23	2.12	0.001
Ill-defined descriptions and complications of heart disease	1.49	1.01	2.17	0.043
Other heart conditions (ind. adm.)	0.36	0.19	0.63	0.001
Other heart conditions	1.67	0.94	2.87	0.070
Cerebrovascular disease	1.35	1.03	1.75	0.029
COPD (ind. adm.)	0.71	0.52	0.95	0.023
COPD	1.08	0.81	1.43	0.603
Other chronic disease (liver, pancreas, intestine)	1.06	0.55	1.91	0.860
Other chronic disease (liver, pancreas, intestine) (ind. adm.)	2.22	0.90	4.97	0.065
Systolic blood pressure at entry missing vs > 100	1.22	0.90	1.63	0.197
Systolic blood pressure at entry <100 vs > 100	3.92	3.24	4.74	<.0001

roc=0.827

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AMI Mortality. Adjusted ORs calculated by using HIS and RAD-Esito, by exposure

	HIS				HIS+RAD-ESITO			
	OR	CI 95%		p	OR	CI 95%		p
No PTCA	8.54	3.97	18.37	0.000	8.43	3.91	18.18	0.000
before admission	5.52	1.32	23.17	0.020	5.36	1.26	22.82	0.023
within 90 minutes of admission	3.54	1.37	9.09	0.009	3.09	1.19	8.00	0.021
90 minutes-24 hours from admission	4.56	1.84	11.31	0.001	4.53	1.82	11.27	0.001
more then 24 hours from admission	1.00				1.00			

AMI mortality. Adjusted ORs calculated by using HIS and RAD-Esito, by hospital of treatment

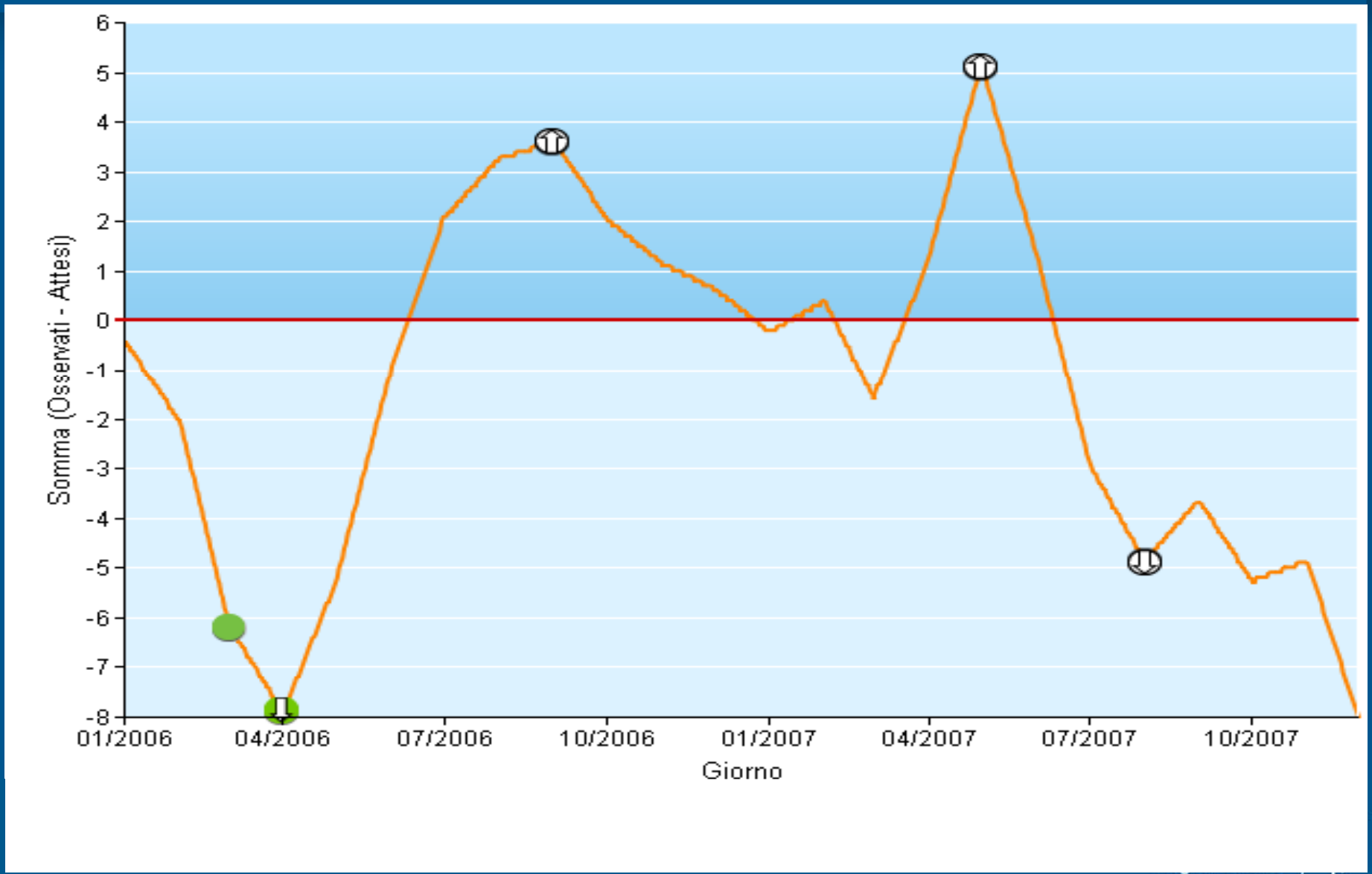
HIS

Admission hospital	crude OR	95% CI		adjusted OR	95% CI	
ref group	1			1		
047	1.95	1.07	3.45	3.14	1.66	5.91
061	1.59	0.98	2.57	1.79	1.08	2.97
066	2.01	1.24	3.26	2.64	1.58	4.42
071	3.28	1.81	5.79	2.67	1.44	4.94
076	1.46	0.92	2.34	1.95	1.19	3.18
134	2.18	1.12	4.04	2.23	1.14	4.36
165	1.29	0.76	2.16	3.01	1.71	5.30
180	1.78	1.05	2.98	2.57	1.47	4.51
200	2.02	1.31	3.14	3.02	1.89	4.81
206	1.71	1.05	2.79	3.07	1.83	5.16
215	2.34	1.32	4.06	2.79	1.54	5.06
226	1.54	0.79	2.87	3.75	1.84	7.63
228	1.48	0.72	2.85	1.94	0.94	4.02
267	1.86	1.17	2.96	2.75	1.68	4.49
271	1.92	1.08	3.34	2.12	1.17	3.86
901	1.89	1.22	2.95	2.62	1.64	4.18
902	0.97	0.54	1.70	2.03	1.10	3.73
903	1.88	1.22	2.92	1.93	1.22	3.05
906	1.70	1.04	2.75	3.22	1.91	5.42
919	0.56	0.28	1.04	1.59	0.81	3.14
920	0.72	0.34	1.39	2.06	0.98	4.31

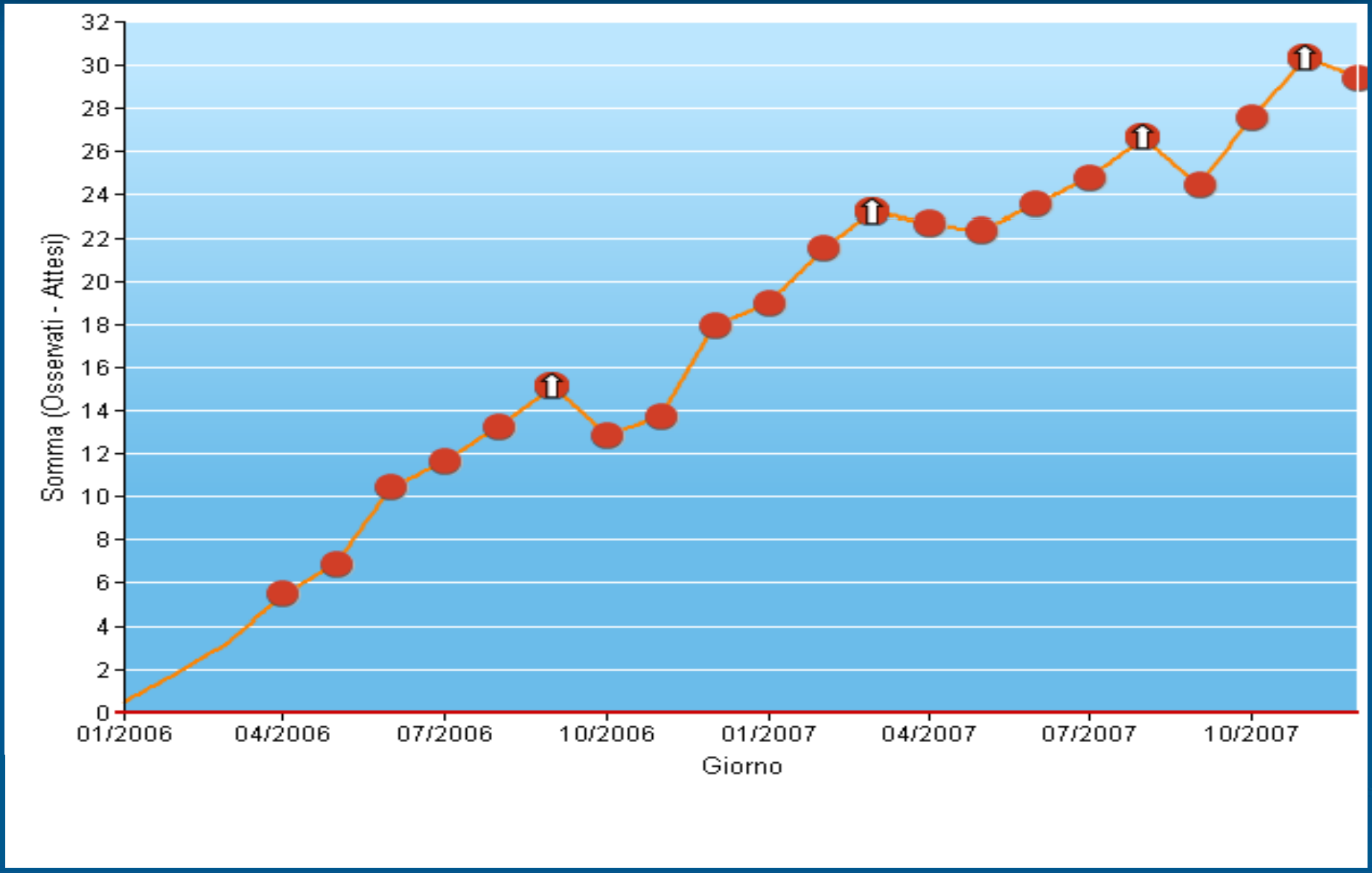
HIS+RAD-ESITO

Admission hospital	crude OR	95% CI		adjusted OR	95% CI	
ref. group	1			1		
047	1.95	1.07	3.45	3.20	1.67	6.13
061	1.59	0.98	2.57	1.59	0.95	2.69
066	2.01	1.24	3.26	2.63	1.55	4.45
071	3.28	1.81	5.79	2.65	1.39	5.02
076	1.46	0.92	2.34	1.84	1.11	3.04
134	2.18	1.12	4.04	2.43	1.23	4.83
165	1.29	0.76	2.16	2.56	1.44	4.57
180	1.78	1.05	2.98	2.70	1.53	4.78
200	2.02	1.31	3.14	2.91	1.80	4.69
206	1.71	1.05	2.79	2.68	1.58	4.57
215	2.34	1.32	4.06	2.63	1.43	4.83
226	1.54	0.79	2.87	4.07	1.97	8.39
228	1.48	0.72	2.85	1.64	0.77	3.46
267	1.86	1.17	2.96	2.71	1.64	4.47
271	1.92	1.08	3.34	2.05	1.11	3.79
901	1.89	1.22	2.95	2.31	1.43	3.74
902	0.97	0.54	1.70	2.04	1.10	3.80
903	1.88	1.22	2.92	2.00	1.26	3.19
906	1.70	1.04	2.75	3.14	1.85	5.34
919	0.56	0.28	1.04	1.58	0.79	3.14
920	0.72	0.34	1.39	2.12	1.01	4.44

AMI mortality. VLAD Chart – Hospital A



AMI mortality. VLAD Chart – Hospital B



Proposals

- Identification of the clinical variables to be collected
- Linkage with others Health Information System (Drug claims Information System)
- Introduction of another tool: VLAD function
- Do we need a Statistical group?