Meeting of the EURHOBOP project

DEASL, Rome
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Minutes

Participants:

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1) Welcome

2) WP5: Analysis of availability of severity measurements in administrative data

Presence of variables of severity in the Medical Records. Descriptive.
Some tables regarding the preliminary results of the data base with approximately 7000 patients with QC completed are presented (Annex). Some suggestions include:

a) Providing a sensitivity analysis with all categories of variables including "not stated" principally aimed at determining whether "not stated" category risk of death differs from the "no" response.
b) We should compute the Hazard Ratios (HR) for in-hospital mortality for each variable: with two levels of basic adjustment: CRUDE, and for age and sex

3) WP4: Benchmarking function development

Some suggestions are put forward regarding model adjustment and other issues in benchmarking function.

- # of functions: can be more than one to facilitate adaptation to user data availability (increasing complexity of functions)

Type of adjustment

Stratify by ST elevation, and by AMI vs VA

a) Stratify mortality by AMI *vs.*, Unstable angina
STelevation *vs.*, Non-ST elevation *sv.*, non-classifiable
b) There is a discussion on the effects of the adjustment for population CV mortality, and how it can reflect pre-hosp case fatality, which constitutes typically more than 30% of 28 day MI case fatality.

Discussion on three level model analysis, with mixed-models. The data bases will be shared in their present fQC status in STATA or SAS with DEASL to initiate some testing of the analyses proposed here and to replicate IMIM analysis on the provisional data base.

a) .
   First select variables from **2b** by significant HR.
b) Three sets of results by percentile
c) Cross validation set and derivation set: this alternative is also discussed with two possibilities:
    1. Cross-validation with subsamples within EURHOBOP
    2. Possible use of EUPHORIC for validation.

4) WP6: Sex inequalities assessment

Multilevel model is judged better than fixed effect model (hospital and patient): Random intercept and Random slope.
PCI within 12h is similar between genders. However PCI within 48h is lower in women regardless of type of hospital (university or non-university) and severity. This effect is more prominent in patients older than 55y.
Including a propensity score in the model is suggested to render patients similar in their PCI indication.

5) All Other Business

The following topics are suggested for discussion in the forthcoming Porto Meeting
In Porto we will need to check the consecutiveness of patients to ensure the comparability of in-hospital mortality figures to be accurate: there is some variability among countries and hospitals. It is mandatory to stratify as described in point 3.a to ensure comparability.

- Possible future project to be submitted to EAHC
- Possible future project to be submitted to FP-7 HEALTH 1012

ANNEX

Table I: Presence of "Not stated" values in severity and other important variables related to patient prognosis by the sources used in data collection.

	Information obtained coming from			
DL = Discharge letter Med Rec = Medical records	DL alone N=729	DL plus Med Rec N=1757	Any other source Combination N=4327	p.overall
BASIC DATA:				
Age	0 (0.00%)	0 (0.00%)	0 (0.00%)	1.000
Sex	0 (0.00%)	0 (0.00%)	0 (0.00%)	1.000
PREVIOUS HISTORY:				
Renal failure	38 (5.21%)	1203 (68.5%)	1545 (35.7%)	<0.001
ADMISSION DATA:				
Type of Acute Coronary Syndrome on admission	6 (0.82%)	75 (4.27%)	66 (1.53%)	<0.001
Heart rate on admission	153 (21.0%)	322 (18.3%)	1030 (23.8%)	<0.001
Systolic blood pressure on admission	146 (20.0%)	574 (32.7%)	1140 (26.3%)	<0.001
Acute pulmonary edema on admission	14 (1.92%)	1085 (61.8%)	1026 (23.7%)	<0.001
Cardiogenic shock on admission	203 (27.8%)	1416 (80.6%)	1049 (24.2%)	0.000
Initial Creatinine - mg/dl	122 (16.7%)	34 (1.94%)	589 (13.6%)	<0.001
PROCEDURES USED IN HOSPITALIZATION:				
Coronary artery bypass surgery	200 (27.4%)	1206 (68.6%)	871 (20.1%)	<0.001
Intracardiac defibrillator (ICD)	201 (27.6%)	1743 (99.2%)	1550 (35.8%)	0.000
Intra-aortic balloon pump (IABP)	199 (27.3%)	1273 (72.5%)	1556 (36.0%)	<0.001

Table I (Cont)

	DL alone N=729	DL plus Med Rec N=1757	Any other source Combination N=4327	p.overall
SEVERITY INDICATORS AND COMPLICATIONS DURING HOSPITALIZATION:				
TIMI (0-14)	729 (100%)	1718 (97.8%)	3992 (92.3%)	<0.001
Q-wave in the evolving ECG	154 (21.1%)	1007 (57.3%)	1022 (23.6%)	<0.001
Anterior ST elevation	13 (1.78%)	86 (4.89%)	541 (12.5%)	<0.001
Troponin peak	62 (8.50%)	201 (11.4%)	644 (14.9%)	<0.001
Left systolic ejection fraction	221 (30.3%)	991 (56.4%)	1674 (38.7%)	<0.001
Acute pulmonary edema	193 (26.5%)	1558 (88.7%)	1083 (25.0%)	0.000
Cardiogenic shock	195 (26.7%)	1658 (94.4%)	1117 (25.8%)	0.000
Cardiac arrest	190 (26.1%)	1636 (93.1%)	1824 (42.2%)	0.000
Acute renal failure	197 (27.0%)	1628 (92.7%)	1723 (39.8%)	0.000
Reinfarction	199 (27.3%)	1744 (99.3%)	1859 (43.0%)	0.000
Stroke / TIA	204 (28.0%)	1749 (99.5%)	1890 (43.7%)	0.000
Intracranial bleeding	205 (28.1%)	1755 (99.9%)	1864 (43.1%)	0.000
Bleeding with a drop in haemoglobin >50 g/L	198 (27.2%)	1697 (96.6%)	1835 (42.4%)	0.000
Bleeding with a drop in haemoglobin 31-50 g/L	205 (28.1%)	1751 (99.7%)	1833 (42.4%)	0.000
Days in Coronary Care Unit	133 (18.2%)	1 (0.06%)	600 (13.9%)	<0.001
Days in Intensive Care Unit	257 (35.3%)	1 (0.06%)	1695 (39.2%)	<0.001

Table I bis: Descriptives in severity and other important variables related to patient prognosis by the sources used in data collection.

	Information obtained coming from			
	DL alone N=729	DL plus Med Rec N=1757	Any other source combination N=4327	p.overall
BASIC DATA:				
Age	66.6 (13.3)	67.6 (13.0)	65.4 (13.2)	<0.001
Sex	208 (28.5%)	596 (33.9%)	1130 (26.1%)	<0.001
PREVIOUS HISTORY:				
Renal failure	56 (8.10%)	298 (53.8%)	419 (15.1%)	<0.001
ADMISSION DATA:				
Type of Acute Coronary Syndrome on admission				<0.001
Non-STEACS	491 (67.9%)	1042 (62.0%)	2515 (59.0%)	
STEACS	195 (27.0%)	488 (29.0%)	1407 (33.0%)	
Non classifiable	37 (5.12%)	152 (9.04%)	339 (7.96%)	
Heart rate on admission	74.0 [64.0; 87.0]	75.0 [65.0; 89.0]	75.0 [65.0; 89.0]	0.237
Systolic blood pressure on admission	137 (25.8)	141 (26.8)	136 (27.8)	<0.001
Acute pulmonary edema on admission	61 (8.53%)	80 (11.9%)	313 (9.48%)	0.081
Cardiogenic shock on admission	14 (2.66%)	50 (14.7%)	85 (2.59%)	<0.001
Initial Creatinine - mg/dl	1.00 [0.90; 1.30]	1.00 [0.81; 1.30]	1.05 [0.89; 1.29]	<0.001
PROCEDURES USED IN HOSPITALIZATION:				
Coronary artery bypass surgery	18 (3.40%)	62 (11.3%)	126 (3.65%)	<0.001
Intracardiac defibrillator (ICD)	0 (0.00%)	13 (92.9%)	9 (0.32%)	<0.001
Intra-aortic balloon pump (IABP)	4 (0.75%)	52 (10.7%)	52 (1.88%)	<0.001

Table I bis (Cont)

	DL alone N=729	DL plus Med Rec N=1757	Any other source combination N=4327	p.overall
SEVERITY INDICATORS AND COMPLICATIONS DURING HOSPITALIZATION:				
TIMI (0-14)	. [.; .]	4.00 [2.50; 4.00]	3.00 [2.00; 4.00]	0.012
Q-wave in the evolving ECG:				<0.001
No	193 (33.6%)	132 (17.6%)	1292 (39.1%)	
Yes	87 (15.1%)	152 (20.3%)	688 (20.8%)	
Unstable angina	295 (51.3%)	466 (62.1%)	1325 (40.1%)	
Anterior ST elevation	119 (16.6%)	390 (23.3%)	464 (12.3%)	<0.001
Troponin peak	2.01 [0.10; 14.2]	1.82 [0.18; 15.8]	2.40 [0.19; 17.5]	0.039
Left systolic ejection fraction	53.4 (13.5)	51.4 (15.3)	50.4 (13.0)	<0.001
Acute pulmonary edema	26 (4.85%)	82 (41.2%)	173 (5.33%)	<0.001
Cardiogenic shock	36 (6.74%)	94 (94.9%)	114 (3.55%)	<0.001
Cardiac arrest	37 (6.86%)	120 (99.2%)	115 (4.59%)	<0.001
Acute renal failure	20 (3.76%)	128 (99.2%)	251 (9.64%)	<0.001
Reinfarction	19 (3.58%)	13 (100%)	56 (2.27%)	<0.001
Stroke / TIA	4 (0.76%)	7 (87.5%)	58 (2.38%)	<0.001
Intracranial bleeding	1 (0.19%)	1 (50.0%)	5 (0.20%)	0.005
Bleeding with a drop in haemoglobin >50 g/L	9 (1.69%)	57 (95.0%)	12 (0.48%)	<0.001
Bleeding with a drop in haemoglobin 31-50g/L	10 (1.91%)	4 (66.7%)	55 (2.21%)	<0.001
Days in Coronary Care Unit	3.00 [1.00; 6.00]	4.00 [2.00; 7.00]	1.00 [0.00; 3.00]	<0.001
Days in Intensive Care Unit	1.00 [0.00; 2.00]	2.00 [0.00; 3.00]	0.00 [0.00; 0.00]	<0.001

Table II: Presence of "Not stated" values in registries with DL alone by type of acute coronary syndrome and discharge diagnosis.

	Non ST elevation ACS			ST elevation ACS			Non classifiable			Not stated		
	ALL N=4053	MI N=2139	UA N=1914	ALL N=2100	MI N=2031	UA N=69	ALL N=530	MI N=259	UA N=271	ALL N=147	MI N=37	UA N=110
BASIC DATA:												
Age	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Sex: yes	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
PREVIOUS HISTORY:												
Renal failure	1638 (40.5)	1081 (50.6)	557 (29.1)	815 (39.0)	813 (40.2)	2 (2.90)	231 (43.8)	157 (61.1)	74 (27.3)	102 (69.4)	23 (62.2)	79 (71.8)
ADMISSION DATA:												
Heart rate on admission	813 (20.1)	388 (18.2)	425 (22.2)	549 (26.3)	526 (26.0)	23 (33.3)	106 (20.1)	55 (21.4)	51 (18.8)	37 (25.2)	20 (54.1)	17 (15.5)
Systolic blood pressure on admission	1017 (25.1)	485 (22.7)	532 (27.8)	660 (31.6)	633 (31.3)	27 (39.1)	127 (24.1)	64 (24.9)	63 (23.2)	56 (38.1)	20 (54.1)	36 (32.7)
Acute pulmonary edema on admission	1339 (33.1)	883 (41.4)	456 (23.8)	532 (25.5)	531 (26.3)	1 (1.45)	158 (29.9)	89 (34.6)	69 (25.5)	96 (65.3)	19 (51.4)	77 (70.0)
Cardiogenic shock on admission	1685 (41.6)	1130 (52.9)	555 (29.0)	648 (31.0)	646 (32.0)	2 (2.90)	234 (44.3)	149 (58.0)	85 (31.4)	101 (68.7)	18 (48.6)	83 (75.5)
Initial Creatinine - mg/dl	429 (10.6)	189 (8.85)	240 (12.5)	231 (11.1)	225 (11.1)	6 (8.70)	61 (11.6)	24 (9.34)	37 (13.7)	24 (16.3)	11 (29.7)	13 (11.8)
PROCEDURES USED DURING HOSPITALIZATION:												
Coronary artery bypass surgery	1403 (34.7)	779 (36.5)	624 (32.6)	520 (24.9)	518 (25.6)	2 (2.90)	270 (51.1)	168 (65.4)	102 (37.6)	84 (57.1)	12 (32.4)	72 (65.5)
Intracardiac defibrillator (ICD)	2064 (51.0)	1303 (61.0)	761 (39.8)	988 (47.3)	982 (48.6)	6 (8.70)	330 (62.5)	216 (84.0)	114 (42.1)	112 (76.2)	23 (62.2)	89 (80.9)
Intra-aortic balloon pump (IABP)	1798 (44.4)	1050 (49.2)	748 (39.1)	810 (38.8)	799 (39.5)	11 (15.9)	312 (59.1)	197 (76.7)	115 (42.4)	108 (73.5)	19 (51.4)	89 (80.9)

N (%)

Table II (Cont)

	Non ST elevation ACS			ST elevation ACS			Non classifiable			Not stated		
	ALL N=4053	MI N=2139	UA N=1914	ALL N=2100	MI N=2031	UA N=69	ALL N=530	MI N=259	UA N=271	ALL N=147	MI N=37	UA N=110
SEVERITY INDICATORS AND COMPLICATIONS DURING HOSPITALIZATION												
TIMI (0-14)	3830 (94.6)	1974 (92.5)	1856 (97.0)	2005 (95.9)	1936 (95.8)	69 (100)	463 (87.7)	252 (98.1)	211 (77.9)	141 (95.9)	36 (97.3)	105 (95.5)
Q-wave in the evolving ECG: yes	1213 (30.0)	1162 (54.4)	51 (2.67)	763 (36.5)	763 (37.8)	0 (0.00)	182 (34.5)	156 (60.7)	26 (9.59)	25 (17.0)	19 (51.4)	6 (5.45)
Anterior ST elevation	310 (7.66)	226 (10.6)	84 (4.39)	164 (7.85)	163 (8.07)	1 (1.45)	136 (25.8)	94 (36.6)	42 (15.5)	30 (20.4)	16 (43.2)	14 (12.7)
Troponin peak	458 (11.3)	227 (10.6)	231 (12.1)	286 (13.7)	284 (14.1)	2 (2.90)	91 (17.2)	23 (8.95)	68 (25.1)	72 (49.0)	12 (32.4)	60 (54.5)
Left systolic ejection fraction	1902 (47.0)	1020 (47.8)	882 (46.1)	713 (34.1)	697 (34.5)	16 (23.2)	206 (39.0)	114 (44.4)	92 (33.9)	65 (44.2)	16 (43.2)	49 (44.5)
Acute pulmonary edema	1807 (44.6)	1110 (52.0)	697 (36.4)	666 (31.9)	663 (32.8)	3 (4.35)	254 (48.1)	148 (57.6)	106 (39.1)	107 (72.8)	18 (48.6)	89 (80.9)
Cardiogenic shock	1910 (47.2)	1199 (56.2)	711 (37.2)	691 (33.1)	688 (34.0)	3 (4.35)	262 (49.6)	156 (60.7)	106 (39.1)	107 (72.8)	17 (45.9)	90 (81.8)
Cardiac arrest	2258 (55.8)	1458 (68.3)	800 (41.8)	959 (45.9)	954 (47.2)	5 (7.25)	320 (60.6)	205 (79.8)	115 (42.4)	113 (76.9)	21 (56.8)	92 (83.6)
Acute renal failure	2154 (53.2)	1365 (63.9)	789 (41.2)	977 (46.7)	972 (48.1)	5 (7.25)	306 (58.0)	192 (74.7)	114 (42.1)	111 (75.5)	21 (56.8)	90 (81.8)
Reinfarction	2302 (56.9)	1503 (70.4)	799 (41.8)	1049 (50.2)	1044 (51.7)	5 (7.25)	336 (63.6)	220 (85.6)	116 (42.8)	115 (78.2)	23 (62.2)	92 (83.6)
Stroke / TIA	2326 (57.5)	1519 (71.1)	807 (42.2)	1058 (50.6)	1053 (52.1)	5 (7.25)	344 (65.2)	222 (86.4)	122 (45.0)	115 (78.2)	23 (62.2)	92 (83.6)
Intracranial bleeding	2311 (57.1)	1510 (70.7)	801 (41.9)	1054 (50.4)	1049 (51.9)	5 (7.25)	343 (65.0)	225 (87.5)	118 (43.5)	116 (78.9)	24 (64.9)	92 (83.6)
Bleeding with a drop in haemoglobin >50 g/L	2258 (55.8)	1466 (68.7)	792 (41.4)	1024 (49.0)	1019 (50.4)	5 (7.25)	334 (63.3)	218 (84.8)	116 (42.8)	114 (77.6)	23 (62.2)	91 (82.7)
Bleeding with a drop in haemoglobin 31-50g/L	2298 (56.8)	1501 (70.3)	797 (41.7)	1039 (49.7)	1034 (51.2)	5 (7.25)	337 (63.8)	221 (86.0)	116 (42.8)	115 (78.2)	23 (62.2)	92 (83.6)
Days in Coronary Care Unit	395 (9.76)	235 (11.0)	160 (8.36)	262 (12.5)	259 (12.8)	3 (4.35)	55 (10.4)	15 (5.84)	40 (14.8)	22 (15.0)	14 (37.8)	8 (7.27)
Days in Intensive Care Unit	1104 (27.3)	383 (17.9)	721 (37.7)	706 (33.8)	663 (32.8)	43 (62.3)	121 (22.9)	23 (8.95)	98 (36.2)	22 (15.0)	12 (32.4)	10 (9.09)

N (%)

Table III: Presence of "Not stated" values in registries with DL alone by type of hospital

MI = Myocardial infarction
UA = Unstable Angina

	University			Non-University		
	All N=3468	**MI N=2195**	**UA N=1273**	**All N=3162**	**MI N=2127**	**UA N=1035**
BASIC DATA:						
Age	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Sex	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
PREVIOUS HISTORY:						
Renal Failure	1181 (34.1%)	823 (37.5%)	358 (28.1%)	1574 (50.0%)	1228 (58.2%)	346 (33.5%)
ADMISSION DATA:						
Type of Acute Coronary Syndrome on admission	33 (0.95%)	11 (0.50%)	22 (1.73%)	112 (3.56%)	26 (1.23%)	86 (8.32%)
Heart Rate on admission	703 (20.3%)	495 (22.6%)	208 (16.3%)	782 (24.9%)	484 (22.9%)	298 (28.8%)
Systolic blood pressure on admission	797 (23.0%)	584 (26.6%)	213 (16.7%)	1036 (32.9%)	605 (28.7%)	431 (41.7%)
Acute Pulmonary oedema on admission	915 (26.4%)	665 (30.3%)	250 (19.6%)	1206 (38.3%)	854 (40.5%)	352 (34.0%)
Cardiogenic shock on admission	1206 (34.8%)	900 (41.0%)	306 (24.0%)	1269 (40.3%)	906 (42.9%)	363 (35.1%)
Initial creatinine	518 (14.9%)	292 (13.3%)	226 (17.8%)	223 (7.09%)	155 (7.34%)	68 (6.58%)
PROCEDURES USED DURING HOSPITALIZATION						
Coronary artery bypass surgery	786 (22.7%)	446 (20.3%)	340 (26.7%)	1291 (41.0%)	887 (42.0%)	404 (39.1%)
Intracardiac defibrillator	1220 (35.2%)	811 (36.9%)	409 (32.1%)	2074 (65.9%)	1569 (74.3%)	505 (48.8%)
Intra-aortic balloon pumb (IABP)	968 (27.9%)	554 (25.2%)	414 (32.5%)	1861 (59.2%)	1368 (64.8%)	493 (47.7%)

Table III (Cont)

MI = Myocardial infarction
UA = Unstable Angina

	Non-University			University		
	All N=3468	**MI N=2195**	**UA N=1273**	**All N=3162**	**MI N=2127**	**UA N=1035**
SEVERITY INDICATORS AND COMPLICATIONS DURING HOSPITALIZATION:						
TIMI/GRACE	3181 (91.7%)	2026 (92.3%)	1155 (90.7%)	3058 (97.2%)	2028 (96.1%)	1030 (99.6%)
Q-wave in the evolving ECG	906 (26.1%)	866 (39.5%)	40 (3.14%)	1134 (36.1%)	1094 (51.8%)	40 (3.87%)
Anterior ST elevation	194 (5.59%)	150 (6.83%)	44 (3.46%)	438 (13.9%)	343 (16.2%)	95 (9.19%)
Troponin peak	378 (10.9%)	247 (11.3%)	131 (10.3%)	521 (16.6%)	297 (14.1%)	224 (21.7%)
Left systolic ejection fraction	1392 (40.1%)	867 (39.5%)	525 (41.2%)	1412 (44.9%)	922 (43.7%)	490 (47.4%)
Acute pulmonary oedema	1251 (36.1%)	884 (40.3%)	367 (28.8%)	1394 (44.3%)	921 (43.6%)	473 (45.7%)
Cardiogenic shock	1280 (36.9%)	909 (41.4%)	371 (29.1%)	1499 (47.7%)	1016 (48.1%)	483 (46.7%)
Cardiac arrest	1453 (41.9%)	1005 (45.8%)	448 (35.2%)	2010 (63.9%)	1502 (71.2%)	508 (49.1%)
Acute renal failure	1423 (41.0%)	981 (44.7%)	442 (34.7%)	1932 (61.4%)	1432 (67.8%)	500 (48.4%)
Reinfarction	1538 (44.3%)	1089 (49.6%)	449 (35.3%)	2068 (65.8%)	1561 (73.9%)	507 (49.0%)
Stroke/TIA	1567 (45.2%)	1106 (50.4%)	461 (36.2%)	2077 (66.0%)	1568 (74.3%)	509 (49.2%)
Intracranial bleeding	1536 (44.3%)	1085 (49.4%)	451 (35.4%)	2088 (66.4%)	1579 (74.8%)	509 (49.2%)
Bleeding & haemoglobin drop >50	1504 (43.4%)	1058 (48.2%)	446 (35.0%)	2033 (64.6%)	1530 (72.5%)	503 (48.6%)
Bleeding & haemoglobin drop 31-50	1527 (44.0%)	1081 (49.2%)	446 (35.0%)	2062 (65.6%)	1554 (73.6%)	508 (49.1%)
Days in Coronary Care Unit	435 (12.5%)	330 (15.0%)	105 (8.25%)	299 (9.51%)	193 (9.14%)	106 (10.3%)
Days in Intensive Care Unit	878 (25.3%)	531 (24.2%)	347 (27.3%)	1075 (34.2%)	550 (26.1%)	525 (50.8%)