



Risk Factor Control and Long-Term Outcomes in Patients After a Myocardial Infarction

Emil Hagström, Maria Bäck, Bertil Lindahl, Nermin Hadziosmanovic, Tomas Jernberg, Anna Norhammar and Margrét Leosdottir

emil.hagstrom@ucr.uu.se

MD, PhD, Associate Professor, FESC

Department of Medical Sciences, Uppsala University, Sweden



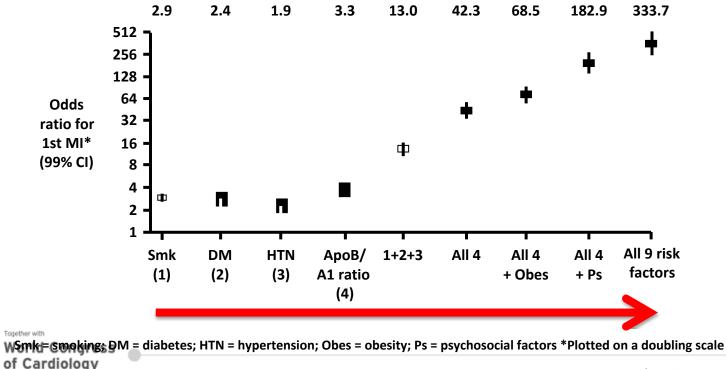
Declaration of interest

Consulting/Royalties/Owner/Stockholder of healthcaee company: (Consukting for AMGEN, Bayer, and Sanofi. Speakers fee from AMGEN, AstraZeneca, Bayer, NovoNordisk, and Sanofi)

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INTERHEART: increasing number of risk factors are related to the risk of MI



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Aim

Assess **six major secondary prevention risk factors** after a first MI and:

- An increasing number of these risk factors **not** at target and prognosis, compared to matched controls
- The riskfactors' relative importance for CV events and mortality

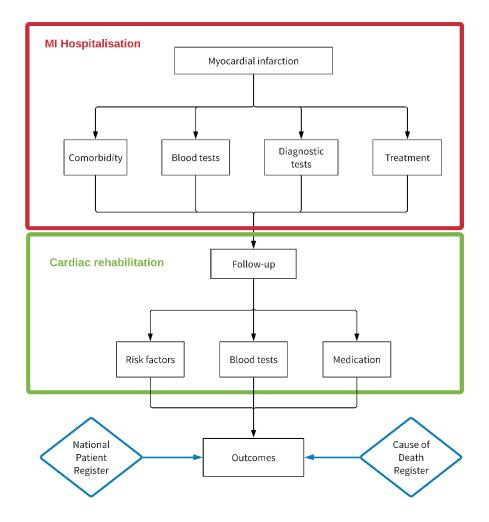






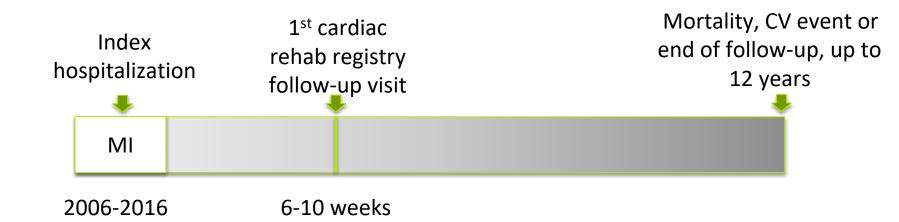
The SWEDEHEART registry







Study design



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Outcomes

- All-cause mortality
- Cardiovascular mortality
- Ischemic stroke
- Heart failure hospitalisation
- Major bleeding
- Exploratory analyses:
 - MACE (mortality, MI, stroke)
 - Myocardial infarction

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Study population

Matched controls were individuals ever registered in the:

- national hospital outpatient registry (50% of the controls)
- inpatient registry (50% of the controls)
- total number of individuals: >3 miljon
- start date 1987

65,002 first MI patients 325,010 age and sex matched controls, no prior MI

Secondary prevention risk factors not at target

- Blood pressures: ≥140/≥90 mmHg
- Elevated fasting plasma glucose: ≥7.0 mmol/L (≥126 mg/dL)
- Obesity: BMI ≥30 kg/m²
- LDL-C: ≥1.8 mmol/L (≥70 mg/dL)
- Current smoking
- Not performing ≥30 minutes of moderate intensity daily physical activity ≥5 days/week ("insufficient physical activity")

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Methods

- Unique identification number matching between registires
- In adjusted Cox regression models (COPD, cancer, dementia):
 - increasing number of risk factors outside target and outcomes were assessed
 - prespecified age strata
- Compared the relative importance of risk factors for outcomes





Results

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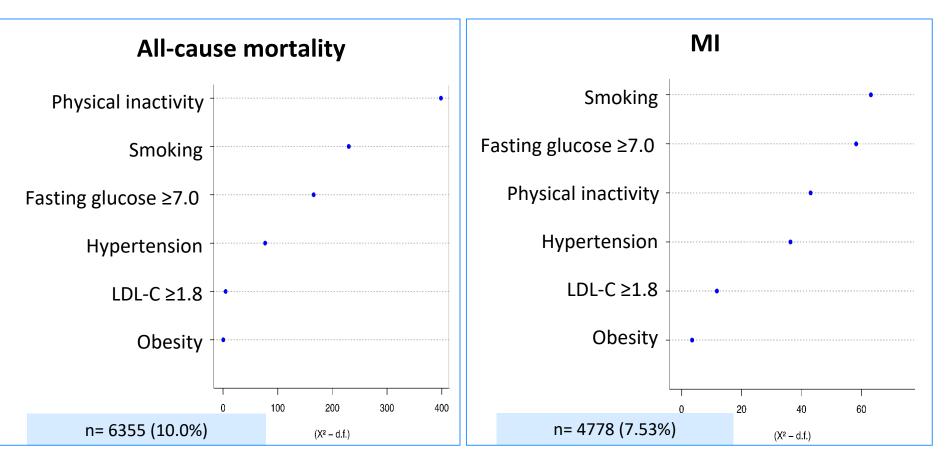


Population characteristics

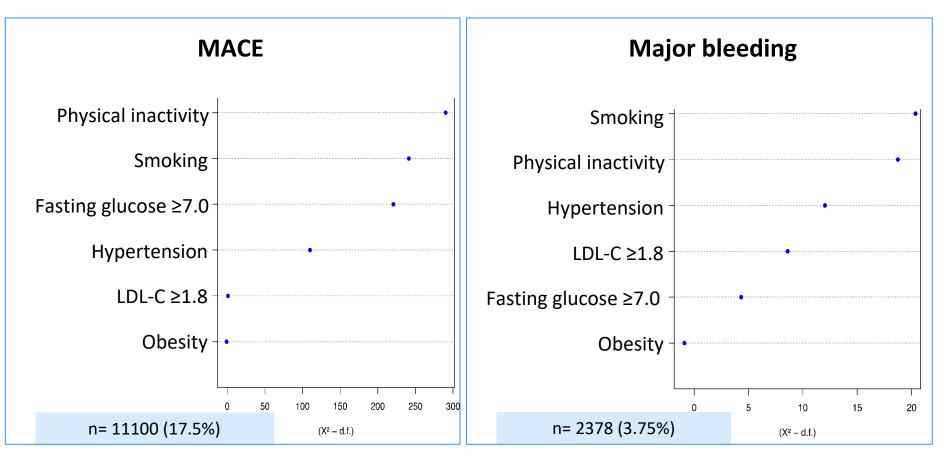
	Patients	Controls					
n	65,002	325,010					
Age (years)	64 (57, 69)	64 (57, 69)					
Females (%)	26.3	26.3					
Current smoker (%)	29.7	-					
Diabetes mellitus (%)	17.9	-					
BMI (kg/m²)	26.9 (24.5, 29.8)	-					
Systolic blood pressure (mmHg)	130 (120, 140)	-					
Diastolic blood pressure (mmHg)	78 (70, 81)						
Physical activity <5 days/week (%)	50.4	-					
lian(01, 02)							

(median; Q1, Q3)

Relative risk factor importance for outcomes



Relative risk factor importance for outcomes

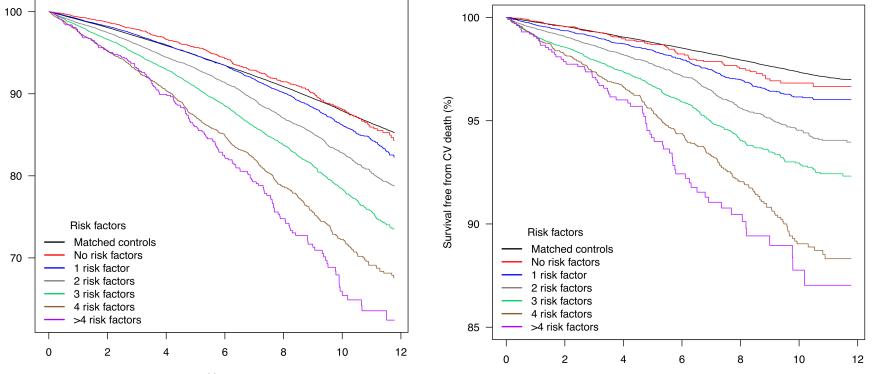


Cumulative incidence by outcome

All-cause mortality

Survival free from All-cause death (%)

Cardiovascular mortality



Years

Years

Association between number of risk factors and outcomes compared to controls HR (95%CI) Matched

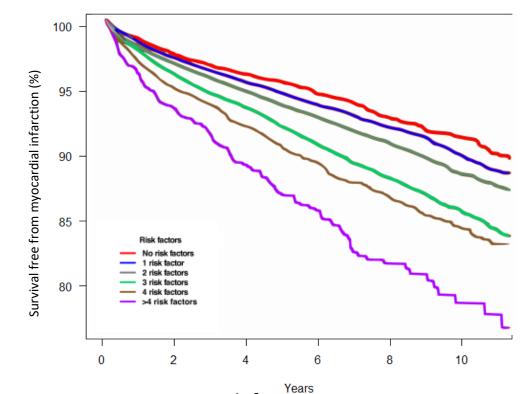
	Outcome Risk factors	N(no. of events)									control as reference	
	Death	,										
All-cause		317195 (22460)	-									
		5779 (321)									0.91 (0.81-1.0	2)
mortalit	1 Risk factor	18197 (1355)									1.11 (1.05-1.1	
	2 Risk factors	20972 (2033)	-	-							1.43 (1.35-1.5	,
	3 Risk factors	12838 (1654)		-								,
		,			-						1.88 (1.74-2.0)	
	4 Risk factors	4650 (794)		-	-						2.46 (2.23-2.7	
	>4 Risk factors	1003 (198)									2.99 (2.48-3.6	1)
CV	CV death	247405 (4720)										
	Control	317195 (4729)	T								1 40 /0 00 4 5	
mortalit		5779 (85)		_							1.18 (0.93-1.5	
	1 Risk factor	18197 (368)		- • -							1.41 (1.26-1.5	
	2 Risk factors	20972 (618)			_						2.02 (1.81-2.2	,
	3 Risk factors	12838 (527)			_	_					2.85 (2.53-3.2	,
	4 Risk factors	4650 (269)			_	-	_				3.91 (3.41-4.4	,
	>4 Risk factors	1003 (69)					-				5.09 (3.99-6.5	0)
Heart	Heart failure											
	Control	317195 (3031)	-		_							
failure	No risk factors	5779 (171)									3.57 (3.03-4.2	
hospital	isat ¹ Risk factor	18197 (627)			-	-					3.93 (3.55-4.3	,
ion	2 Risk factors	20972 (1017)									5.38 (4.92-5.8	
1011	3 Risk factors	12838 (742)					-	-			6.21 (5.64-6.8	
	4 Risk factors	4650 (326)							_		7.82 (6.88-8.8	,
	>4 Risk factors	1003 (84)							-	_	9.25 (6.99-12.)	23)
				2		4	6	8	10	14		
				2		4	0	0	10	14		

Association between number of risk factors and outcomes compared to controls

	Outcome Risk factors	N(no. of events)									control as reference
MACE	^MACE2										
WACL	Control	317195 (29839)									
	No risk factors	5779 (728)									1.61 (1.48-1.75)
	1 Risk factor	18197 (2869)			•						1.89 (1.81-1.97)
	2 Risk factors	20972 (4020)									2.31 (2.21-2.41)
	3 Risk factors	12838 (3066)			-						2.87 (2.71-3.03)
	4 Risk factors	4650 (1333)									3.50 (3.27-3.75)
	>4 Risk factors	1003 (329)									4.29 (3.81-4.83)
	Stroke										
Stroke	Control	317195 (6470)									
	No risk factors	5779 (96)		-							0.93 (0.76-1.14)
	1 Risk factor	18197 (382)		-							1.13 (0.98-1.31)
	2 Risk factors	20972 (590)									1.41 (1.26-1.57)
	3 Risk factors	12838 (451)			_						1.79 (1.62-1.98)
	4 Risk factors	4650 (205)		-							2.17 (1.83-2.57)
	>4 Risk factors	1003 (50)		-							2.57 (1.84-3.57)
	Major bleeding										
Major	Control	317195 (7484)	•								
bleeding	No risk factors	5779 (163)		—							1.47 (1.23-1.76)
biccung	1 Risk factor	18197 (643)									1.56 (1.38-1.75)
	2 Risk factors	20972 (778)									1.67 (1.51-1.84)
	3 Risk factors	12838 (514)			-						1.75 (1.59-1.92)
	4 Risk factors	4650 (226)		_							2.06 (1.72-2.48)
	>4 Risk factors	1003 (54)		_	-	-					2.36 (1.79-3.13)
					2	4	6	8	10	14	
					-		•				

2 Risk factor	rs.		
<55	4177 (115)		1.83 (1.50-2.23)
56-64	7276 (529)		1.55 (1.41-1.71)
65-70	5624 (675)		1.44 (1.27-1.64)
71-75	3576 (643)		1.30 (1.19-1.43)
3 Risk factor	ſS		
<55	2741 (137)	_	2.84 (2.30-3.51)
56-64	4349 (427)		2.11 (1.89-2.37)
65-70	3313 (529)	_ _	1.93 (1.60-2.34)
71-75	2222 (506)		1.65 (1.51-1.80)
4 Risk factor	ſS		
<55	972 (62)	=	3.94 (2.97-5.22)
56-64	1621 (234)	=	2.89 (2.31-3.62)
65-70	1182 (261)	_ _	2.64 (2.24-3.11)
71-75	801 (217)		2.16 (1.76-2.65)
>4 Risk facto	ors		-CV mortality
<55	217 (23)		6.10 (3.74-9.95)
56-64	398 (71)	_	3.96 (2.77-3.72)
65-70	230 (58)	_	hospitalisation
71-75	142 (38)		-Stroke 2.12 (1.49-3.03)
		1 2 3 4 5 6	$_{5}$ $_{7}$ Major bleeding

Cumulative incidence of myocardial infarction



Exploratory outcome. Comparator: no risk factors.



Conclusions

In this real-world population of patients with MI and over 10 years of follow-up:

- Insufficient physical activity and current smoking were the strongest predictors of future major outcomes
- Raised LDL-C (at statin steady state) and obesity were the weakest
- For every risk factor at target, there was a linear, stepwise additional reduction in risk of all outcomes
- Patients after a MI with no risk factors had the same hazard of all-cause mortality, CV mortality and stroke as compared to controls





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