

Sex-related differences in prognosis after myocardial infarction: changes from 1978 to 2007

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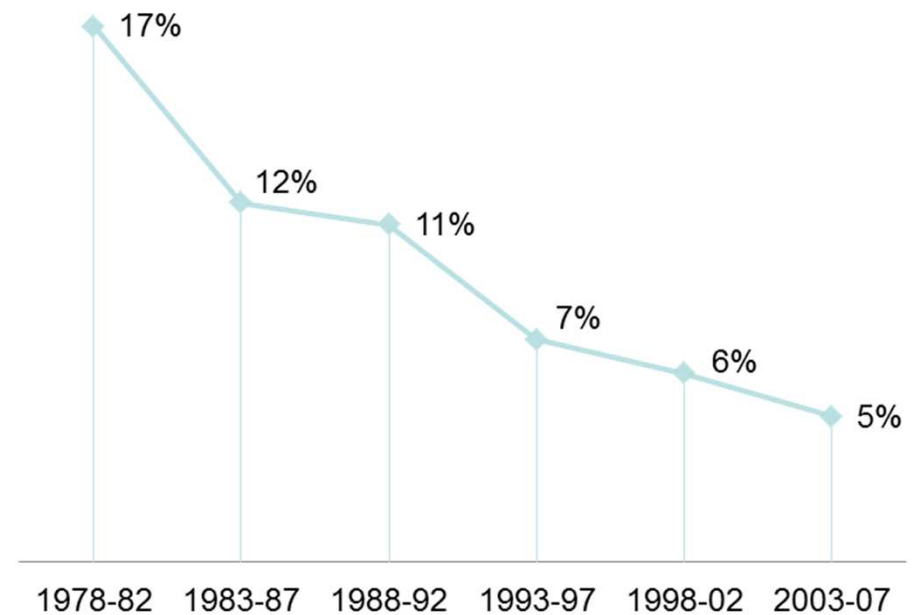
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Introduction

- In-hospital mortality has significantly decreased in both sexes:
 - Concurring with changes in the treatment of MI
 - Regardless of the severity of patients admitted to hospitals

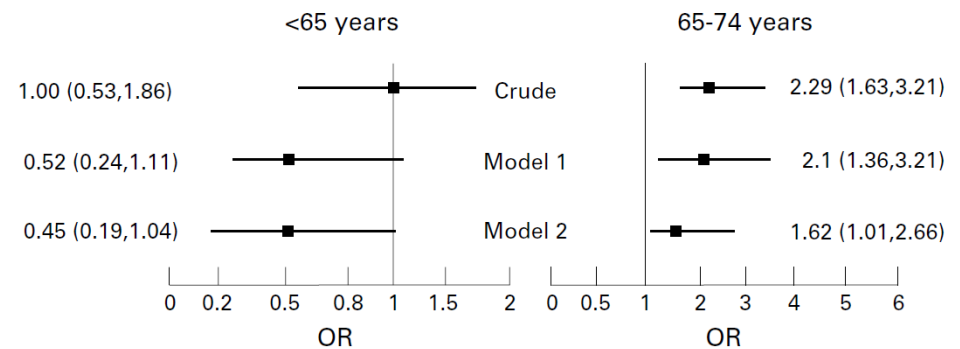


28-day case fatality of patients with a first MI admitted to the reference Coronary Care Unit in Girona, Spain, from 1978 to 2007, by 5-year periods

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Short- and Long-term prognosis

- Women with myocardial infarction have shown a 28-day survival disadvantage compared with men
 - Women aged 65-74 had higher early mortality risk than men of the same age
 - Conversely, women under 65 tended to be at lower risk than men.
- Results are not consistent when considering long-term prognosis in 28-day survivors



Adjusted odds ratio and 95% confidence intervals of 28 day mortality for women after a first MI by age group (over and under 65).

Model 1 adjusted for smoking, anterior location of MI, diabetes, hypertension, and thrombolysis.

Model 2 as model 1 plus acute pulmonary edema or cardiogenic shock

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Justification

- The hospital registry of consecutive MI patients in Girona since 1978 provides a good opportunity to analyze the trends in MI prognosis by sex
- The accumulated knowledge on sex-related differences may result in improvements in prognosis or more intensive management of MI in women

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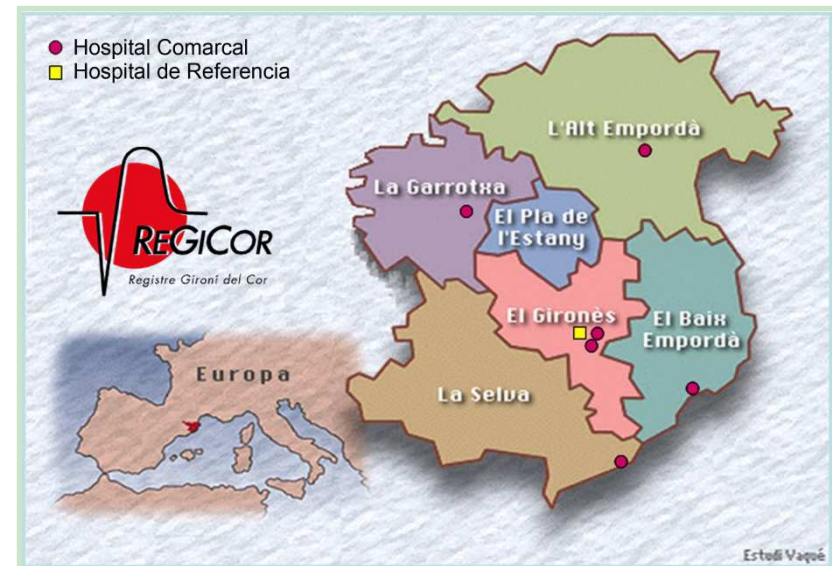
Objective

- To estimate the trends in sex-related differences between 1978 and 2007 in the prognosis of a first Q-wave MI considering three end-points:
 - 28-day mortality or severe ventricular dysfunction
 - 28-day mortality
 - 2-year cardiovascular mortality or non-fatal MI in 28-day survivors after a first MI

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The REGICOR Hospital Registry

- Cohort study of 3,982 consecutive patients
 - Admitted with first Q-wave MI between 1978 and 2007
 - One tertiary university hospital
 - Aged 25-74 years
 - Residents of Girona



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Variable definition

- Myocardial infarction definition
 - Electrocardiography
 - Q-wave MI
 - Typical signs or symptoms
 - Cardiac enzymes for MI
 - Creatin phosphokinase
- Exposure variable
 - Female sex
- Covariables
 - Comorbidity
 - Hypertension
 - Diabetes
 - Smoking
 - Previous angina
 - Disease severity
 - Anterior MI location
 - Ventricular arrhythmia
 - Drugs and procedures
 - Thrombolysis
 - Anti-platelet drugs
 - β -blockers
 - ACE inhibitors
 - Angiograms
 - Percutaneous coronary intervention
 - Coronary arteri by-pass graft surgery

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Outcome definition

- 28-day outcomes were assessed for all participants
 - Severe ventricular dysfunction
 - Acute pulmonary edema (Killip III) or cardiogenic shock (Killip IV) during the hospital stay
 - Mortality
 - Considered cardiovascular in all instances
 - Ascertained by reviewing medical records or death certificates in the Catalonia Death Registry
- 2-year outcomes were assessed for 28-day survivors recruited between 1978 and 2005
 - Non-fatal MI
 - Assessed in the outpatient clinic or by telephone contact
 - Cardiovascular mortality
 - Ascertained by reviewing medical records or death certificates in the Catalonia Death Registry

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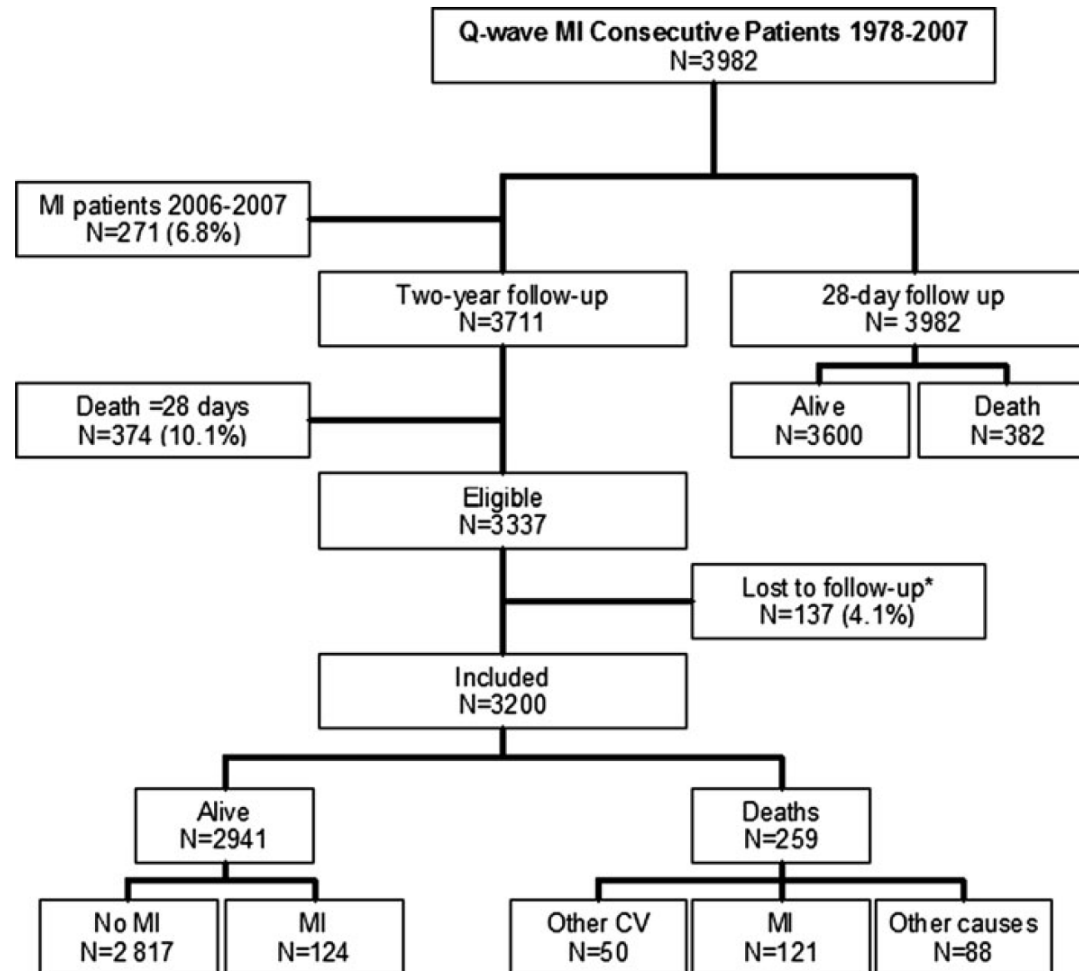
Statistical analysis

- Short-term prognosis: logistic regression model
- Long-term prognosis: Cox proportional hazard model
- Smoothed spline regression for plotting the results

- All models were adjusted for
 - Age
 - Sex
 - Comorbidity
 - Hypertension, diabetes, smoking and previous angina
 - Severity
 - MI location
 - Year of inclusion

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Follow-up flow chart



CV. Cardiovascular diseases; MI. Myocardial Infarction; *Not found by telephone contact

Table 1. Characteristics of patients and drugs procedure used by sex

	Men N=3,307	Women N=675	P
Age, mean (SD)	59 (10)	65 (8)	<0.001
Comorbidity			
Diabetes, %	20.5	43.9	<0.001
Hypertension, %	43.6	63.0	<0.001
Smokers, %	63.4	11.8	<0.001
Previous angina, %	43.3	48.8	0.011
Disease severity			
Anterior MI ECG location, %	43.6	47.7	0.060
Acute pulmonary edema / cardiogenic shock, %	11.0	25.0	<0.001
Ventricular arrhythmia, %	13.6	11.2	0.121
Drugs and procedures			
Thrombolysis, %	33.4	24.9	<0.001
Anti-platelet drugs, %	64.9	65.3	0.898
β-blockers, %	36.7	33.1	0.081
ACE inhibitors, %	26.5	27.3	0.696
28-day angiograms, %	23.4	24.7	0.487
28-day PCI, %	35.7	29.8	0.093
28-day CABG, %	2.0	2.2	0.818

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Results

Table 2. Outcomes of patients aged 25-74 years with a first Q-wave MI admitted between 1978 and 2007 by sex

	Men N=3,307	Women N=675	<i>P</i>
Angina post-MI, %	16.0	23.7	<0.001
28-day mortality, %	8.3	16.0	<0.001
Severe ventricular dysfunction or 28-day mortality, %	14.5	30.2	<0.001
2-year cardiovascular mortality, %	3.1	6.7	<0.001
2-year cardiovascular mortality or non-fatal MI, %	8.2	14.5	<0.001

Table 3. Characteristics of patients by endpoint

	Short-term prognosis			Long-term prognosis		
	No N=3,273	Yes N=683	<i>P</i>	No N=2,894	Yes N=306	<i>P</i>
Age, mean (SD)	59 (10)	64 (8)	<0.001	59 (10)	63 (9)	<0.001
Women, %	14.3	29.9	<0.001	14.8	24.8	<0.001
Comorbidity						
Diabetes, %	21.5	38.8	<0.001	22.8	32.5	<0.001
Hypertension, %	45.2	55.4	<0.001	44.4	56.1	<0.001
Smokers, %	57.0	42.3	<0.001	56.7	47.3	0.002
Previous angina, %	43.1	50.2	<0.001	42.5	53.7	<0.001
Disease severity						
Anterior MI ECG location, %	41.6	57.7	0.001	42.5	47.4	0.102
Acute pulmonary edema / cardiogenic shock, %	--	--	--	7.3	18.9	<0.001
Ventricular arrhythmia, %	9.6	31.0	<0.001	10.8	13.9	0.111
Drugs and procedures						
Thrombolysis, %	34.3	20.7	<0.001	33.2	23.8	0.001
Anti-platelet drugs, %	66.1	59.1	<0.001	64.0	61.6	0.412
β-blockers, %	40.5	14.4	0.001	34.3	26.2	0.004
ACE inhibitors, %	27.1	24.6	0.208	23.3	23.9	0.830
28-day angiograms, %	24.1	21.4	0.135	21.2	19.0	0.363
28-day PCI, %	36.5	24.5	0.001	10.5	8.6	0.308
28-day CABG, %	1.8	3.4	0.011	2.1	1.6	0.555

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Short-term prognosis

Table 4. Adjusted Odds Ratio of short-term outcomes for women (N=3,982)

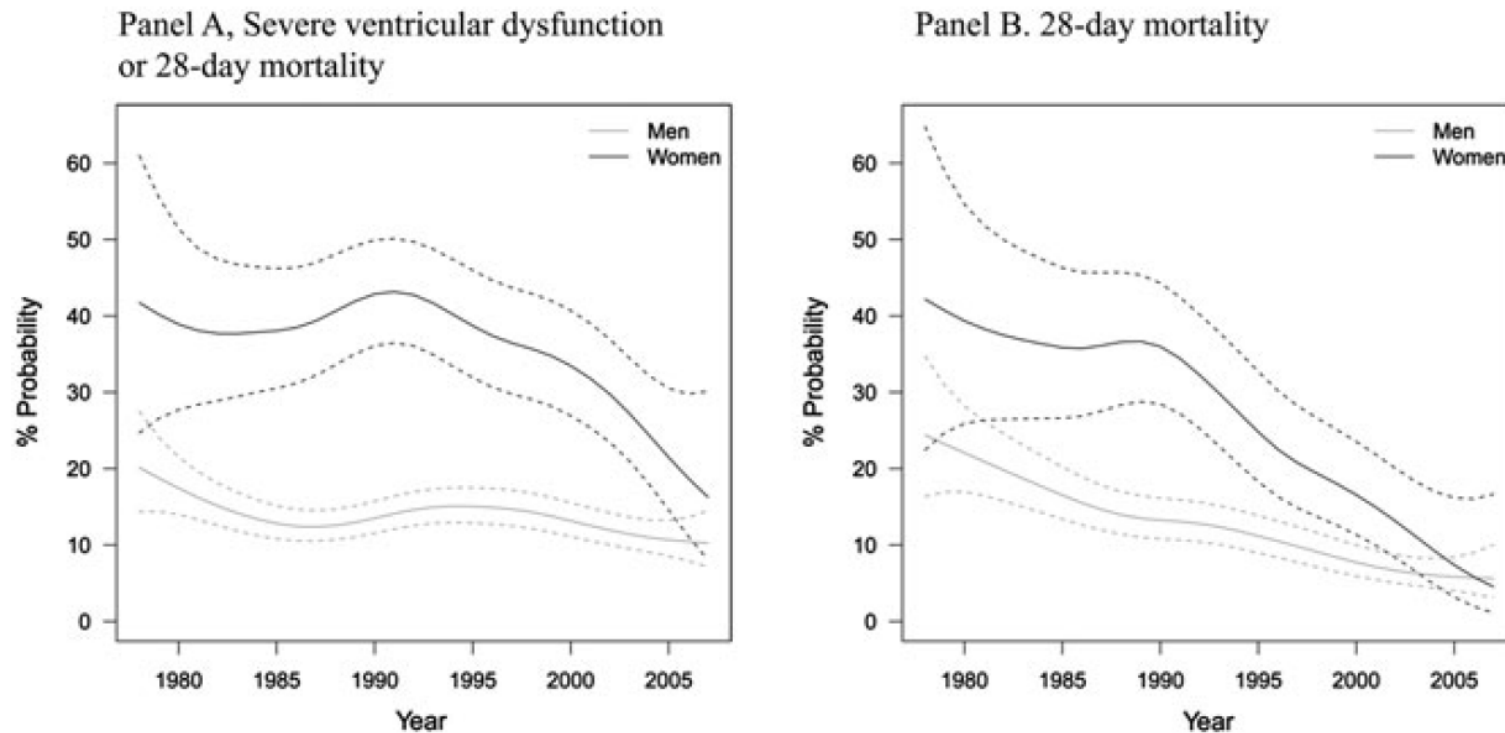
	Severe ventricular dysfunction or 28-day mortality		28-day mortality	
	Adjusted OR	<i>P</i>	Adjusted OR	<i>P</i>
Sex (women)	1.71	<0.001	1.33	0.072
Age	1.06	<0.001	1.08	<0.001
Comorbidities				
Diabetes	1.83	<0.001	1.30	0.061
Hypertension	1.22	0.038	1.19	0.162
Smoking	1.10	0.410	0.83	0.208
Previous angina, %	1.13	0.197	1.16	0.243
Disease severity				
Anterior MI ECG location, %	1.97	<0.001	1.80	<0.001
Time of inclusion				
Year	0.98	0.005	0.94	<0.001

Model is adjusted for age, sex, disease severity (anterior MI ECG location), comorbidity (diabetes, hypertension, smoking, previous angina) and year of inclusion

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Short-term prognosis

Figure 2. Changes by sex in the probability of severe ventricular dysfunction or 28-day mortality (Panel A) and 28-day mortality (Panel B).
The spline models were adjusted for age, sex, disease severity, and comorbidity



The spline models were adjusted for age, sex, disease severity (anterior MI ECG location), and comorbidity (diabetes, hypertension, smoking, previous angina)

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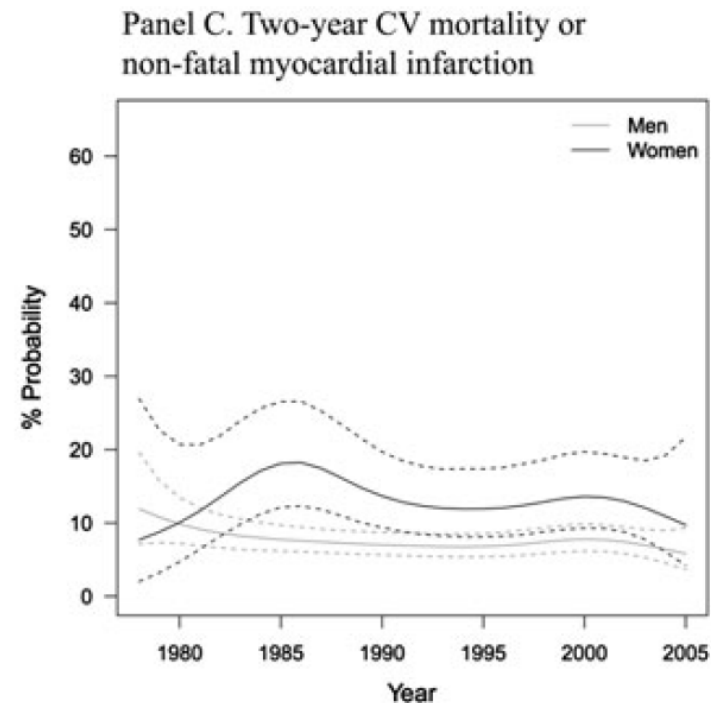
Long-term prognosis

Table 5. Hazard Ratio of 2-year cardiovascular mortality or non-fatal MI in 28-day survivors of a first myocardial infarction (N=3,200)

	HR	P
Sex (women)	1.40	0.035
Age	1.03	<0.001
Comorbidities		
Diabetes	1.34	0.030
Hypertension	1.39	0.008
Smoking	1.05	0.728
Previous angina	1.43	0.004
Disease severity		
Anterior MI ECG location	1.17	0.204
Time of inclusion		
Year	0.99	0.195

Model is adjusted for age, sex, disease severity (anterior MI ECG location), comorbidity (diabetes, hypertension, smoking, previous angina) and year of inclusion

Figure 2. Changes by sex in the probability of 2-year cardiovascular mortality or non-fatal myocardial infarction.



The spline models were adjusted for age, sex, disease severity (anterior MI ECG location), and comorbidity (diabetes, hypertension, smoking, previous angina)

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Conclusions

- Short-term prognosis for first Q-wave MI patients in the period 1978-2007:
 - Has been worse overall in women than in men
 - Has improved faster in women to the point that it resembled that of men in 2007
- Long-term prognosis did not improve in the studied period in men or women
 - Secondary prevention should be reinforced to achieve a success similar to the short-term prognosis

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