DIABETES, LIPIDS AND METABOLISM

Improved but still high short- and long-term mortality rates after myocardial infarction in patients with diabetes mellitus: a time-trend report from the Swedish Register of Information and Knowledge about Swedish Heart Intensive Care Admission

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Objective: The aim of the study was to compare time-trends in mortality rates and treatment patterns between patients with and without diabetes based on the Swedish register of coronary care (Register of Information and Knowledge about Swedish Heart Intensive Care Admission [RIKS-HIA]).

Methods: Post myocardial infarction mortality rate is high in diabetic patients, who seem to receive less evidence-based treatment. Mortality rates and treatment in 1995–1998 and 1999–2002 were studied in 70 882 patients (age <80 years), 14 873 of whom had diabetes (the first registry recorded acute myocardial infarction), following adjustments for differences in clinical and other parameters.

Results: One-year mortality rates decreased from 1995 to 2002 from 16.6% to 12.1% in patients without diabetes and from 29.7% to 19.7%, respectively, in those with diabetes. Patients with diabetes had an adjusted relative 1-year mortality risk of 1.44 (95% CI 1.36 to 1.52) in 1995–1998 and 1.31 (95% CI 1.24 to 1.38) in 1999–2002. Despite improved pre-admission and in-hospital treatment, diabetic patients were less often offered acute reperfusion therapy (adjusted OR 0.85, 95% CI 0.80 to 0.90), acute revascularisation (adjusted OR 0.78, 95% CI 0.69 to 0.87) or revascularisation within 14 days (OR 0.80, 95% CI 0.75 to 0.85), aspirin (OR 0.90, 95% CI 0.84 to 0.98) and lipid-lowering treatment at discharge (OR 0.81, 95% CI 0.77 to 0.86).

Conclusion: Despite a clear improvement in the treatment and myocardial infarction survival rate in patients with diabetes, mortality rate remains higher than in patients without diabetes. Part of the excess mortality may be explained by co-morbidities and diabetes itself, but a lack of application of evidence-based treatment also contributes, underlining the importance of the improved management of diabetic patients.

Patients with diabetes have higher short- and long-term mortality rates after acute myocardial infarction (MI) than those without diabetes.[1–4] This pattern has remained even after the introduction of modern therapeutic principles.[5–7] According to US mortality rate trends diabetic patients have not experienced a similar mortality rate reduction as that seen in non-diabetic patients.[8–10] Less use of evidence-based treatment has been suggested as an important explanation.[4 10–14] The systematic use of such therapy should decrease hospital mortality rate in diabetic patients so that it approaches that in those without diabetes.[15]

The Register of Information and Knowledge about Swedish Heart Intensive Care Admissions (RIKS-HIA), covering almost all Swedish patients with MI, offers detailed information on treatment patterns and prognosis in unselected patients with and without diabetes. The aim of this study is to analyse time trends in treatment patterns and prognosis in order to see whether management has improved.

METHODS

Patients

The RIKS-HIA contains information on all patients admitted to Swedish coronary care units, increasing from 19 patients registered in 1995 to 70 in 2002. Data were collected during 1995–2002. Because of an increased risk of concomitant diseases patients >80 years were not included. All 70 882 patients with a first registry recorded acute MI were included, of whom 14 873 (21%) had known diabetes mellitus.

Case record forms

Information on care of the patients is recorded into the RIKS-HIA by means of case record forms including about 100 variables as previously explained.[4] Thirty variables are recorded at admission (baseline characteristics, symptoms and ECG changes at entry). During hospital stay another 37 variables are registered, including treatments and interventional procedures. The final 33 variables are recorded at hospital discharge and include variables such as as diagnosis during hospital stay, revascularisation procedures and medications. Source data verification is continuously performed by an external monitor comparing the register information with actual hospital records in 50 patients from ten hospitals every year. In the first 1004 computer forms derived from 21 hospitals and comprising 92 368 measurements there was a 94% overall agreement between the registered information and patient records.

Abbreviations: CABG, coronary artery bypass graft; LBBB, left ventricular bundle block; MI, myocardial infarction; NSTEMI, non-ST elevation myocardial infarction; OR, odds ratio; PCI, percutaneous revascularisation; RIKS-HIA, Swedish Register of Information and Knowledge about Swedish Heart Care Admission; STEMI, ST elevation myocardial infarction.

Follow-up
Information on the performance on coronary procedures before and after hospital admission was obtained by matching patient data with the National Registries on coronary angiography, percutaneous revascularisation (PCI) and coronary artery bypass graft (CABG). One-year and long-term mortality rates were obtained by merging the RIKS-HIA database with the National Cause of Death Register.

Definitions
Myocardial infarction
From 1995 to 2000 the criteria for the diagnosis of acute MI were based on the World Health Organization criteria from 1994[16] combining symptoms with the increase of a biochemical marker (mainly creatine kinase-cardiac muscle [CK-MB]) and typical ECG changes. From late 2001 the criteria for the diagnosis of MI were changed to those of the European Society of Cardiology/American College of Cardiology/American Heart Association consensus document, using troponin T or troponin I together with typical symptoms and/or ECG-changes.[17 18]

Diabetes mellitus
Diabetes was defined as a previously established diagnosis of this disease or the prescription of glucose-lowering treatment at the time of hospital discharge (oral drugs or insulin).

Statistical analysis
The background characteristics, treatments and complications were compared in diabetic and non-diabetic patients. Results are presented as odds ratios (ORs) and 95% CIs. A propensity score method compensated for the non-randomised study design. This method, described in detail elsewhere,[19 20] expresses for each patient the *propensity* of having the same background characteristics as the average diabetic patient through a logistic regression analysis. The model includes patient characteristics (age as a third degree polynomial, sex and smoking habits), previous diseases (history of MI, heart failure, PCI or CABG, and hypertension), admission ECG characteristics and medication at admission (aspirin, beta-blockers, ACE inhibitors, calcium antagonists, lipid-lowering drugs, nitrates, anticoagulation therapy and diuretics). Several two-way interactions were included in the model. To study differences between diabetic and non-diabetic patients for in-hospital or discharge treatment modalities, separate logistic regression models were fitted. The models included diabetes status (diabetic/non-diabetic) as the independent variable, and the propensity score together with each respective in-hospital or discharge treatment (see Figure 1), one for each model, as dependent variables.

To compare the risk of mortality between diabetic and non-diabetic patients a Cox regression analysis was performed. This model included the propensity score as well as in-hospital treatment (beta-blockers, anticoagulation, thrombolysis and acute revascularisation) and treatment at discharge (aspirin, beta-blockers, ACE inhibitors, calcium antagonists, nitrates, anticoagulation, diuretics, digitalis and heparins) and revascularisation within 14 days following discharge. Estimated survival rates were calculated for the complete time period and separately for the two time periods 1995–1998 and 1999–2002. Difference in relative risk (RR) between the time periods was assessed by including an interaction term (time period × diabetes status) in the model. All analyses were done using the statistical program R (version 2.0; R Development Core Team).[21]

Ethical considerations
All patients were informed of their participation in the RIKS-HIA registry and the long-term follow-up. The merging with other registries was approved by the National Board of Health Welfare and the Swedish Data Inspection Board.

RESULTS
Trends in prevalence of risk factors and preadmission treatment
Diabetes versus non-diabetes
Patients with diabetes were older (mean age: 68 versus 66 years) and more often female. They had a more frequent history of hypertension, MI, heart failure and revascularisation but smoked less. Their pre-admission therapy more frequently included aspirin, beta-blockers, ACE inhibitors, diuretics, nitroglycerin and lipid-lowering drugs as shown in Table 1, which also includes changes in baseline characteristics and treatment 1995–1998 versus 1999–2002.

Changes over time
During the time period studied, the prevalence of known diabetes changed from 20.9% in 1995 to 22.5% in 2001. Previous hypertension, revascularisation and smoking became more common and previous MI less common within the diabetic cohort. Non-diabetic patients showed a similar but less pronounced change causing diabetic patients to present with a more serious disease history at admission over time (Table 1). Comparing the first and second time period, pre-admission use of aspirin, beta-blockers, ACE inhibitors and lipid-lowering drugs increased among diabetic patients, while the use of nitroglycerin, diuretics and calcium-channel-blockers became less frequent. Similar but less pronounced changes were observed in non-diabetic patients (Table 1). In patients without diabetes admission ECG showed ST elevation in 47% of patients during the first time period and in 43% during the second time period. The corresponding values for patients with diabetes were 40% and 33%.

In-hospital treatment trends
Comparing the first time period with the second, there was an increased use of intravenous beta-blockers and acute revascularisation in hospital and at-discharge use of aspirin, beta-blockers, ACE inhibitors, lipid-lowering treatments, heparins, anticoagulation and revascularisation within 14 days; the use of diuretics, digitalis and nitroglycerin decreased in patients both with and without diabetes. Diabetic patients less often received aspirin (84% versus 88%), beta-blockers (82% versus 84%), lipid-lowering drugs (55% versus 59%), and revascularisation within 14 days (20% versus 28%). For glucose-lowering therapy there was no change from the first to the second time period in the use of insulin or oral agents (Table 1).

Multiple adjustments
The propensity score adjusted ORs for in-hospital treatments during the two time periods are shown in Figure 1. Reperfusion therapy (thrombolysis or acute PCI) (OR 0.85, 95% CI 0.80 to 0.90), acute revascularisation (acute PCI or CABG) (OR 0.78, 95% CI 0.69 to 0.87), aspirin (OR 0.90, 95% CI 0.84 to 0.98), lipid-lowering treatment at discharge (OR 0.81, 95% CI 0.77 to 0.86) and revascularisation within 14 days (OR 0.80, 95% CI 0.75 to 0.85) remained significantly less frequent among diabetic patients during the second time period, while beta-blockers, heparins and anticoagulation therapy were prescribed to an equal proportion of patients with and without diabetes at discharge.

Mortality
The crude 1-year mortality rate decreased from 1995 to 2002 from 16.6% to 12.1% in patients without diabetes compared with 29.7 to 19.7%, respectively, in those with diabetes. An

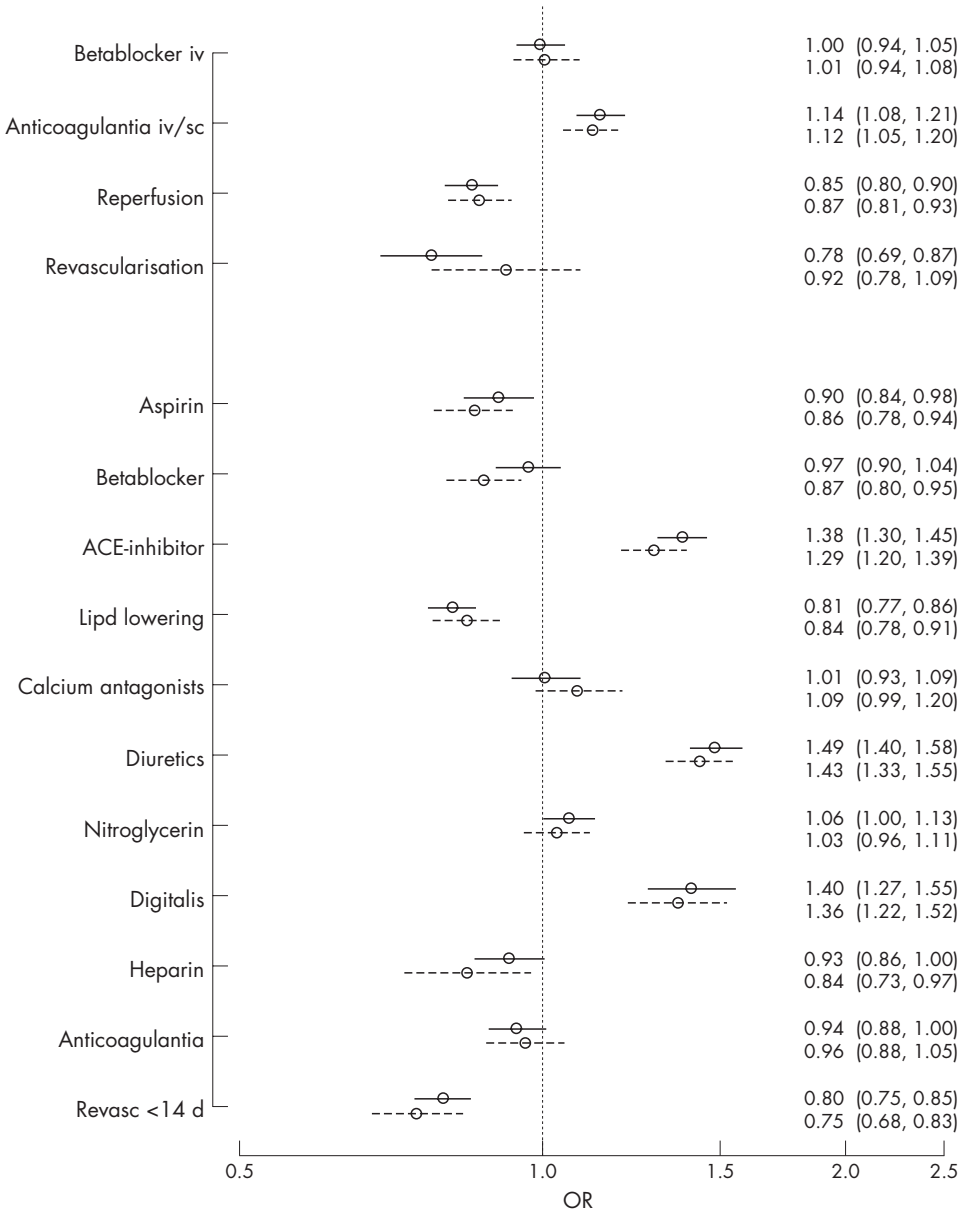

Figure 1 Propensity score adjusted OR for prescription of in-hospital (top four) and at discharge (bottom 11) treatment modalities in patients with and without diabetes and MI in 1995–1998 (dashed line) and 1999–2002 (solid line). Treatments with an OR >1.0 are given more often to patients with diabetes.

improvement in mortality rate was seen in both groups, but a fatal outcome remained higher among diabetic patients (Figure 2). Mortality rate within 30 days decreased from 18.3% in 1995 to 10.6% in 2002 for patients with diabetes and from 10.2% to 6.7% in those without diabetes. One-year survival rate curves are shown in Figure 3A and long-term survival rate in Figure 3B. The unadjusted estimated RR for diabetic patients during the complete time period was 1.95 (95% CI 1.89 to 2.01). Following adjustments (propensity score and in-hospital and discharge treatment) the RR was 1.38 (95% CI 1.32 to 1.43). The adjusted RR decreased from 1.44 (95% CI 1.36 to 1.52) in 1995–1998 to 1.31 (95% CI 1.24 to 1.38) in 1999–2002 ($p = 0.012$). Long-term survival rate curves separate over time to the disadvantage of patients with diabetes, especially in the youngest age group. During the whole time period diabetic patients <65 years had an adjusted RR of 1.66 (95% CI 1.50 to 1.84), 65–74 years 1.42 (1.33 to 1.51) and >74 years 1.34 (1.26–1.42). The decreasing relative risk per age group was statistically significant (p for trend <0.001). The decrease in the 1-year mortality rate was of the same magnitude in different levels of hospitals (from university to local) both for patients with and without diabetes. One-year mortality rate in the whole cohort was 14% after admission for ST elevation MI (STEMI) and 17% after non-STEMI (NSTEMI). The pattern of higher mortality rate in NSTEMI patients was similar for patients with and without diabetes during both time periods. This pattern remained after exclusion of patients admitted with left ventricular bundle block (LBBB; Figure 3C). After adjusting for difference in treatment and other risk factors by the propensity score, diabetic NSTEMI patients had a RR from mortality rate during the whole study-period of 1.42 (95% CI 1.35 to 1.50) while the corresponding RR for diabetic STEMI patients was 1.36 (95% CI 1.26 to 1.45).

DISCUSSION

In this time-trend analysis there is a clear-cut improvement in survival rate after an acute MI over time, more apparent in patients with diabetes (33%) than in those without non-diabetes (25%). The observed 10% absolute reduction in mortality rate over 8 years corresponds to one life saved for ten patients treated. Diabetes still remains an independent predictor for mortality rate, particularly in younger patients.

Table 1 Baseline characteristics and treatment in patients with and without diabetes during the two time periods

	Time period 1995–1998			Time period 1999–2002		
	Diabetes			Diabetes		
	No (n = 22 582)	Yes (n = 5679)	OR for diabetes (95% CI)	No (n = 33427)	Yes (n = 9134)	OR for diabetes (95% CI)
Baseline characteristics						
Age (years, mean)*	66.4	68.1	1.19 (1.15–1.23)	66.5	68.4	1.21 (1.19–1.24)
Male (%)	70.8	63.4	0.72 (0.67–0.76)	69.0	63.2	0.77 (0.73–0.81)
Previous diseases						
Hypertension	29.2	45.4	2.02 (1.90–2.14)	30.7	50.1	2.26 (2.16–2.37)
Smoker	27.6	17.3	0.55 (0.51–0.59)	29.5	19.3	0.57 (0.54–0.61)
MI	21.2	33.0	1.83 (1.71–1.95)	16.7	27.8	1.93 (1.82–2.03)
Heart failure	7.0	16.8	2.68 (2.46–2.92)	6.6	17.2	2.92 (2.73–3.13)
PCI	3.1	4.4	1.43 (1.23–1.66)	3.7	6.0	1.66 (1.49–1.84)
CABG	4.3	6.0	1.45 (1.27–1.64)	5.3	7.7	1.73 (1.58–1.88)
PCI/CABG	6.8	9.5	1.45 (1.31–1.61)	8.1	13.1	1.72 (1.60–1.85)
Treatment on admission						
Aspirin	29.7	42.7	1.76 (1.66—1.87)	30.2	46.8	2.04 (1.94–2.13)
Beta-blocker	29.3	38.6	1.51 (1.42–1.61)	29.7	44.0	1.86 (1.77–1.95)
ACE inhibitor	10.7	26.9	3.06 (2.84–3.29)	12.9	32.8	3.29 (3.12–3.48)
Calcium antagonist	15.6	23.7	1.68 (1.56–1.81)	13.9	22.1	1.76 (1.66–1.86)
Lipid-lowering drugs	6.7	10.6	1.64 (1.48–1.81)	12.1	24.9	2.42 (2.28–2.56)
Diuretics	19.9	38.8	2.55 (2.39–2.72)	17.9	37.5	2.75 (2.61–2.89)
Oral anticoagulant	5.8	8.1	1.45 (1.30–1.62)	5.6	9.2	1.71 (1.57–1.86)
Nitroglycerin	16.5	27.5	1.91 (1.79–2.05)	12.7	22.8	2.03 (1.92–2.15)
Treatment in hospital						
Anticoagulants (subcutaneous, intravenous)	57.7	62.7	1.23 (1.16–1.31)	37.5	42.6	1.24 (1.18–1.30)
Beta-blocker (intravenous)	31.9	28.1	0.83 (0.78–0.89)	40.4	35.7	0.82 (0.78–0.86)
Reperfusion†	41.1	31.0	0.64 (0.61–0.69)	36.8	26.1	0.60 (0.57–0.64)
Revascularisation‡	5.1	3.9	0.75 (0.65–0.88)	8.2	5.4	0.64 (0.58–0.71)
Complications at hospital						
Atrial fibrillation	13.9	18.5	1.42 (1.32–1.54)	12.5	17.5	1.50 (1.41–1.60)
Heart failure	37.6	50.7	1.71 (1.61–1.81)	30.1	45.4	1.93 (1.84–2.03)
Treatment at discharge						
Aspirin	84.2	80.1	0.76 (0.70–0.82)	87.7	84.1	0.74 (0.69–0.79)
Beta blocker	79.7	74.6	0.75 (0.70–0.81)	84.5	82.4	0.85 (0.80–0.91)
ACE inhibitor	34.4	49.7	1.88 (1.77–2.00)	40.5	57.6	1.99 (1.90–2.09)
Calcium antagonist	13.3	19.3	1.56 (1.44–1.69)	11.8	17.7	1.61 (1.51–1.72)
Lipid-lowering drugs	27.5	25.1	0.89 (0.82–0.95)	58.9	54.8	0.85 (0.81–0.89)
Diuretics	32.8	53.6	2.37 (2.23–2.53)	29.2	51.6	2.59 (2.47–2.72)
Digitalis	7.7	14.2	1.99 (1.81–2.18)	5.3	10.8	2.16 (1.99–2.35)
Nitroglycerin	36.3	45.2	1.45 (1.36–1.54)	28.6	37.3	1.48(1.41–1.56)
Oral anticoagulant	20.0	20.7	1.04 (0.97–1.13)	22.4	23.8	1.08 (1.02–1.14)
Heparin	6.5	6.0	0.91 (0.80–1.04)	13.8	13.2	0.96 (0.89–1.02)
Glucose lowering therapy (oral)		39.1			37.9	
Insulin		30.6			30.4	
Combination		7.7			11.6	
Revascularisation <14 days	13.4	10.2	0.74 (0.67–0.81)	27.5	20.5	0.68 (0.64–0.72)

Values are percentages if not otherwise stated.
*OR for age represents the increase in relative odds of being a diabetic patient for an increase of 1 SD of age (10.2 years) in the whole sample.
†Reperfusion; acute thrombolysis or acute PCI.
‡Revascularisation; acute PCI or CABG or both.

Although patient management improved, reasons for the excess mortality rate may include shortcomings in the delivery of important treatment modalities and unsatisfactory secondary prevention in diabetic patients.

The Swedish register of coronary care (RIKS-HIA) undergoes regular external monitoring ascertaining high data reliability. It offers excellent opportunities to mirror the everyday management of patients with MI with a sample size sufficient to compare two time periods within a total time-frame of 8 years. This may seem a fairly short time-span, but knowledge was gained rapidly and great efforts were made to create and distribute guidelines in this field. It is important to study whether such efforts are successful. A comparison of patients with and without diabetes is of particular interest since diabetic patients have been neglected over the years, not benefiting from therapeutic progress to the same extent as non-diabetic patients.[4 8]

The propensity score method was applied in an attempt to overcome the problem of non-randomised allocation of treatment in the diabetic and non-diabetic patient. This score adjusts for factors that may have influenced how treatments were chosen. Accordingly, observed discrepancies in patient management should represent a true difference and not just reflect chance.

Treatment patterns improved substantially for all patients. Early revascularisation and the use of lipid-lowering drugs became twice as common in patients with and without diabetes during the second time period, but the rate of interventions was still less common among diabetic patients, despite recent reports on their efficacy in this particular group.[4 6 15 22] Revascularisation was offered to diabetic patients less often, even after adjustment for other risk factors. In the Fragmin and Fast Revascularisation During Instability in Coronary Artery Disease (FRISC) 2 study early revascularisation reduced mortality rate and reinfarction by almost 40% in diabetic patients with unstable coronary artery disease.[6] Reperfusion treatment was used less frequently in diabetic patients. This might be because of a misinterpretation of symptoms leading to

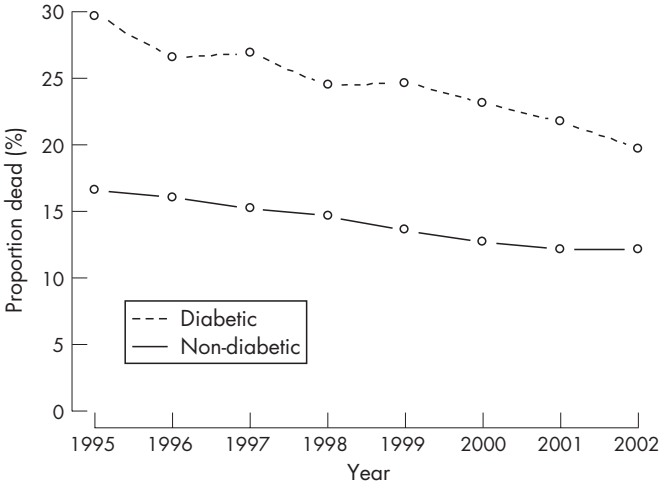

Figure 2 Crude one-year mortality rates in patients with and without diabetes with MI in 1995–2002.

longer admission times, or to problems in diagnosing diabetic patients because of atypical symptoms at the onset of a MI.[23] Another misconception may be that thrombolytic drugs cause bleeding complications in diabetic patients.[24]

Lipid-lowering treatment was prescribed less often to diabetic patients despite their need for especially aggressive lipid-lowering treatment.[22]

The use of ACE inhibitors was higher in diabetic patients, probably reflecting a more aggressive treatment of hypertension and prevention of renal disease in diabetic patients, but also their higher prevalence of heart failure. However, in the light of the Heart Outcomes Prevention Evaluation (HOPE) and the European Trial on Reduction of Cardiac Events with Perindopril in Stable Coronary Artery Disease (EUROPA) trials, there still seems to be a need for more extensive use, especially in diabetic patients.

The importance of an aggressive glucose-lowering treatment for outcome in diabetic patients with MI was highlighted by the Diabetes and Insulin–Glucose Infusion in Acute Myocardial Infarction (DIGAMI) trials.[25–27] Benefits of strict glucose control

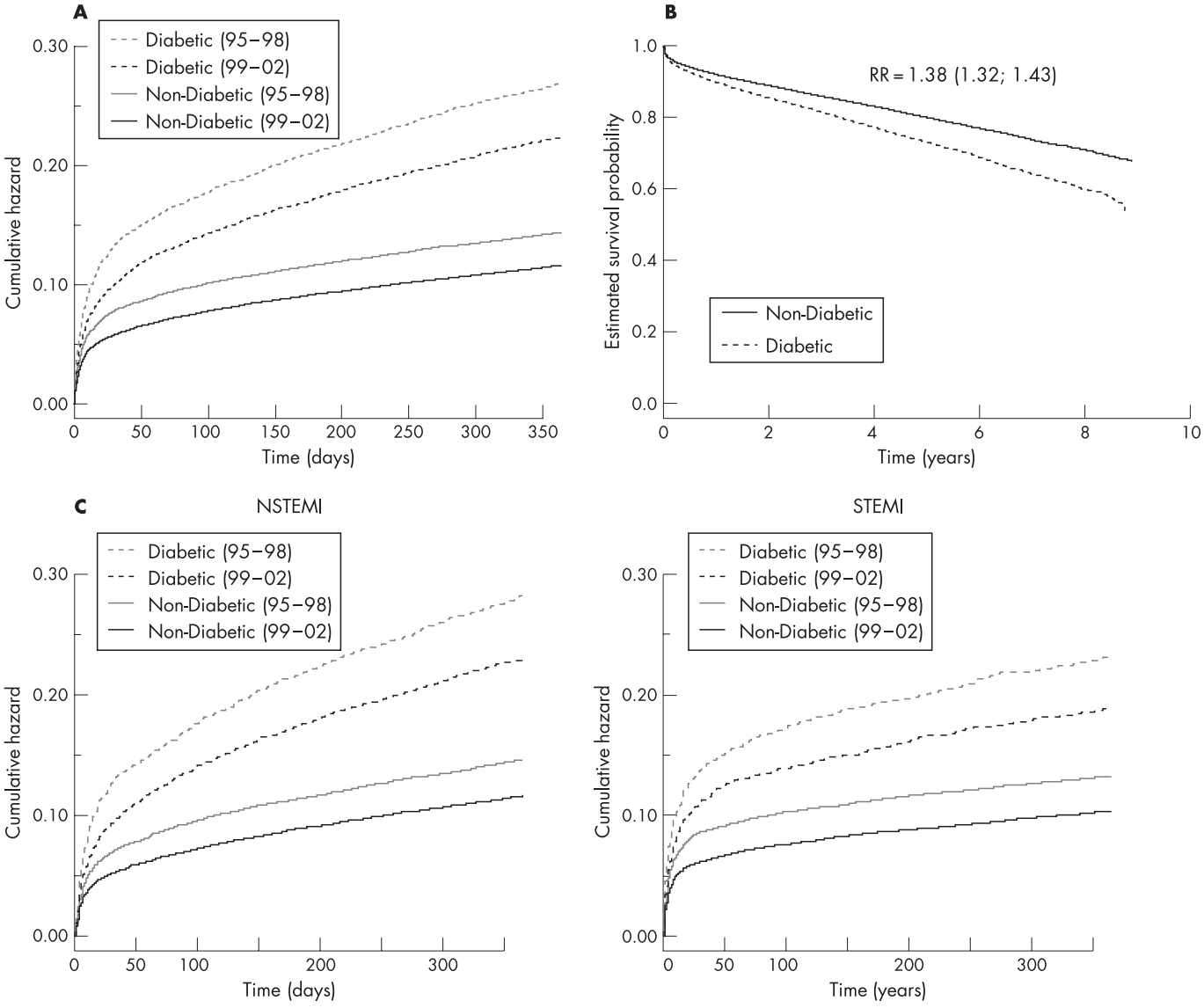

Figure 3 (A) Estimated 1-year cumulative HR of death for diabetic (dashed line) and non-diabetic (solid line) patients during the two time periods: 1995–1998 (grey line) and 1999–2002 (black line). (B) Estimated long-term survival rate curves in patients with and without diabetes and MI in 1995–2002. RR represents the estimated RR with corresponding 95% CI for mortality rate over the complete time period after adjustments by propensity score and in-hospital/discharge treatment in a Cox regression model. (C) Estimated 1-year cumulative HR of death after STEMI and NSTEMI for diabetic (dashed line) and non-diabetic (solid line) patients during the two time periods 1995–1998 (grey line) and 1999–2002 (black line) after excluding ECG with LBBB.

have also been reported in other intensive care populations.[28] However, the use of oral glucose-lowering drugs and insulin was unchanged over time. Unfortunately no details on metabolic control, in hospital or during follow-up, or on the type of diabetes are available in the RIKS-HIA.

Importantly, the extended follow-up time revealed a successively increasing difference in adjusted mortality rate, to the disadvantage of diabetic patients. Factors such as cardiac dysfunction and less intense treatment of the MI may expose them to an increased risk for worse long-term outcome compared with those without diabetes. It may also be an expression of the demand for a more aggressive secondary prevention combined with treatment aiming for normoglycaemia.[27 29 30]

Despite these concerns the encouraging significant decrease over time in the RR of mortality (1.44 to 1.31) for a diabetic patient should be acknowledged. Improved pre-infarction management of cardiovascular risk factors together with increased in-hospital use of aspirin, anticoagulants, beta-blockers, statins, ACE inhibitors and early revascularisation during the second time period are probable contributors. Factors not covered by the registry may also make a contribution, such as diabetes duration and glucose control before, during and after the infarction. Future research should be directed towards improved understanding and management of these factors in diabetic patients with MI. It could be argued that a trend towards more NSTEMI and less STEMI could be an explanation of the findings of improved mortality rate. However, as presented in the results, during both time periods there was a higher mortality rate after NSTEMI (with or without LBBB) compared with STEMI for patients both with and without diabetes, and the RR of mortality after NSTEMI/STEMI between the time periods did not change. However, the absolute risk was improved the later time periods, with improved mortality rates after STEMI and NSTEMI for patients both with and without diabetes. Thus our results, with a difference in mortality rates between patients with and without diabetes and the improvement seen among patients with diabetes, could not be explained by a change to more NSTEMI during the later time period.

Study limitations

A confounding factor is the introduction of new and widened diagnostic criteria for MI.[17 18] These criteria were not introduced until late 2001, thereby affecting only a limited part of the study population. Moreover the related increase in the incidence of MI was, when checked for Sweden, mostly seen in patients >80 years of age. Patients >80 years old were not included in the present investigation, because of the risk of co-morbidities not accounted for by the registry. As previously discussed some important factors that might have influenced both the selection of treatment and outcome were not recorded in the database, ie, serum creatinine, left ventricle ejection fraction and glucose control.

CONCLUSIONS

Survival rate after acute MI in patients with diabetes has improved over the last few years. As recorded in the RIKS-HIA, the most important contributing factors are improvements in the use of evidence-based pharmacological and interventional treatments and an expanded use of secondary prevention. There are, however, ample opportunities for further improvements in the care of diabetic patients with MI. Diabetes is as an important risk factor for short- and long-term mortality rate, partly relating to underlying co-morbidities but also to a less than optimal use of established treatment modalities, especially lipid-lowering therapy and early revascularisation.

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IMAGES IN CARDIOLOGY

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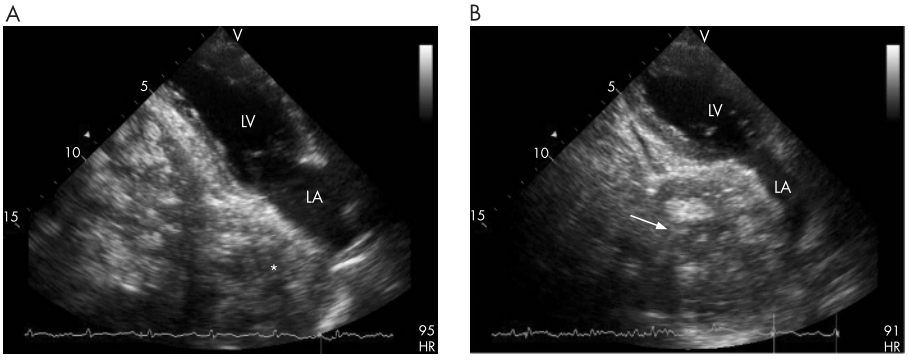
Dynamic changing mass behind the left atrium

An 85-year-old woman was examined at the echocardiography laboratory during a predischarge examination after an uncomplicated, circumscribed acute myocardial infarction.

An undefined liquid-containing mass (*) was observed behind the left atrium (LA), with no evidence of compression (panel A). This mass could be clearly demonstrated (arrow) after ingestion of 300 ml sparkling water mixed with an ampoule of the echo contrast medium Echovist 300 (D-galactose suspension; Schering AG, Berlin, Germany), and the performance of a Valsalva manoeuvre (panel B). The video recording of the examination shows a dynamic filling of the mass behind the LA during the abdominal compression manoeuvre, and its emptying towards the stomach after relaxation. The patient showed no symptoms at all during the whole examination.



A hiatal hernia masked as an LA mass can be diagnosed accidentally during echocardiographic examination. Most patients are asymptomatic, whereas a few patients present symptoms of gastro-oesophageal reflux. Arrhythmias and heart failure have been reported. This patient presented no history of recurrent gastrointestinal symptoms or postprandial syncope, therefore, conservative treatment was recommended.

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To view video footage visit the *Heart* website—http://heart.bmj.com/supplemental