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Age-dependent inequalities in improvements in mortality occur early after acute myocardial infarction in 478,242 patients in the Myocardial Ischaemia National Audit Project (MINAP) registry.

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Abstract

BACKGROUND:

Mortality rates after acute myocardial infarction (AMI) have declined, but there is uncertainty regarding the extent of improvements in early mortality in the elderly.

METHODS:

Mixed-effects regression analysis of 30-day mortality using data from 478,242 patients with AMI at 215 hospitals in England and Wales stratified by STEMI/NSTEMI, sex, and age group. A hospital opportunity-based composite score (OBCS) for aspirin, ACE-inhibitor, statin, β blocker, and referral for cardiac rehabilitation was used as measure of quality of hospital care.

RESULTS:

30-day mortality rates (95% CI) fell from 10.7% (10.6 to 10.9%) in 2004/5 to 8.4% (8.3 to 8.6%) in 2008/9. The median (IQR) hospital OBCSs increased over time, 2004/5: 87.3 (7.2), 2006/7: 88.9 (6.3), 2008/9: 90.3 (6.1), P<0.001, and were similar between age groups (18 to <65 years, 65 to 79 years, and ≥ 80 years) for STEMI: 89.4 (6.5) vs. 89.4 (6.6), vs. 89.2 (6.5) and NSTEMI: 88.6 (7.3) vs. 88.8 (7.0) vs. 88.9 (7.0), respectively For males, all age groups except patients <65 years demonstrated a significant decrease in adjusted mortality. For females, only patients ≥ 80 years demonstrated a significant reduction in adjusted mortality. A 1% increase in hospital OBCS was associated with a 1% decrease in 30-day mortality (95% CI: 0.99 to 0.99, P<0.001).

CONCLUSION:

In England and Wales, for patients with AMI there are age and sex-dependent differences in improvements in 30-day mortality. Whereas young males with AMI have reached an acceptable performance plateau, all other groups are either improving or, more importantly, are yet to demonstrate this.

KEYWORDS:

30-day mortality; Acute myocardial infarction; Age; MINAP; Opportunity-base composite score; Sex

1. Introduction

Whilst the decline in rates of death after acute myocardial infarction (AMI) has been clearly documented in observational studies from a number of developed countries [1], [2], [3], there is uncertainty regarding the extent of improvements in mortality in the elderly. Previous studies have suggested that the risk of early and late death after AMI has fallen equally between age groups [3], [4], [5]. Yet, others claim this is not the case [6], [7] and a recent study revealed that although the elderly were found to have made equal improvements in in-hospital mortality, their survival to 1 year had barely improved [8].

On the one hand, it is anticipated that because the elderly benefit equally, if not more, from evidence-based therapies for AMI than their younger counterparts [9], [10], any health gains from advances in AMI care in this group are transferred equally beyond the hospital stay. On the other hand, smaller improvements in long-term outcomes are not to be unexpected for the elderly. In this group a number of factors unrelated to the index admission for AMI compete to influence mortality—allowing age-dependent inequalities in improvement to be a reflection of 'age' rather than hospital treatment. Historically, 30-day mortality has been taken as an indicator of outcome of the presenting complaint and hospital care, and for this reason it is important that age-differences in temporal improvements in mortality are investigated at this time point. This study aimed, therefore, to determine whether there was evidence of age-dependent differences in temporal improvements in 30-day mortality using data from a national registry of 478,242 patients with AMI.

2. Methods

2.1. Study design

Our analyses were performed on data from the Myocardial Ischaemia National Audit Project (MINAP), a multicentre prospective registry of patients hospitalised in England and Wales with an acute coronary syndrome (ACS) [11], [12], [13], [14]. MINAP data collection and management have previously been described [15], [16], [17]. Each patient entry offers details of the patient journey, including the method and timing of admission, in-patient investigations, treatment, and date of all-cause death (from linkage to the Medical Research Information System, part of the NHS Information Centre using a unique National Health Service (NHS) number).

2.2. Ethics

The National Institute for Cardiovascular Outcomes Research (NICOR) which includes MINAP (Ref: NIGB: ECC 1-06 (d)/2011) has support under section 251 of the NHS Act 2006. Formal ethical approval was not required under NHS research governance arrangements for the current analysis.

2.3. Cohort description

We had access to MINAP data only after patient identity had been protected. We excluded 18 hospitals with > 50% missing data for any of the predictor variables, and also hospitals with < 200 patient records. This left data for 478,242 first events of AMI for patients admitted to one of 215 acute hospitals in England and Wales between 1st January 2004 and 31st December 2009.

Patients were categorised into 3 groups according to their age at admission to hospital: 18 to < 65 years, 65 to 79 years, and ≥ 80 years of age. We based our analyses on the final diagnosis of type of AMI which had been judged by local clinicians according to presenting history, clinical examination and the results of inpatient investigations. For our calculation of the number of patients receiving primary percutaneous coronary intervention (PCI), the definition of ST-elevation myocardial infarction (STEMI) reflected the working diagnosis made by an ambulance paramedic crew, or other clinicians in a position to provide definitive treatment at the time of admission.

For each hospital, we calculated an opportunity-based composite score (OBCS) of the number of times a care process was actually performed for each patient (numerator) divided by the number of opportunities a provider had to give this care to the patient (denominator) [18]. We used aspirin, β blocker, statin, and ACE inhibitor on discharge from hospital, and referral for cardiac rehabilitation as the care processes. To make this assessment we first excluded data relating to patients with the reported presence of a contra-indication to a care modality, or when it was either not-applicable, not-indicated or refused. MINAP collects detailed data concerning the prescription of evidence-based therapies and specific reasons why it may not have been provided independent of the healthcare professional offering the care. A hospital score of 100% means that all the eligible opportunities to provide each (or a) unit of patient care were achieved at that hospital.

2.4. Statistical methods

The population was described using crude numerical data (without adjustment for any additional factor) and also by percentages (for categorical variables), and by medians and interquartile range (IQR) or mean and standard deviation (SD), depending upon plausibility of normality, for continuous variables. The Kruskal–Wallis test was used to compare any difference in distributions across groups. The analysis of variance test with Bonferroni correction was used to test whether the means of more than 2 groups were equal.

Given that there was a significant interaction between age, 30-day mortality and sex for both AMI phenotypes (STEMI, $P < 0.001$ and non ST-elevation myocardial infarction (NSTEMI), $P < 0.001$), models were fitted separately for men and women. We assumed patients to be clustered in hospitals and therefore to account for variations at the hospital level, a linear mixed-effects regression model (random intercepts for each hospital) with binomial distribution and a log link was used to quantify the relationship between age category and 30-day mortality. The model included date of hospitalisation (to each quarter year, contrast = 2009 final quarter), admission systolic blood pressure per mm Hg and heart rate per bpm, previous AMI, history of diabetes mellitus, previous PCI, history of heart failure, and history of chronic renal failure. This was run for 12 subgroups defined by the 3 age groups, sex and STEMI/NSTEMI final diagnosis and the adjusted mortality rates represented as odds ratios (OR) with 95% confidence intervals (CI).

The authors of this manuscript have certified that they comply with the Principles of Ethical Publishing in the International Journal of Cardiology.

3. Results

Of the cohort, 177,890 (37.2%) were aged 18 to < 65 years, 179,766 (37.6%) were aged 65 to 79 years, and 120,586 (25.2%) were ≥ 80 years of age. Data for age were missing for 1244 (0.2%) patients, and 30-day status was missing for 17,682 (3.6%) of the cohort.

3.1. Patient characteristics

The distribution of patient characteristics varied by age group, sex and year (Table 1). For all periods in men and women, the frequency of chronic heart failure and previous AMI increased, and previous PCI decreased, by age group. Over the same periods, there was an increase in the frequency of diabetes mellitus in men and women. The mean (SD) systolic blood pressures and heart rates on admission were; 2004/5: 140.4 (29.7) mm Hg and 81.9 (24.1) bpm; 2006/7: 138.7 (29.3) mm Hg and 82.5 (23.9) bpm; 2008/9: 139.1 (28.5) mm Hg and 81.7 (22.8) bpm respectively ($P < 0.001$). For patients aged between 65 and 79 years, but not the other age groups, the proportion of patients with cardiogenic shock on admission to hospital reduced significantly from 4.1% in 2004/5 to 3.7% in 2008/9; RR: 0.90, 95% CI 0.85 to 0.96.

3.2. Provision of AMI care

The median (IQR) hospital OBCSs were high and increased over time, 2004/5: 87.3 (7.2), 2006/7: 88.9 (6.3), 2008/9: 90.3 (6.1), $P < 0.001$, and were similar in men and women for STEMI: 89.4 (6.6) vs. 89.4 (6.7) and NSTEMI: 88.8 (7.0) vs. 88.8 (7.0). Inequalities in median hospital OBCSs were not evident between age groups (18 to < 65 years, 65 to 79 years, and ≥ 80 years) for STEMI: 89.4 (6.5) vs. 89.4 (6.6), vs. 89.2 (6.5) and NSTEMI: 88.6 (7.3) vs. 88.8 (7.0) vs. 88.9 (7.0), respectively (Fig. 1).

The proportion of patients who were prescribed clopidogrel increased equally for each age group between 2004 and 2009: 18 to < 65 years: 59.8% vs. 72.8%; 65 to 79 years: 56.3% vs. 68.9%; ≥ 80 years: 46.8% vs. 60.9%. The proportion of patients admitted with STEMI who received primary PCI increased significantly for each age group from 2004 to 2009, and more so for those ≥ 80 years: 18 to < 65 years: 5.9% vs. 53.7%; 65 to 79 years: 4.6% vs. 42.4%; ≥ 80 years: 2.0% vs. 36.1%. The proportion of patients with AMI who received coronary angiography increased for each age group from 2004 to 2009: 18 to < 65 years: 49.3% vs. 72.9%; 65 to 79 years: 36.0% vs. 59.1%; ≥ 80 years: 11.5% vs. 25.5%.

3.3. 30-day mortality

In the total study population the 30-day mortality rates (95% CI) fell from 10.7% (10.6 to 10.9%) in 2004/5 to 8.4% (8.3 to 8.6%) in 2008/9. The results were more pronounced for patients aged ≥ 80 years with NSTEMI, decreasing from 18.9% (18.5 to 19.4%) in 2004/5 to 15.0% (14.6 to 15.4%) in 2008/9, and least evident for patients aged between 18 and < 65 years with STEMI, from 3.8% (3.5 to 4.0%) in 2004/5 to 3.5% (3.3 to 3.7%) in 2008/9. Table 2 shows the unadjusted 30-day mortality rates by age group, sex, period and AMI phenotype.

From 2004/5 to 2008/9 the adjusted risk of 30-day mortality fell by nearly 20%, OR: 0.82, 95% CI 0.79 to 0.85, P < 0.001. Overall there was no significant improvement in adjusted 30-day mortality for patients aged < 65 years. For men, all age groups except patients < 65 years demonstrated a significant decrease in adjusted mortality (first quarter 2004 compared with last quarter 2009) ranging from OR: 1.4, 95% CI 1.1 to 1.8, P = 0.001 to OR: 2.1, 1.5 to 2.8, P < 0.001. In contrast, there was no significant decline in adjusted mortality for women, except in patients aged ≥ 80 years with NSTEMI (OR: 1.5, 95% CI 1.2 to 1.8, P = 0.001). Fig. 2 shows the adjusted 30-day mortality by quarter year from 2004 to 2009 for patients with STEMI and NSTEMI by sex and age group.

3.4. Hospital OBCS and 30-day mortality

Overall, each 1% increase in hospital OBCS was associated with, on average, a 1% decrease in 30-day mortality (95% CI: 0.99 to 0.99, P < 0.001). This effect was similar in men and women, by age group, and for STEMI and NSTEMI, and more pronounced in period 2004/5 (OR: 0.98, 95% CI 0.97 to 0.98, P < 0.001). After adjustment for age, sex, year of hospitalisation and primary PCI in patients with STEMI, there was a 2% reduction in 30-day mortality for each unit increase in hospital OBCS (OR: 0.98, 95% CI 0.97 to 0.98, P < 0.001).

4. Discussion

This study refutes the notion of a homogeneous temporal decline in mortality after AMI across all age groups. At 30 days after hospitalisation there was no significant improvement in adjusted 30-day mortality for patients aged < 65 years. There was, however, a clear difference in favour of men aged ≥ 65 years, in temporal improvements in adjusted mortality at 30 days. For women, the only group to demonstrate a significant decline in death rate was in patients aged ≥ 80 years with NSTEMI. Whilst providing evidence that age-dependent inequalities in improvements in mortality exist and are seen much earlier than previously reported [8], this study also highlights the significant sex-dependent differences in temporal improvements in mortality in an established national registry of patients with acute coronary syndrome (MINAP).

A number of European studies have suggested that the magnitude of improvements in mortality over a time has been broadly similar in different age groups. A study of in-hospital mortality after AMI using MINAP data from 616,011 patients and a single-centre study from the Netherlands of 5-year mortality in 14,434 patients with AMI revealed improvements equal between age groups [3], [4]. Smolina et al. used administrative data to demonstrate reductions for all age groups in 30-day mortality rates after hospitalisation with AMI in England from 2002 to 2010, however, adjustment for case-mix was not fully considered [5]. A recent study of 21,423 patients discharged with AMI suggested that adjusted mortality at 1 year and not in-hospital was associated with age-dependent differences in improvements in care [8]. In another study over 20 years, improvements in prognosis post-AMI were evident, though to a lesser extent in the very elderly [7]. Our study documents the substantial age-dependent differences in improvements in death and that they occur much earlier after discharge from hospital that previously reported. Indeed, it appears that in England and Wales

temporal improvements in in-hospital mortality may not extend beyond the hospital stay for all groups of patients.

Whilst we do not report a reduction in the risk of early mortality for all age groups, this is not to say that temporal improvements in care have not occurred. One explanation for the lack of improvement in patients aged < 65 years with AMI is that the baseline 30-day mortality rate was low, and that significant improvements in mortality occurred prior to the analysis period. That is, the unadjusted 30-day mortality rate for men with NSTEMI aged 18 to < 65 years was 1.8% (95% CI 1.3 to 2.4%) and these patients may have reached a plateau of achievable care [16].

There are a number of reasons why women aged > 65 years with AMI did not demonstrate a temporal improvement in 30-day mortality. First, because the unadjusted mortality for women was similar to that of the equivalent groups of men who showed a significant improvement it is unlikely that women have reached a performance plateau. Second, the median hospital OBCS (which was used as a surrogate of hospital quality of care [18]) and rates of primary PCI for STEMI (men 22.7% vs. women 20.5%) did not vary substantially by sex, factors beyond this such as drug adherence, efficacy of evidence-based treatments or other factors were responsible for the lack of reduction in mortality. One explanation is that there is a lag effect in the impact of the advances in AMI care for women. Reassuringly, women with NSTEMI aged ≥ 80 years (who had a high baseline mortality rate), demonstrated a significant reduction in adjusted risk of 30-day mortality over the 7 years studied. Another explanation is that for some patients, such as women aged between 65 and 79 years (who had relatively high OBCSs, and no significant improvement in 30-day mortality risk) the impact of hospital-treatments may diminish after discharge from hospital, and/or that competing effects occur in the community.

The variation by age group in improvements in mortality over time may be as a result of a number of additional factors. We found that only a small difference in hospital OBCS was negatively associated with 30-day mortality, and perhaps minimal changes in OBCS by age group are responsible for the variations in outcome. Indeed, efforts to ensure all possible opportunities to deliver care should be sought for each patient at each hospital. However, this does not explain fully our findings because and it is possible that our composite indicator did not reflect a large proportion of hospital quality of care [19], [20], [21]. An additional point is that much greater numbers of patients aged ≥ 80 years had chronic heart failure and/or chronic renal failure. It is therefore possible that the mechanisms of deaths may be mediated by aetiologies compatible with these long-term conditions which are less amenable to standard cardiovascular secondary prevention measures. If so, expectations of equivalent mortality benefits across all ages may not be appropriate.

4.1. Opportunities for further research

The lack of improvement in risk of 30-day mortality in some patient groups contrasts with an earlier study from a similar cohort in which all patient subgroups demonstrated a reduction in the risk of in-hospital mortality. Notwithstanding plateau of achievable care effects in young STEMIs and opportunity-based composite score effects, it is possible that in certain groups of patients mortality benefits due to emergency hospital treatments may acquiesce more rapidly after discharge from

hospital. Closer attention to research which considers the full cardiovascular pathway beyond the hospital stay for patients with AMI may reveal additional opportunities for improved quality of care.

5. Study limitations

Our study has some limitations. MINAP does not collect data on all patients in England and Wales and it is possible that patients entered into the MINAP database differ from those not recorded. MINAP is rich in the depth and breadth of its clinical data and we believe that the data recorded are a good representation of hospital admissions for patients with AMI in a modern National Health Service. The complete case modelling of diagnosis, 30-day mortality and impact of year considered hospital-level and patient-specific influences when the use of alternative covariates and factors may change the effects or effect sizes demonstrated. We explored a number of modelling strategies and our final models were influenced by fit and clarity of results. This included model fits using date of hospitalisation factored as year, half year, quarter year and month. We also investigated the merits of a 3-level model with patients within hospitals within Strategic Health Authorities and of 3 different age groups (18 to 65, 65 to 75, over 75 years), neither of which substantially altered the findings. Two confounders which were not considered were the reduction in times to reperfusion and improvements in pre-hospital survival rates over more recent years [22], [23]. In England and Wales times to reperfusion have shortened and vary to a small but statistically significant extent by sex and age [16] which may influence early mortality rates in some groups more than others. Another issue which we were unable to address was the change in the extent to which elderly patients were previously managed at home rather than be admitted to hospital for management of STEMI. If in the past predominantly the lower-risk elderly were hospitalised, then this may explain some of the temporal variation. Yet, we found that for patients aged 80 years and over, the relative risk of presentation to hospital with cardiogenic shock did not vary significantly with time. We did not have data relating to drug adherence, and it may be that in some groups of patients this was associated with early mortality [24]. Finally, this research reveals important associations but cannot prove causation.

6. Conclusions

In England and Wales, for patients hospitalised with AMI there are age-dependent differences in improvements over 7 years of 30-day mortality. Whereas young males with AMI have reached an acceptable performance plateau, all other groups are either improving or, more importantly, are yet to demonstrate this.

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Table 1. Characteristics of male and females hospitalized with an acute myocardial infarction by age group and year of hospitalization.

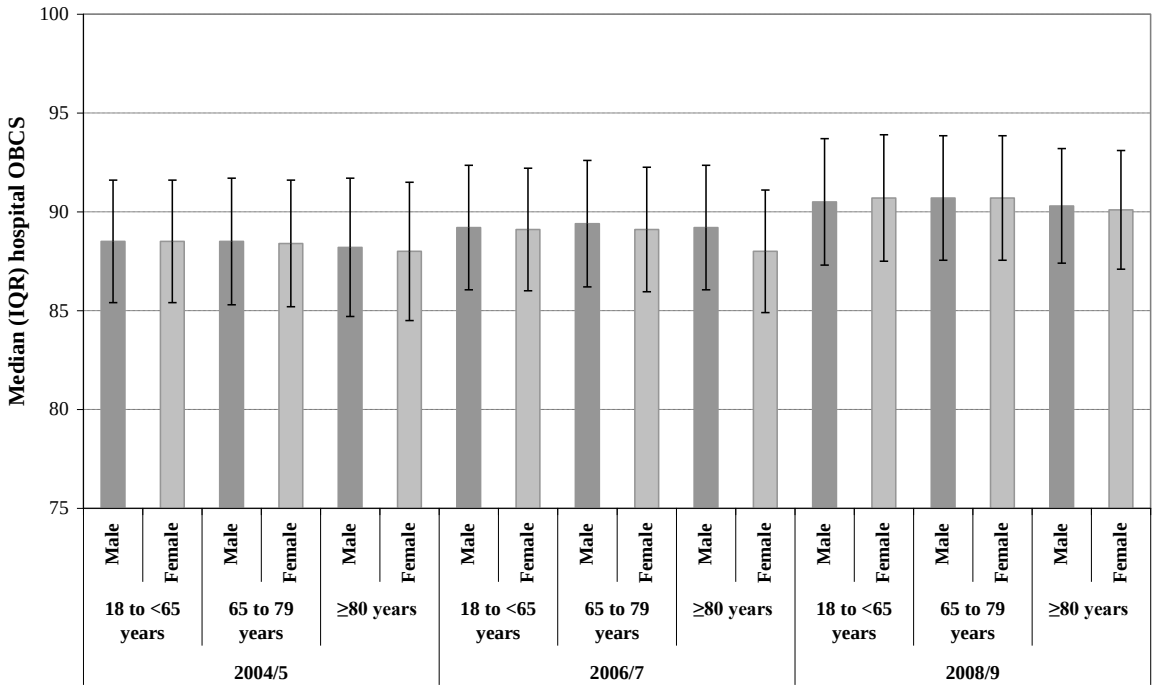
Year of hospitalization		2004-5		2006-7		2008-9	
	Age group (years)	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
Diabetes mellitus, n (%)	18 to 65	6535 (13.9)	4203 (13.3)	6543 (14.2)	4085 (12.9)	7229 (14.7)	4606 (13.8)
	65 to 79	9464 (12.6)	7064 (20.3)	9366 (23.1)	6924 (21.7))	9801 (23.3)	6799 (21.5)
	≥80	3831 (17.2)	3892 (16.2)	4167 (18.6)	4171 (17.6)	4897 (20.3)	4610 (18.5)
Chronic heart failure, n (%)	18 to 65	1028 (0.2)	511 (1.6)	830 (1.9)	437 (1.4)	797 (1.7)	425 (1.6)
	65 to 79	3043 (7.1)	2073 (6.1)	2417 (6.2)	1660 (5.4)	2184 (5.6)	1467 (5.0)
	≥80	2633 (12.1)	3031 (13.0)	2476 (11.4)	2744 (11.9)	2447 (10.8)	2715 (11.5)
Chronic renal failure, n (%)	18 to 65	740 (1.6)	403 (1.3)	760 (1.7)	454 (1.5)	833 (1.8)	486 (1.6)
	65 to 79	1842 (4.3)	1086 (3.2)	2064 (5.3)	1196 (3.9)	2086 (5.3)	1342 (4.5)
	≥80	1560 (7.1)	1172 (5.0)	1957 (9.0)	1488 (6.5)	2428 (10.7)	1957 (8.3)
Previous PCI, n (%)	18 to 65	3692 (8.5)	1961 (6.3)	4379 (11.1)	2393 (7.7)	5290 (13.3)	2919 (9.2)
	65 to 79	3692 (8.5)	2084 (6.1)	4379 (11.1)	2633 (8.5)	5290 (13.3)	3039 (10.1)
	≥80	824 (3.8)	564 (2.4)	1179 (5.4)	780 (3.4)	1651 (7.2)	1224 (5.1)
Previous AMI, n (%)	18 to 65	9998 (20.6)	4750 (14.6)	8770 (19.0)	4388 (13.9)	9138 (19.2)	4474 (14.0)
	65 to 79	14334 (31.5)	8940 (25.1)	12445 (30.6)	7725 (24.2)	12210 (30.2)	7127 (23.4)
	≥80	7910 (34.4)	7439 (30.1)	7945 (35.3)	7170 (30.2)	8217 (35.2)	7280 (30.1)

Table 2. Unadjusted 30-day mortality rates (95% confidence interval) for patients hospitalised with STEMI and NSTEMI by age group and period of hospitalization.

	30-day mortality rate (95% confidence interval), %					
Year of hospitalization	**2004/5**		**2006/7**		**2008/9**	
Sex	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
STEMI						
18 to 65 years	3.4 (3.2 to 3.7)	5.2 (4.5 to 5.8)	3.5 (3.2 to 3.8)	5.2 (4.5 to 5.9)	3.1 (2.9 to 3.4)	5.0 (4.4 to 5.7)
65 to 79 years	12.3 (11.7 to 12.9)	15.7 (14.9 to 16.6)	10.8 (10.2 to 11.3)	13.1 (12.3 to 14.0)	9.3 (8.8 to 9.8)	11.8 (11.0 to 12.7)
≥80 years	27.2 (25.8 to 28.5)	29.9 (28.7 to 31.1)	26.0 (24.7 to 27.3)	28.7 (27.5 to 30.0)	24.3 (23.0 to 25.6)	25.8 (24.6 to 27.0)
NSTEMI						
18 to 65 years	3.1 (2.9 to 3.3)	3.5 (3.1 to 3.9)	2.3 (2.1 to 2.5)	2.9 (2.5 to 3.2)	2.2 (2.0 to 2.4)	2.7 (2.3 to 3.0)
65 to 79 years	9.4 (9.0 to 9.8)	9.3 (8.9 to 9.8)	7.6 (7.3 to 7.9)	7.4 (7.0 to 7.8)	6.6 (6.3 to 6.9)	7.0 (6.5 to 7.3)
≥80 years	19.4 (18.8 to 20.1)	18.5 (17.9 to 19.1)	17.4 (16.7 to 18.0)	17.2 (16.6 to 17.8)	15.5 (14.9 to 16.1)	14.5 (13.9 to 15.1)

Figure 1 (a and b). Median (IQR) hospital OBCS for (a) STEMI and (b) NSTEMI, stratified by sex, age group, and period of hospitalisation.

a. STEMI



b. NSTEMI

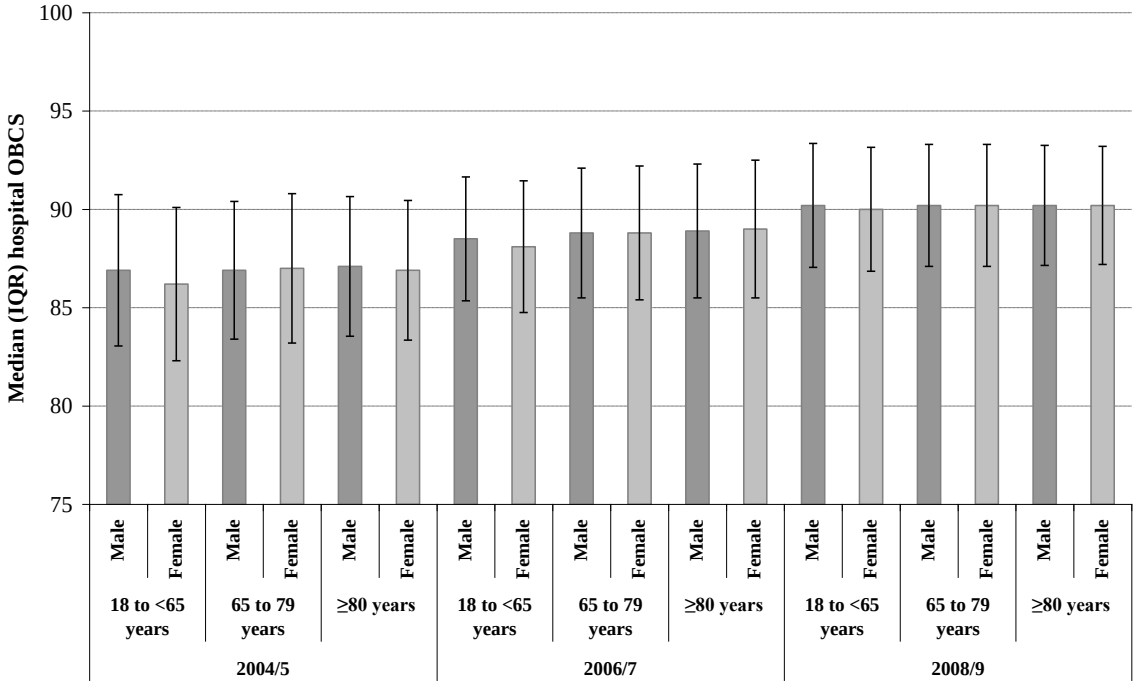
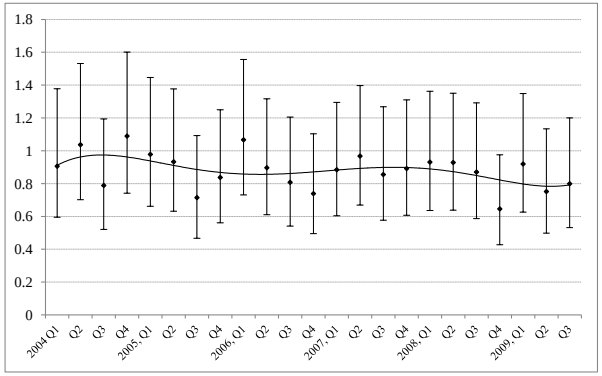

100
95
90
85
80
75
Median (IQR) hospital OBCS
Male
Female
18 to <65 years
65 to 79 years
≥80 years
2004/5
2006/7
2008/9

Figure 2 (a to l). Odds ratios (95% confidence intervals) relative to final quarter 2009 for adjusted* 30-day all-cause mortality by quarter year for patients hospitalised with STEMI and NSTEMI, stratified by age type of AMI and gender.

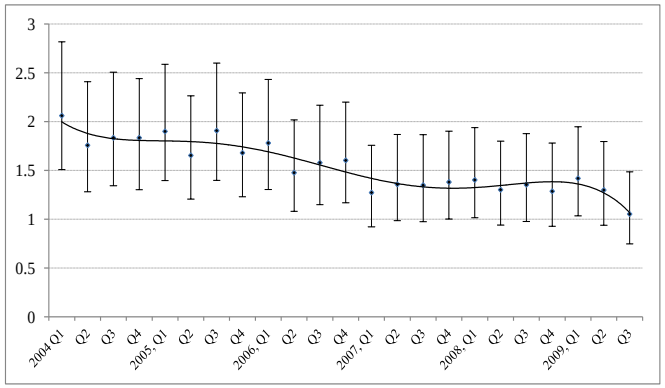
*Adjusted by systolic blood pressure on admission, heart rate on admission, previous AMI, history of diabetes mellitus, previous PCI, history of heart failure, and history of chronic renal failure, with hospital random intercept effects.

Figure 2a. Male and STEMI and 18 to 65 years.



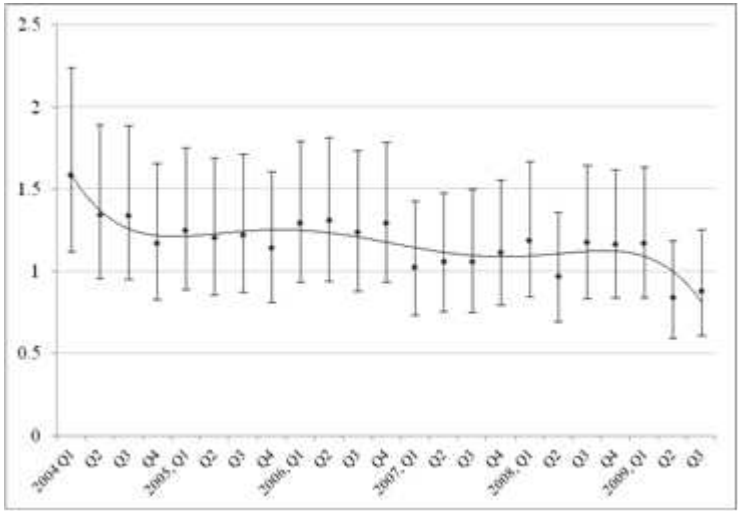
Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 3.4% (2.7 to 4.2%).

Figure 2b. Male and STEMI and 65 to 79 years.



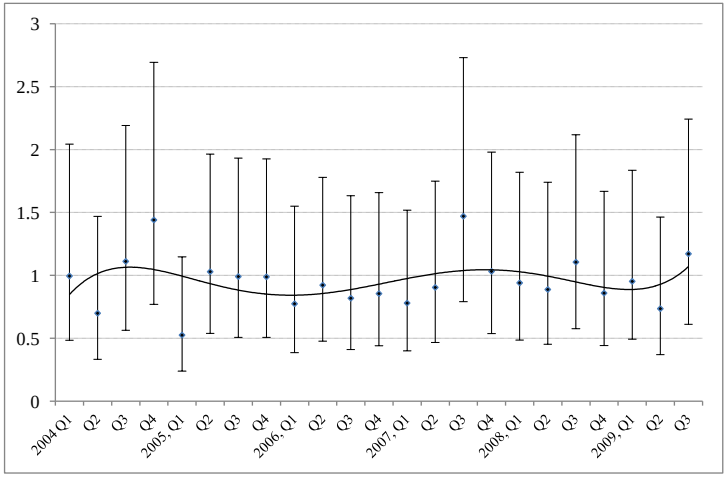
Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 7.3% (6.0 to 8.7%).

Figure 2c. Male and STEMI and ≥80 years.



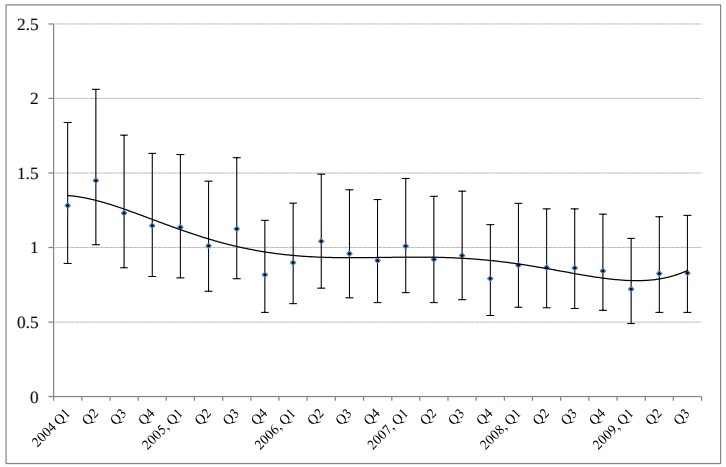
Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 23.4% (19.8 to 27.1%).

Figure 2d. Female and STEMI and 18 to 65 years.



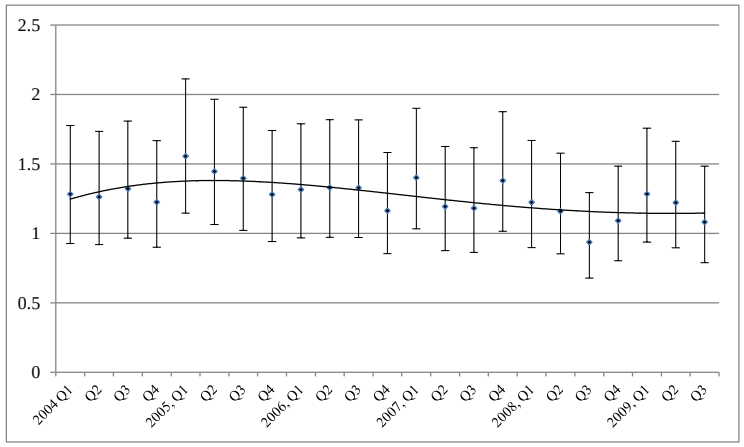
Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 5.8% (3.8 to 7.8%).

Figure 2e. Female and STEMI and 65 to 79 years.



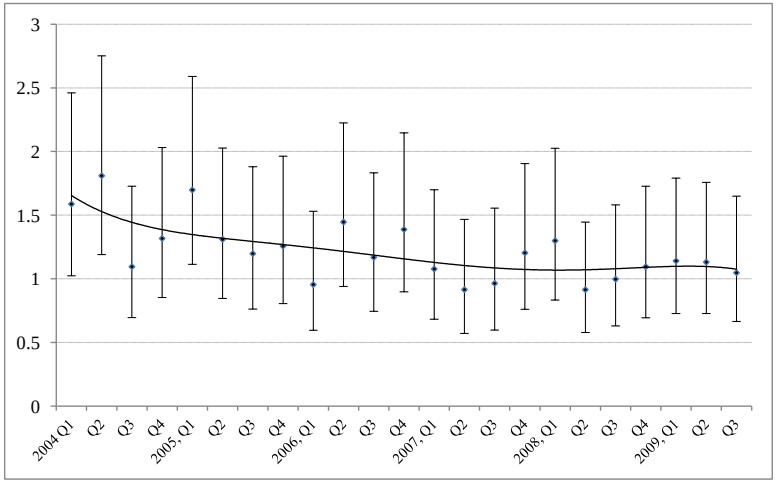
Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 12.1% (9.6 to 14.5%).

Figure 2f. Female and STEMI and ≥80 years.



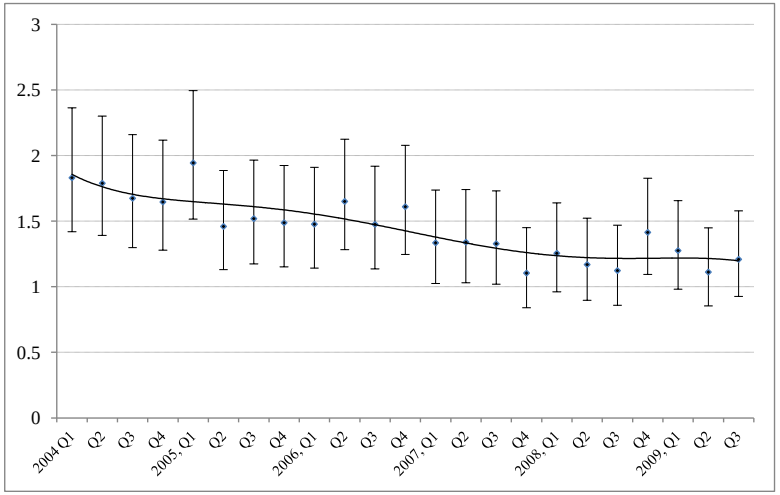
Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 24.0% (20.4 to 27.5%).

Figure 2g. Male and NSTEMI and 18 to 65 years.



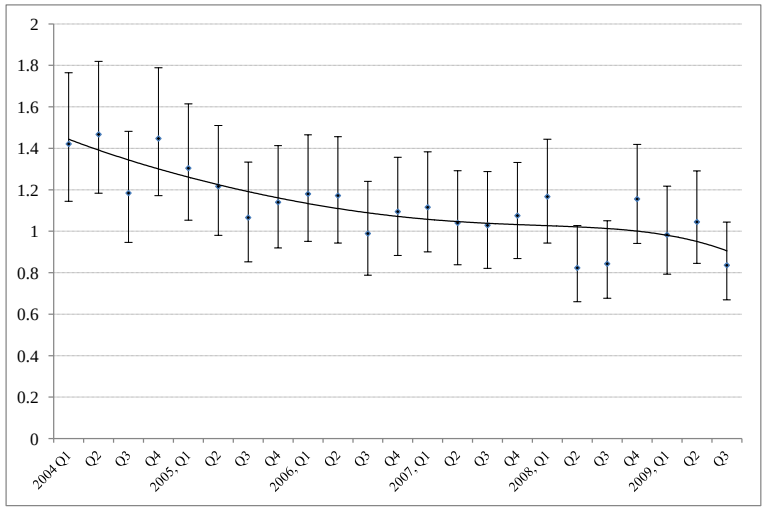
Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 1.8% (1.3 to 2.4%).

Figure 2h. Male and NSTEMI and 65 to 79 years.



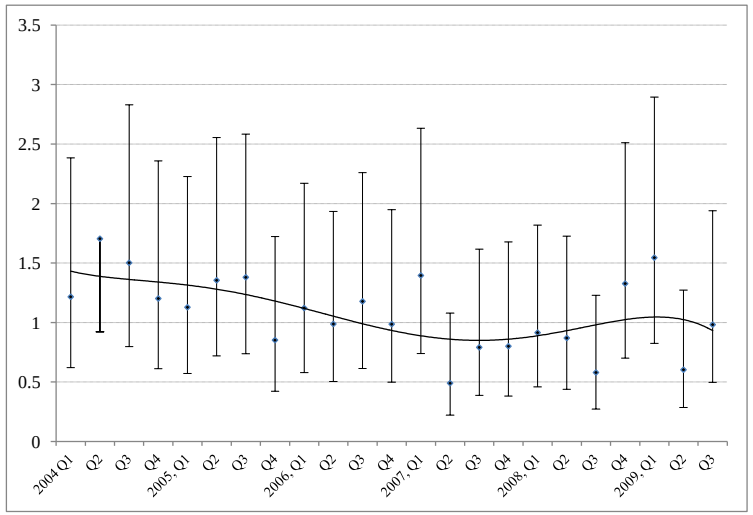
Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 5.4% (4.6 to 6.3%).

Figure 2i. Male and NSTEMI &and ≥80 years.



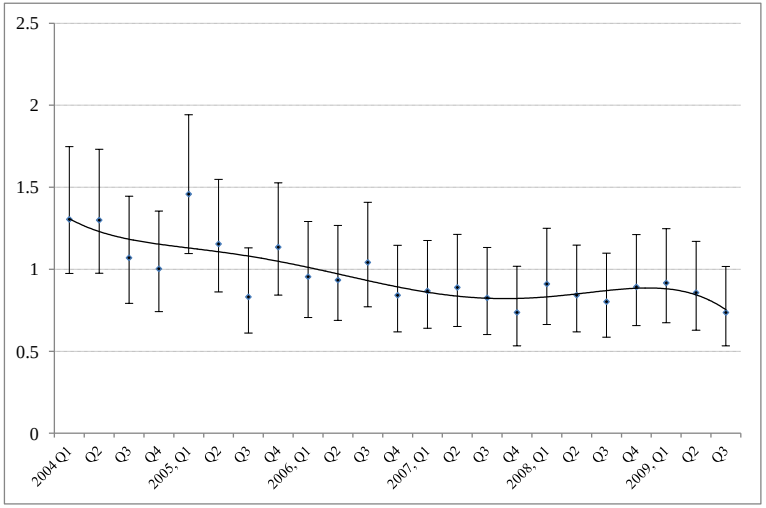
Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 15.1% (13.3 to 16.8%).

Figure 2j. Female and NSTEMI and 18 to 65 years.



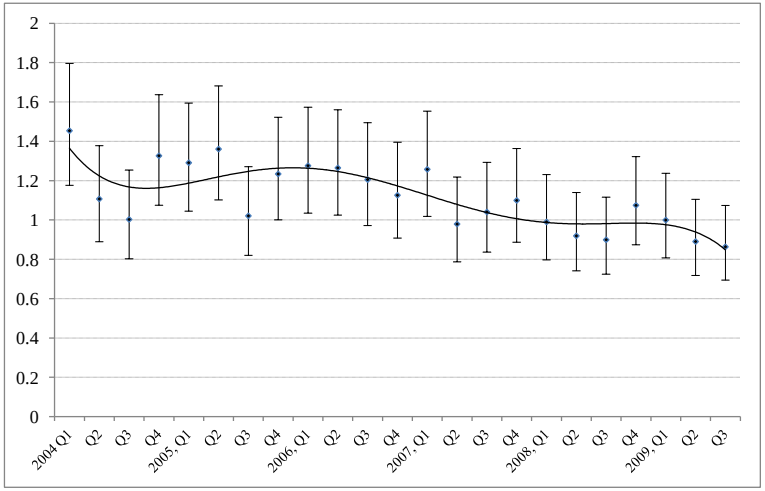
Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 3.0% (1.9 to 4.2%).

Figure 2k. Female and NSTEMI and 65 to 79 years.



Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 7.7% (6.3 to 9.0%).

Figure 2l. Female and NSTEMI and ≥80 years.



Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 15.3% (13.5 to 17.0%).

Fig. 2.Odds ratios (95% confidence intervals) relative tofinal quarter 2009 for adjusted (adjusted by systolic blood pressure on admission, heart rate on admission, previous AMI,history of diabetes mellitus, previous PCI, history of heart failure, and history of chronic renal failure, with hospital random intercept effects)30-day all-cause mortality by quarteryear for patients hospitalised with STEMI and NSTEMI, stratified by age type of AMI and gender. a. Male and STEMI and 18 to 65 years. Final quarter 2009 unadjusted 30-day mor-tality rate (95%confidence interval) 3.4% (2.7 to 4.2%). b. Male and STEMI and 65 to 79 years. Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 7.3% (6.0to 8.7%). c. Male and STEMI and≥80 years. Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 23.4% (19.8 to 27.1%). d. Female and STEMI and 18 to65 years. Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 5.8% (3.8 to 7.8%). e. Female and STEMI and 65 to 79 years. Final quarter 2009 unadjusted30-day mortality rate (95%confidence interval) 12.1% (9.6 to 14.5%). f. Female and STEMI and≥80 years. Final quarter 2009 unadjusted 30-day mortality rate (95%confidence in-terval) 24.0% (20.4 to 27.5%). g. Male and NSTEMI and 18 to 65 years. Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 1.8% (1.3 to 2.4%). h. Male andNSTEMI and 65 to 79 years. Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 5.4% (4.6 to 6.3%). i. Male and NSTEMI &and≥80 years. Final quarter 2009unadjusted 30-day mortality rate (95%confidence interval) 15.1% (13.3 to 16.8%). j. Female and NSTEMI and 18 to 65 years. Final quarter 2009 unadjusted 30-day mortality rate(95%confidence interval) 3.0% (1.9 to 4.2%). k. Female and NSTEMI and 65 to 79 years. Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 7.7% (6.3to 9.0%). l. Female and NSTEMI and≥80 years. Final quarter 2009 unadjusted 30-day mortality rate (95%confidence interval) 15.3% (13.5 to 17.0%).885C.P. Gale et al. / International Journal of Cardiology 168 (2013) 881–887