

population for prevention of cardiovascular disease until their benefit is proved by controlled clinical trials.

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Impact of changing diagnostic criteria on incidence, management, and outcome of acute myocardial infarction: retrospective cohort study

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Acute myocardial infarction used to be defined by criteria based on symptoms, changes in electrocardiograms and the concentrations of cardiac enzymes, as recommended by the World Health Organization.¹ Specific markers of myocardial damage, including troponin T, are more sensitive indicators than total creatine kinase concentration for ischaemic myocardial necrosis and prognosis.²

In 2000, the European Society of Cardiology and the American College of Cardiology recommended changing the diagnostic criteria for acute myocardial infarction to include raised troponin T concentrations in addition to changes in electrocardiograms or coronary intervention.³ Some patients with acute coronary syndrome who had been diagnosed as having unstable angina are now classified as having myocardial infarction. We investigated the impact of using the new criteria on the incidence, management, and outcome of myocardial infarction.

Participants, methods, and results

Since 1997, all patients admitted with chest pain to Monklands Hospital, Airdrie, had their troponin T concentrations measured. We identified patients admitted between April 1997 and December 2000 with a principal diagnosis of acute myocardial infarction,

according to the old criteria, from routine discharge data, the databases of the coronary care unit and laboratory, and case notes. We used the databases to identify patients admitted for chest pain who had raised troponin T concentrations (≥ 0.1 ng/ml) in the absence of non-myocardial causes such as renal failure, thromboembolic disease, or myocarditis. The new criteria increased admissions for myocardial infarction by 58%, from 1671 to 2637; this equated to approximately 160 000 additional myocardial infarctions per year in the United Kingdom.

Compared with patients who met the old criteria, the additional 966 patients identified were older (median age 74 v 68 years; $P < 0.001$; Mann Whitney U test) and a higher proportion were women (47% v 38%; $P < 0.0001$, χ^2 test). Thrombolysis was given to only 13 of the additional patients compared with 672 patients who met the old criteria (1% v 40%; $P < 0.0001$; χ^2 test). As a result, thrombolysis rates fell from 40% (95% confidence interval 38% to 42%) to 26% (24% to 28%).

Linkage to national admission (Scottish morbidity record) and death data (General Registrar's Office) provided information on survival, readmission for ischaemic heart disease, coronary angiography, and coronary revascularisation. We calculated cumulative

probabilities of these outcomes up to one year of follow up using Kaplan-Meier product limit estimates.

The additional patients had higher 30 day mortality ($P=0.016$, log rank test) (table). The difference in mortality increased over one year ($P<0.0001$, log rank test). In a Cox proportional hazards model, the difference in survival on univariate analysis (hazard ratio 2.69; 2.32 to 3.12) was slightly attenuated after adjustment for age, sex, and deprivation (2.07; 1.77 to 2.42) and attenuated further after we adjusted for thrombolysis administration (1.87; 1.58 to 2.20). However, the difference remained significant ($P<0.001$). The univariate differences in readmission (0.71; 0.60 to 0.84; $P<0.001$), coronary angiography (0.60; 0.47 to 0.76; $P<0.001$), and revascularisation (0.69; 0.52 to 0.91; $P<0.001$) were no longer significant after we adjusted for demography.

Comment

The new criteria identified additional patients who were significantly different from those previously classified as having myocardial infarction in terms of demography, eligibility for thrombolysis, and outcome. Their poorer survival may be, in part, because they are older and ineligible for thrombolysis because ST segments are not elevated in electrocardiograms. Less frequent revascularisation may be because of poorer survival but may also reflect real differences in practice. Recent evidence suggests these patients might benefit from early revascularisation.⁴ Thrombolysis rates, 30 day mortality, readmission, and revascularisation are commonly used to assess and compare the quality of care provided by hospitals. Because hospitals vary in both access to troponin assays and adoption of the new diagnostic criteria,⁵ comparisons between hospitals are misleading. Similarly, longitudinal studies will be unable to differentiate between real changes and artefacts. Our findings have serious implications for auditing, benchmarking, and epidemiology.

Kaplan-Meier product limit estimates (95% confidence intervals) of outcomes after acute myocardial infarction using old^a and new^b diagnostic criteria

	Old criteria (n=1671)	New criteria additional cases (n=966)	New criteria total cases (n=2637)
Death within 30 days	19 (17 to 21)	24 (21 to 27)	21 (19 to 22)
Death within 1 year	27 (25 to 30)	45 (41 to 48)	33 (32 to 35)
Readmission for ischaemic heart disease within 1 year	38 (36 to 41)	24 (20 to 27)	34 (32 to 36)
Coronary angiogram within 1 year	23 (21 to 26)	13 (10 to 15)	20 (18 to 22)
Coronary revascularisation within 1 year	14 (12 to 16)	8 (6 to 10)	12 (10 to 13)

^aBased on electrocardiograms, cardiac enzymes, and symptoms.

^bBased on troponin concentration and electrocardiograms.

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One hundred years ago

Medicine and matrimony

It has been said that marriages would be at least as happy were they made by the Lord Chancellor as they generally prove to be under our present system of sexual selection. Certainly those who know the average French *ménage*, not as it is portrayed by novelists whose sole idea of love is adultery, but as it is seen in quiet provincial towns and in the country, can testify to the happiness of marriages which have been arranged for the contracting parties by their parents or guardians.

There is not, we think, much chance of the Lord Chancellor taking the place of Cupid as a match-maker in this country. It would be well, however, if in negotiations with a view to matrimony the doctor were to be called in as an assessor to the God of Love, who is proverbially blind, and therefore regardless of consequences. It need not be explained in a medical journal how serious the consequences of the marriage of the unfit are likely to be for their offspring, and ultimately for the race. The matter is one of the most far-reaching importance not only to particular nations,

but to human society. So strongly has the conviction of this truth impressed itself on social reformers in some foreign countries that, as was stated in a previous article, Bills for the State regulation of marriage have been introduced into the Legislature of several States of the American Union. In North Dakota, the Creed Bill, which became law in 1899, provides that, before a couple can marry, they must obtain a licence which is granted only to such as are able to produce a certificate from a Medical Board stating that they are free from infectious venereal disease, tuberculosis, epilepsy, hereditary insanity, and confirmed inebriety. . . . Now, however, for the first time, as far as we are aware, a European Government has undertaken to deal with the question. At the reopening of the Spanish law courts in Madrid not long ago the Minister of Justice, in speaking of certain reforms which he proposed to introduce, mentioned among these the need for medical sanction of marriage contracts.

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