

The contribution of intensive coronary care

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Rose, G. (1975). *British Journal of Preventive and Social Medicine*, **29**, 147-150. **The contribution of intensive coronary care.** Coronary care units are expensive consumers of scarce resources, and it is unfortunate that there has been little attempt to evaluate their achievements: even simple data relating outcome to age, duration of stay, and severity are not available. Indirect evidence is presented from the Hospital In-patient Enquiry and the national mortality reports for England and Wales. Over the period in which intensive care facilities have become widespread the hospital admission rates have risen steeply but numbers of hospital deaths have been stable. A part of this decline in case fatality has probably resulted from therapeutic advance, but most is probably due to the admission of larger numbers of milder cases.

THE PRESENT POSITION

It is more than 10 years since intensive coronary care units (CCUs) were first established in this country. As with any powerful new treatment in medicine, the process of establishing indications and benefits is lengthy. Assumptions which seemed at the time to be reasonable are later called in question, and using 10 years of hindsight it is easy to be wise. With better statistical analysis of results, and especially if there had been some randomized controlled trials, the position today could have been much clearer: but in the history of medicine this is the usual pattern, not the exception.

The questions look simple enough. How many lives are saved by CCUs? Among patients with acute myocardial ischaemia, who are likely to do best with intensive care, and who—if any—in ordinary hospital wards, or at home? Unfortunately even some of the simplest items of relevant information are not available. The Department of Health and Social Security does not know how many patients, and of what ages, are treated each year in the country's CCUs. The units themselves have not published, and are seemingly unable to provide, mortality results analysed by age, severity, and duration of stay. As a result hospitals without CCUs do not know whether they ought to hurry up and get them, and general practitioners do not know which patients to admit and which to treat at home.

The present paper sets out a very incomplete evaluation based on some of the indirect evidence that is available.

POTENTIAL BENEFITS

In England today, out of every 1000 30-year-old men only about 750 can expect to survive until the age of retirement, and in the intervening period about 75 will have died of coronary heart disease (CHD). Recent community studies (for example, Kinlen, 1973) suggest that out of these 75 deaths about 45 will be unattended, 10 will take place at home, and 20 will be in hospital. In the early 1960s, before CCUs were introduced, the hospital case fatality for acute myocardial infarction at these ages was just under 20% compared with a little over 10% as the most optimistic figure now claimed for intensive care. The difference amounts to 7-8% of hospital admissions for acute CHD; but this estimate of potential benefit has to be reduced since many of the survivors will later suffer a fatal recurrence. It seems that if the highest hopes for intensive coronary care were fulfilled and if it were available for all hospital patients, then instead of 75 pre-retirement deaths per 1000 men, one might expect perhaps 71 or 72, corresponding to a reduction of up to 5% in the total CHD mortality at this age. This is an estimate of maximum benefit.

A sense of proportion is important in this difficult and emotive field. On the one hand it would seem

not impossible that intensive coronary care might save the lives of three or four out of every 1000 middle-aged men—a substantial gain. On the other hand its contribution to the total problem of CHD control can only be relatively very small.

ESTIMATING ACTUAL BENEFITS

There is no dispute about the benefits that CCUs have brought to research. The present understanding of the rhythm and haemodynamic disturbances following acute myocardial infarction could hardly have been achieved in any other way. What needs to be questioned is the size of their contribution to the saving of life. These units are large consumers of scarce resources, and there needs to be firm evidence of substantial benefits in order to justify their position. At present this evidence cannot be available because the relevant data have not been reported.

The Hospital In-patient Enquiry reports for England and Wales provide some indirect evidence. Table I shows case fatality ratios, analysed by age and sex, for patients admitted with acute coronary heart disease in 1963 (before intensive care was introduced) and in 1971 (when it had become fairly widespread). It is apparent that mortality depends greatly on age. Any statements of coronary mortality that are not age-specific—such as, 'Before coronary care units hospital mortality was 30%'—are meaningless, and it is particularly risky to compare mortality in different series without taking age and severity into account. This table also shows, unexpectedly perhaps, that fatality ratios have fallen more at older ages and have seemingly not changed among men under the age of 45.

Subsequent data from the Hospital In-patient Enquiry will be given only for the age group of main concern (45–64 years). Fig. 1 illustrates the large and steady decline in hospital fatality ratios during the period 1963–71, shared equally by men

and women. It would be attractive to attribute this striking improvement to the advances that have taken place in hospital care, particularly in intensive care; but the possibility must be considered that it might have resulted from changes in admission criteria and practice. As word gets around of advances in hospital care, it is natural for general practitioners to respond by sending more patients, particularly perhaps the milder cases previously thought not to justify hospitalization. Fig. 2 shows the changes in actual mortality rates over the period in question, both for deaths occurring in hospital and for those in the country as a whole. The rates are related to the numbers at risk in the general population. Apart from a very slight rise in the national rate for men at these ages, the position generally is remarkably stable. Fig. 3 shows the great rise that has occurred nevertheless in the numbers of patients admitted to hospital with acute CHD.

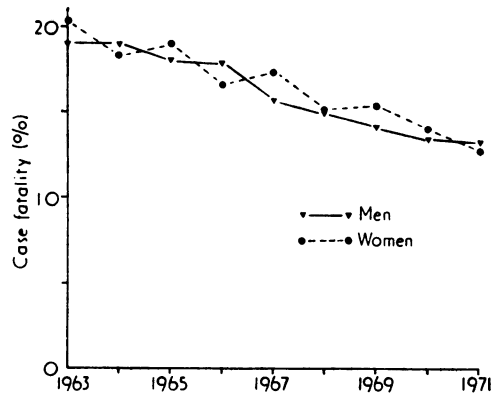


FIG. 1. Case fatality ratios at ages 45–64 for hospital admissions for acute coronary heart disease, England and Wales, 1963–71.

TABLE I
CASE FATALITY RATIOS, BY AGE AND SEX, FOR PATIENTS ADMITTED TO HOSPITAL FOR ACUTE CORONARY HEART DISEASE (ENGLAND AND WALES, 1963 AND 1971)

Age (years)	Hospital Case Fatality %			
	Men		Women	
	1963	1971	1963	1971
<45	8	8	12	7
45–64	19	16	21	18
65+	43	35	44	42
All ages	27	22	36	33

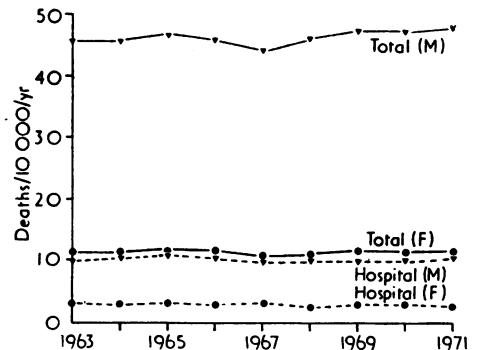


FIG. 2. Coronary heart disease mortality rates at ages 45–64 for England and Wales, 1963–71, for total deaths and deaths in hospital.

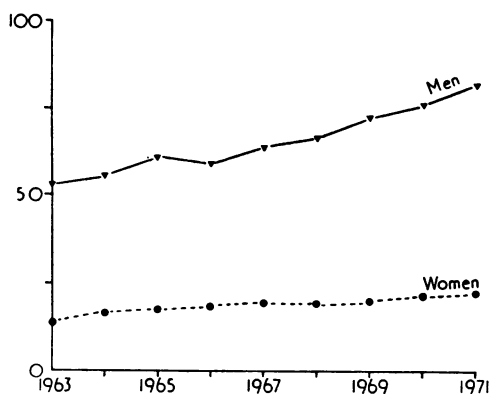


FIG. 3. Hospital admission rates for acute coronary heart disease at ages 45-64, England and Wales, 1963-71.

DISCUSSION

Putting the results together from the three figures it appears that although the number of patients admitted has risen greatly there has been no corresponding increase in hospital deaths. Two extremes of interpretation are possible:

1. The change in hospital experience could result solely from the admission of milder cases, increasing the numbers but not the mortality.
2. The increased hospital admission rate could reflect a true increase in incidence; hospital admissions might be of the same average severity as before, and treatment advances may have stemmed the rise in mortality which would otherwise have occurred.

It is probable that the truth lies somewhere between these two extremes. The relative stability of national mortality rates over this period argues against any major changes in incidence rates, and hence it seems likely that most of the decline in hospital fatality ratios has resulted from admission of more cases of less severe type, due to changes in medical attitudes and practice. On the other hand, even 'milder' cases of acute myocardial ischaemia are by no means free of a risk of death; since there has been no rise at all in the numbers of deaths in hospitals, despite the great increase in numbers treated, it is hard to escape the conclusion that at least some credit for this containment of mortality must go to treatment advances. Among the changes that have occurred in the past 10 years which may be contributory, intensive care is the most important.

There remains nevertheless a major paradox. For those patients with acute coronary heart disease admitted to hospital the position has seemingly improved, and yet at the same time the

community as a whole has shown no evidence of benefit: the national mortality trends have been steady or slightly adverse. This could be because the effect of real but small benefits are lost among the much larger numbers which determine the national rates; but the serious question must be faced, whether hospital admission causes those very rhythm disturbances which it is now so successful in controlling. It is not in dispute that there are many patients who developed ventricular fibrillation who are alive and active today, who would have died apart from prompt direct-current countershock. What needs to be known is how many of them would have developed ventricular fibrillation had they been spared the stresses of hospital admission and of the consequent disturbance of autonomic activity and catecholamine release. Experience from the controlled trials of Mather *et al.*, (1971) has shown that this possibility is more than theoretical: it must be taken very seriously indeed. Table II summarizes the results from their report. General practitioners who made a clinical diagnosis in the home of acute myocardial infarction were asked first to decide in each case whether it would be proper to accept an externally made choice of treatment at home or by intensive hospital care. In 28% of patients this choice was accepted, and patients were allocated randomly to home or hospital treatment. The results showed that overall mortality was a little lower in those treated at home, although not to a statistically significant extent. Particularly notable was the fact that during the first week of the illness there were 12 deaths in hospital but only five at home. This trial has therefore failed to produce any evidence of an overall benefit from a policy of hospital admission, in regard to those patients (mostly, perhaps, the less severe cases) who were considered suitable for entry to the trial. A further report from this important study is to be published in the near future.

TABLE II
OUTCOME OF ILLNESS IN 343 PATIENTS WITH ACUTE MYOCARDIAL INFARCTION RANDOMLY ALLOCATED TO HOME OR HOSPITAL CARE†

Patients	Hospital Care	Home Care
Total	169	174
Deaths		
First week ..	12*	5*
Later ..	12	12
Total ..	24 (14%)	17 (10%)

*0.1 > P > 0.05

†(Mather *et al.*, 1971)

CONCLUSIONS

The main conclusion is that there is a serious lack of evidence on a highly important subject. To some extent this is unnecessary and could be remedied if some of the larger CCUs were to analyse their mortality results by age, severity index, and duration of stay. Similar data from patients treated in general medical wards could be used to provide a comparison group. Such evidence would be less reliable than a proper controlled trial, but it would be much better than nothing.

In the meantime, should hospitals without CCUs hurry up and get them? No one knows, but there is little positive evidence that they should. Should general practitioners send all their patients with

acute myocardial ischaemia to hospital? There is no simple answer and various medical and social factors must be considered in each individual case. In general, however, it can be said that for the good-risk case the only available hard evidence is in favour of staying at home.

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