Middle Articles

HOSPITAL TOPICS

Coronary Care Unit in a General Medical Ward

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Summary: A five-bedded coronary care unit has been set up within a general medical ward without the provision of extra medical or nursing staff. During 30 months 1,000 patients were admitted. Sixty-three developed cardiac arrest; 28 were resuscitated successfully initially; and 18 were eventually discharged. The corresponding figures for the 28 patients with ventricular fibrillation treated by direct current defibrillation were 20 and 12 respectively. The mortality rate during the first three days (the usual length of stay in the unit) was 8.9%, compared with 9.7% after transfer to the general ward. It is suggested that these results are comparable with those from more highly staffed purpose-built units.

Introduction

There is no doubt that coronary care units have saved lives, and in order to provide cover for the largest possible population such units must be set up in district hospitals. Though many units have published their experiences, these have all been in purpose-built or specially adapted accommodation separate from the general medical wards and have usually been in well-staffed teaching hospitals. The construction and staffing of such units in district hospitals may be delayed by shortages of money and manpower.

At the Bradford Royal Infirmary we had no suitable accommodation and were faced with a severe shortage of nursing staff. We have therefore adapted part of a general medical ward to serve as a coronary care unit. One thousand patients have passed through this unit during a period of 30 months.

Description of Unit

Six beds at the end of a 30-bedded general medical ward nearest to the nursing station were adapted for coronary care. One bed was sacrificed to make space for mobile equipment—D.C. defibrillator, anaesthetic and drug trolley, oxygen cylinders, portable suction apparatus, and intravenous drip stand. The other five bed-stations were wired to provide three power outlets and equipped with a wall sphygmomanometer and an oscilloscope which was fitted with an auditory alarm system (Cardiorater, Cardiac Recorders). There was no central display oscilloscope, but the nursing station had a small console to indicate the bed from which an alarm was triggered. Piped oxygen and suction were not available, oxygen being given only to patients who were cyanosed, breathless, or clinically "shocked."

Patients were usually monitored for 72 hours and then transferred to beds reserved for them in the general medical wards. Complicated cases, however, were kept longer in the unit.

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The patients were nursed by the ordinary ward staff, which normally consisted of two sisters, one or two staff nurses, a third-year nurse, a second-year nurse, a first-year nurse, a State-enrolled nurse, and a nursing auxiliary. Only two nurses and usually one auxiliary were on duty at night.

There are four resident house-physicians at the hospital, and the first and second on call carry with them at all times a personal call-receiver by which, in the event of a cardiac arrest, they can be summoned instantly by an alarm bell at the nursing station. D.C. defibrillation is carried out by medical staff only.

Patients Admitted

Of the first 1,000 admissions 597 had unequivocal myocardial infarction (Q waves or progressive T-wave inversion associated with a significant increase in serum aspartate aminotransferase and lactic dehydrogenase) and 180 had coronary insufficiency (typical ischaemic pain usually associated with minor E.C.G. abnormalities). The remaining 223 admissions included some with dysrhythmias which were not due to myocardial infarction, but most were patients in whom an initial diagnosis of myocardial infarction had not been confirmed. Because of limited accommodation the admission of elderly patients was discouraged, and of those with myocardial infarction—of whom 100 were women—only 36 were over 65.

Speed of Admission

It is established that most deaths from myocardial infarction occur within a few hours of the onset of pain (McNeilly and Pemberton, 1968). As staff-shortage does not permit us to send medical teams to the patient's home we have tried to achieve the earliest possible admission to the unit by circulating propaganda material in the area. Ambulance staff are instructed to bring all coronary cases direct to the unit in order to avoid delay in the casualty department, and latterly they have been given authority to admit suspected cases to the unit even when they have not been seen by a doctor. This has meant an increase in the proportion of non-coronary admissions but a speedier admission for genuine cases. In effect, 64% of patients were admitted within six hours of the onset of pain and only 6.5% after more than 24 hours.

Mortality

A total of 53 patients with myocardial infarction (8.9%) died during the 72 hours after admission and another 58 (9.7%) died later while still in hospital. The overall mortality is of the same order of magnitude as that described from other coronary care units (Table I). Crude mortality figures from different centres are of limited value and may be influenced by many factors, such as case-selection, length of time before admission, and the referring habits of local practitioners. The

present series probably included fewer elderly patients, but more rapid admission in other reported series.

TABLE I.—Hospital Mortality Reported from Coronary Care Units

Centre	No. of Patients	Mortality (%)
Edinburgh Royal Infirmary (Lawrie <i>et al.</i> , 1967)	400	17.5
London Hospital (Restieaux <i>et al.</i> , 1967)	150	14.0
Royal Postgraduate Medical School (Thomas <i>et al.</i> , 1968)	156	19.0
General Hospital, Birmingham (Pentecost and Mayne, 1968)	232	18.5
Royal Melbourne Hospital (Sloman, 1968)	350	26.0
Peter Bent Brigham Hospital (Lown, 1968)	300	17.7
U.S. Multicentre trial (Cross, 1968)	2,617	20.9–32.8
Kingston General Hospital, Hull (Aber <i>et al.</i> , 1969)	373	13.4
Green Lane Hospital, Auckland (Norris <i>et al.</i> , 1969)	300	17.0
Present series	597	18.6

Cardiac Arrests

Though lives may be saved in coronary care units by prompt detection and treatment of potentially dangerous dysrhythmias, endocardial pacing for heart block, and the early detection and treatment of left ventricular failure, there are no means of expressing this in quantitative terms. The only measurable benefit of intensive coronary care is successful resuscitation after cardiac arrest.

In this series cardiac arrest occurred in 63 patients while they were being monitored and several had more than one episode of arrest. Resuscitation was initially successful in 28 patients, and 18 survived to leave hospital. Of these 18 long-term survivors, 12 had ventricular fibrillation, two had asystolic arrest, one with heart block had prolonged ventricular standstill, and three were rapidly resuscitated by the nursing staff. The last three may have been examples of prolonged sinus arrest, and it cannot necessarily be assumed that they would have died without resuscitation. Of the 29 patients known to have ventricular fibrillation and who were treated by D.C. fibrillation, 20 recovered and 12 survived to leave hospital.

In common with others we found the prognosis of asystolic arrest (slow, bizarre complexes with no perceptible output) to be very bad, only two out of 30 such patients surviving to leave hospital. In four patients the terminal rhythm was uncertain.

In Table II an attempt has been made to compare the survival rate after all arrests, and in cases of ventricular fibrillation in this series with those reported from other centres. Our results do not seem to be inferior to those achieved elsewhere.

TABLE II.—Survival After Cardiac Arrest in Coronary Care Units

Centre	All Arrests	Survivors	Ventricular Fibrillation	Survivors
Edinburgh Royal Infirmary (Lawrie <i>et al.</i> , 1967)	54	24	—	—
Edinburgh Royal Infirmary (Lawrie <i>et al.</i> , 1968)	—	—	71	33
London Hospital (Restieaux <i>et al.</i> , 1967)	25	10	15	6
Royal Postgraduate Medical School (Thomas <i>et al.</i> , 1968)	39	9	—	—
General Hospital, Birmingham (Pentecost and Mayne, 1968)	—	—	23	9
St. Mary's Hospital (Spracklen <i>et al.</i> , 1968)	27	6	—	—
Royal Melbourne Hospital (Sloman, 1968)	72	9	28	9
Kingston General Hospital, Hull (Aber <i>et al.</i> , 1969)	40	10	—	—
Present series	63	18	29	12

After leaving the unit 21 patients had cardiac arrest and only one of these was successfully resuscitated. This underlines the value of grouping patients at risk in a special unit in a district hospital where it is difficult to organize an efficient resuscitation service in general wards. Of the 84 patients who suffered cardiac arrest in hospital 44 sustained their first arrest during the first 24 hours after admission.

Discussion

Controlled studies have established the value of intensive coronary care (Meltzer, 1968; Norris *et al.*, 1969), and the

coronary care unit is moving from the stage of pilot experiments to the point where it is an essential service requirement in the large district hospital. The staffing and construction of purpose-built units may place a severe strain on manpower and finance. The final answer may be to link them with intensive care units where nursing staff can be shared, but an alternative solution is to establish units in general medical wards where they can be serviced by the medical, nursing, and domestic staff of the ward. Our findings suggest that the results need not be inferior to those obtained by highly staffed purpose-built units.

It is not suggested that our nursing cover is adequate, but it is all that we could get. In particular, an establishment of only two nurses for the whole ward at night has been demonstrably insufficient on occasions. The initial recovery rate of first resuscitations at night was only 10 out of 30, as compared with 18 out of 33 during the day. The purpose of this report is to show that even exiguous resources can be organized to achieve results comparable to the best. The work-load of a coronary care unit may fluctuate erratically from day to day, and this may lead to uneconomic use of nursing staff in individual units. An advantage of our system is that the fluctuations in work-load may disappear in the context of the total work-load of a general medical ward.

There is a widespread though unsubstantiated assumption that peace and quiet are essentials in the treatment of myocardial infarction and that noise and other disturbances may precipitate cardiac arrest. A busy general medical ward cannot by any stretch of the imagination be described as quiet and peaceful, but the incidence of cardiac arrest in our unit was not noticeably greater than that recorded by others, especially when our early admission rate is taken into account. Only one patient (a consultant physician) found the noise intolerable.

It was anticipated that mixing sexes in an open male medical ward might raise problems, but to date only one woman has asked to be moved. Otherwise there have been no complaints on this score from patients or relatives. Each bed can be individually curtained off for nursing purposes.

The physician in charge of the unit lives near the hospital, personally indoctrinates all new junior medical staff, and visits the unit twice daily. He likes to be informed at once when cardiac arrests and other emergencies occur during the day, and if he is at home he can be on the spot in five minutes. In view of the inevitably rapid turnover of medical and nursing staff he is strongly of the opinion that the unit cannot be run by remote control.

No one should try to set up such a unit as the above unless he can count on the willing acceptance of an extra work-load by dedicated young doctors and nurses, and in this respect I have been fortunate indeed.

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