AN ANALYSIS OF THE ADMISSIONS TO THE CORONARY CARE UNIT AT LAGAN VALLEY HOSPITAL

by

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IT has been known for many years that up to 45 per cent of the deaths from myocardial infarction occur within the first hour of the onset of symptoms.\textsuperscript{1,2} It is recognised that initiation of intensive care within the very early hours of infarction\textsuperscript{3} may prevent death. While the delays in initiation of intensive care have been analysed in studies from teaching hospitals,\textsuperscript{2} there are few reports from district hospitals. Therefore, it was decided to analyse the admissions to Lagan Valley District Hospital which serves a mixed urban and rural population of 83,000. We analysed the delay times which occurred both before and after the patients called for medical help. Account was taken of the distance the patients lived from the hospital in order to see if this influenced the delay time. As patients admitted were unselected by the staff of the coronary care unit, the final diagnoses were recorded, in order to determine whether effective use was being made of the coronary care unit facilities.

Because a coronary care ambulance could theoretically reduce the delay before initiation of intensive care, it was hoped that by providing information on the actual delays, comparison with other studies would enable a rational decision to be made on the possible effectiveness of a coronary care ambulance in this situation.

PATIENTS AND METHODS

We studied prospectively all patients admitted to the unit from January to June 1982. The patients were admitted directly by general practitioners or were self-referred through the '999 system' or casualty.

Each patient had a questionnaire filled in as soon as was appropriate after admission. This included the patient’s name, age and distance from the hospital at the time of the attack. The time of onset of the patient’s chest pain or major presenting symptom was noted along with the time at which help was summoned and the time at which they arrived at the hospital coronary care unit. The method of referral was noted (general practitioner, ’999’, casualty). The final diagnosis was recorded and whether the patient survived.

The criteria for diagnosis of myocardial infarction were: (i) typical chest pain, (ii) indubitable evolving ECG changes and/or significant and typical rises in CKMB, CK, AST and LDH enzymes.

RESULTS

There were 221 admissions in the six months. Of these, four were admitted for diagnostic monitoring, three were patients transferred from other hospitals following insertion of intra-cardiac pacemakers, 11 had taken overdoses of drugs requiring cardiac monitoring (e.g. anti-depressants) and one immuno-suppressed patient was admitted for isolation. There was no further analysis of these 19 patients as they were not admitted because of suspected myocardial infarction. Of the remaining 202 patients 82 (40 per cent) had proven acute myocardial infarction.
The mean age of the patients in the infarct group was 64.0 years (range 30-89) and the mean age of the non-infarct group was 61.8 years (range 29-89). There was no statistical difference ($t = 1.09$, df = 200, $0.3 < p < 0.20$).

The duration of the pain before calling for help (e.g., General Practitioner, 999 call or casualty) was analysed in the two groups and is shown in Table I. The time taken was recorded to the nearest five minutes and the times were subsequently grouped as shown. The median time taken before calling for help in the infarct group was two hours (range 0-7 days) and in the non-infarct group it was also two hours (range 0-8 days). Of the 23 patients without myocardial infarction who were admitted at 24+ hours, five were patients with crescendo angina which did not progress to infarction. The time taken between the call for help and admission to the coronary care unit is shown in Table II. The time taken was estimated to the nearest five minutes. The overall median time before arrival at hospital in the patients

### Table I

The time between the onset of pain and the summoning of help

| Time (Hours) | Myocardial Infarction Patients | Non-Myocardial Infarction Patients |
|--------------|--------------------------------|----------------------------------|
|              | No.    | Per cent | No.    | Per cent |
| 1            | 32     | 39.0      | 33     | 27.5      |
| 1-8          | 9      | 9.8       | 25     | 20.8      |
| 2-13         | 13     | 15.8      | 11     | 9.2       |
| 4-10         | 10     | 12.2      | 13     | 10.8      |
| 8-12         | 5      | 6.1       | 8      | 6.7       |
| 12-24+       | 5      | 6.1       | 7      | 5.8       |
|              | 9      | 11.0      | 23     | 19.2      |
| **Total**    | 82     | 100       | 120    | 100       |

### Table II

Interval between "call for help" and initiation of intensive coronary care

| Time (minutes) | Myocardial Infarction Patients | Non-Myocardial Infarction Patients | Total |
|----------------|--------------------------------|-----------------------------------|-------|
| 15             | 2                              | 3                                 | 5     |
| 15-            | 2                              | 6                                 | 8     |
| 30-            | 10                             | 17                                | 27    |
| 45-            | 14                             | 12                                | 26    |
| 60-            | 25                             | 29                                | 54    |
| 10-            | 9                              | 24                                | 33    |
| 120-           | 15                             | 14                                | 29    |
| 240-           | 5                              | 15                                | 20    |
| **Total**      | 82                             | 120                               | 202   |
admitted was 1 hour 10 minutes. The average distance from which the patients travelled to the hospital was 3.8 miles (range up to 17 miles). Thirty-one patients (15 per cent) lived more than 10 miles from the hospital. In this sub-group the delay before arrival at hospital was 90 minutes.

During their attack 149 patients (74 per cent) contacted their general practitioner, 33 patients (15 per cent) used the '999' emergency system and 17 patients (8 per cent) were admitted through casualty. Two patients were admitted from the general wards and one patient was admitted from the outpatients.

Of the 82 patients admitted with definite myocardial infarction, 12 (14.6 per cent) died and 70 (85.4 per cent) survived. Six patients with congestive heart failure complicated by myocardial infarction died (five were due to late ventricular fibrillation). Two patients with complete heart block died within 30 minutes of admission as did one patient who developed complete heart block 24 hours after admission. Two patients with cardiogenic shock at admission developed asystole. One patient went into asystole five hours after presentation.

DISCUSSION

The 40 per cent of patients with chest pain diagnosed as having myocardial infarction corresponds well with the 42 per cent found in cardiac ambulance calls in Belfast. In another study in which patients were selected by the staff of the coronary care unit, 47 per cent were eventually diagnosed as myocardial infarction. Under our present system the patients are admitted directly to the coronary care unit, reducing administration time and we would suggest that the figure of 40 per cent who turned out to have a myocardial infarction represents an effective use of the coronary care facilities. (Many of the patients with other diagnoses were moved quickly to the general wards). The survival rate of 85 per cent in patients with myocardial infarction is similar to studies from other district hospitals.

The average distance travelled by the patients was 3.8 miles and therefore the hospital ambulance had a round trip of 7.6 miles. There are no directly comparable figures available but the time taken to transport the patient to the hospital was an obvious cause of delay in initiating coronary care. In the 15.3 per cent of patients living greater than 10 miles from the hospital, there is greatest scope for reducing the delay before initiation of coronary care, by means of a coronary care ambulance.

Whereas the median time taken to call for assistance was 90 minutes in Edinburgh and 77 minutes in Belfast, we found a median delay of 120 minutes. There was no difference in the median "call" time taken by patients who had a myocardial infarction and those who did not. This is in accord with other studies. At Lagan Valley the total delay before initiation of coronary care was 3 hours 10 minutes. This compares favourably with other studies from hospitals without a cardiac ambulance, which reported delays of five to eight hours. This reflects the "direct admission" policy of the unit which reduces administrative time.

In studies from Belfast on people who have had a fatal myocardial infarction outside hospital, 14 per cent survived the first two hours and it is among this group that there is opportunity for improvement of the mortality figures, as some of these patients will have ventricular fibrillation which may be treated. Belfast studies have shown that whereas there is an overall mortality of 19 per cent in patients admitted
three hours or more after the beginning of their attack, this mortality is only 10 per cent among patients admitted within three hours.\(^7\) This has been ascribed to a reduced incidence of pump failure and shock.

Patient education would be expected to reduce the “call” time of two hours. However, Julian\(^8\) reports that cardiologists with infarcts waited for a median time of 48 hours before calling their doctor. He suggests that the time taken to call for help is directly related to the suddenness and severity of the onset of the attack.\(^8\) Evidence from Belfast suggests that when a cardiac ambulance is available, general practitioners refer patients more quickly and there is a progressive increase in the number of patients coming under intensive care soon after the onset of their coronary attack.\(^4\)

In conclusion, the median time taken before initiation of intensive coronary care in patients with myocardial infarction could possibly be reduced from 3 hours 10 minutes to 1 hour 40 minutes as in the Belfast study.\(^4\) The patient with a myocardial infarction is not only in urgent need of pain relief but is also at great risk of dying. There is substantial evidence that the risk may be reduced by early intervention.\(^3\), \(^4\), \(^5\), \(^6\), \(^7\) The evidence in this paper suggests that while there is room for improvement in delay times, the scope is not as great as in the “pre-coronary care era”.

**SUMMARY**

Two hundred and two patients with suspected myocardial infarctions were admitted to Lagan Valley Hospital during a six month period. Of these, 40 per cent had a myocardial infarction. The median time before calling for help was two hours and before admission to the coronary care unit was a further 1 hour 10 minutes. Mortality rate of patients with myocardial infarction in the coronary care unit was 15 per cent.

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