PAPERS AND SHORT REPORTS

Home care for patients with suspected myocardial infarction: use made by general practitioners of a hospital team for initial management

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Abstract

Two hundred and sixty three general practitioners were offered the use of a hospital based service consisting of a medical senior house officer, a nurse attached to a coronary care unit, and a specially equipped ambulance estate car to help with the initial management of patients with suspected myocardial infarction who might be suitable for home care. One hundred and sixty nine general practitioners registered as potential users of this service; during 22 months they called the hospital team to see 271 patients, 235 of whom the team suspected had indeed suffered a myocardial infarction. During the same period, however, these general practitioners also admitted 317 patients with suspected myocardial infarction directly to hospital. Other general practitioners admitted 323 patients and deputising doctors 258. A further 529 patients with suspected infarction were admitted without the intervention of a general practitioner. Of the patients seen by the team, 54 required immediate admission to hospital; 17 of the remaining patients who initially appeared suitable for home care later required admission to hospital.

In a large city such as Nottingham the provision of hospital based facilities to help general practitioners with home management is unlikely to make an appreciable impact on the overall pattern of care of patients with suspected myocardial infarction.

Introduction

Half the patients who die from a heart attack do so within two hours after the onset of symptoms,¹ and for patients with suspected myocardial infarction who live in urban areas the ideal form of management is an immediate call for an ambulance and rapid transfer to hospital. Unfortunately, patients tend to delay calling for help, so by the time they are seen by a doctor the main period of risk is over. Moreover, patients often call their general practitioners rather than summoning an emergency ambulance, and patients who call general practitioners tend to have had their symptoms for longer than those who summon an emergency ambulance.² General practitioners thus usually see patients who are at relatively low risk and have to decide whether to admit them to hospital or care for them at home.

Two randomised trials^{3 4} and one survey⁵ have suggested that hospital care has little to offer patients who are initially seen by general practitioners unless overt complications require specific treatment. None of these studies was, however, large enough to give an unequivocal answer, and the place of management at home for patients at low risk with heart attacks remains in doubt.

In an earlier study based in Nottingham a hospital based team of a medical senior house officer and a staff nurse attached to the coronary care unit drove to the patient's home in a specially equipped ambulance estate car and provided coronary care in the patient's home for two hours before the patient was randomised to further treatment at home or to admission to hospital.⁴ This study was stopped after the team had responded to 500 calls. The results of the study were reported to all general practitioners in Nottingham, and the team was then made available as a service to them. Here we describe the use made of this service. The period during which the service was available overlapped with a project in patient education in specific general practices that has been described previously,⁶ but the patients who summoned the team as a result of that project were excluded from this account.

Methods

A senior house officer attached to this department and a staff nurse from the coronary care unit were available at all times for 22 months. Their ambulance estate car was equipped with a de-

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fibrillator and all the usual facilities of a coronary care unit except for the provision of temporary pacing. All general practitioners who admit patients to hospitals in Nottingham were meanwhile informed at meetings and by letter of the results of our study of the benefits of admission to hospital compared with those of home care.⁴ Those general practitioners whose practices were within 20 minutes' drive of the centre of Nottingham were offered the opportunity of using the team for the diagnosis and initial management of any patient whom they saw at home and in whom the immediate diagnosis was suspected myocardial infarction. The general practitioners were told that they could call the team only if they registered as potential users of the service; registration in no way committed them to call the team, but they had to agree that if they did call the team out they would accept responsibility for the patient's care if, in the opinion of the senior house officer in the team, the patient was suitable for management at home. This implied that the team would not be called if the general practitioner thought from the outset that admission to hospital would be needed either on medical or social grounds. The general practitioner could call the team without visiting the patient if he was sufficiently sure of the diagnosis from the information given him on the telephone, but in most cases he called for the team from the patient's home.

When the team was called to a patient's home they treated the patient in accordance with the current therapeutic policy of the coronary care unit, and the senior house officer could call an ambulance and arrange admission to the coronary care unit at any time. Specific indications for admission included resuscitation from cardiac arrest, the persistence of an arrhythmia that required monitoring or treatment, and the presence of heart failure of anything other than a mild degree. Unwillingness on the part of the patient or his family to consider care at home also constituted an indication for admission to hospital. Provided that admission to hospital did not appear to be necessary on any of these grounds the team remained in the patient's home for two hours. They recorded an electrocardiogram and took blood for estimation of amino aspartate transferase and lactate dehydrogenase activities. Provided the patient seemed well the team left at the end of two hours, having informed the general practitioner that he now had responsibility for the patient's care. The general practitioner could thereafter admit the patient to hospital at any time and for any reason.

Patients who were kept at home were visited the next day by one of us (JMR) who recorded an electrocardiogram and took blood for further estimations of enzyme activities so that an accurate diagnosis could be made. All the patients seen by the team were reviewed in an outpatient clinic six weeks later.

During the period that this service was available to general practitioners data were collected for all admissions to the coronary care units of hospitals in Nottingham so that the impact of the service on the overall pattern of patient care in the community could be assessed.

The definitions of the different categories of myocardial infarction used in this account are as follows: patients described as having definite or probable infarction were those with a convincing history together with changes in their electrocardiogram characteristic of a new infarction or a rise in enzyme activities to more than twice the upper limit of normal, or both; patients described as having a possible infarction were those with a convincing history together with an electrocardiogram that was abnormal but not characteristic of a new infarction or a rise in enzyme activities to a maximum of less than twice the upper limit of normal, or both; patients described as having ischaemic heart disease were those with clear evidence of a previous myocardial infarction but in whom there were no changes in the electrocardiogram or in enzyme activities to suggest a new infarction; and patients described as having chest pain of unknown cause were those with chest pain in whom there was no evidence of ischaemic heart disease and in whom no other cause of chest pain could be found.

Results

ATTITUDE OF GENERAL PRACTITIONERS TO THE NEW SERVICE

Letters were sent to 263 general practitioners, describing the service and inviting them to register as potential users. One hundred and sixty nine accepted the invitation, and 94 either replied that they did not wish to make use of the service or failed to reply. Fifty eight of the 263 had already taken part in the initial study comparing home and hospital management for patients with suspected infarction⁴; of these, 52 (90%) registered as potential users of the new service and only six did not wish to make further use of the hospital team. Of the 205 general practitioners who had not taken part in the earlier study, 117 (57%) registered as potential users and 88 (43%) did not wish to use the service (figure).

Of the general practitioners who registered as potential users of the hospital team, those who had taken part in the earlier study⁴ made considerably greater use of it than those who had not originally taken part. Thus the 52 general practitioners who had taken part in the earlier study saw 227 patients with suspected myocardial infarction (4.4 patients per general practitioner) during the study of whom they admitted 87 (38%) directly to hospital and called the team to visit the other 140 (62%). The 117 general practitioners who had not participated in the study but who registered as potential users of the new service saw 361 patients with suspected myocardial infarction (3.1

patients per general practitioner) during the study; they admitted 230 (64%) of these patients directly to hospital and called the team to visit 131 (36%). Why these two groups of general practitioners saw different average numbers of patients is not clear. The difference could relate to a real difference in the number of patients with infarction in their practices, to a different level of diagnostic suspicion, or to a different use by their patients of the emergency ambulance service.

USE OF THE TEAM AND DIRECT ADMISSION TO HOSPITAL

During the 22 months covered by this study the team visited 271 patients with suspected myocardial infarction whereas 1437 such patients were admitted directly to hospital, 640 by their general practitioner. Three hundred and seventeen patients were sent to hospital by general practitioners who had registered as potential users of the service. In some cases the general practitioner had felt there was a specific contraindication to home care, but in most cases why the general practitioner had not called the team was uncertain. One hundred and seventy three patients were sent to hospital by general practitioners who had declined the use of the service, and 150 patients were sent to hospital by general practitioners who had not been offered the use of the hospital team because their practices were too far away from the team's base in the centre of Nottingham.

The remaining 797 patients (53% of admissions) had not been sent to hospital by their usual general practitioner so, even if that general practitioner had been a potential user of the new service, home care would not have been possible. Of these, 396 patients (27% of those admitted) telephoned for an emergency ambulance, 258 (18% of those admitted) were seen by a doctor providing emergency cover for general practitioners, using the local deputising service, and 143 (10% of those admitted) either reached the hospital accident and emergency department by their own transport or were sent there by their employer's medical or nursing staff as a result of illness occurring at work.

PATIENTS SEEN BY THE HOSPITAL TEAM

Two hundred and seventy one patients suspected by their general practitioner of having had a myocardial infarction were visited by the hospital team; in 31 of these the senior house officer in the team was able to make a confident diagnosis of some other problem. Four patients were found dead by the team, and resuscitation was not successful. There were therefore 235 patients in whom the diagnosis remained as suspected myocardial infarction and who could potentially be cared for at home.

One hundred and seventeen of the 235 patients had called their general practitioner within one hour after the onset of symptoms, although a few patients had delayed for several hours, making the mean delay three and a half hours. One hundred and eighty one (77%) of the 235 patients were considered to be suitable for home care at the end of the two hours' observation, whereas 54 (23%) were admitted to hospital.

Table I shows the number of patients who needed active management by the team. The number requiring analgesia was surprisingly low (79 (34%)) but many patients had already been given analgesics by their general practitioner before the arrival of the team. Treatment of heart failure was seldom necessary (28 (12%)) and neither was treatment of arrhythmia: 15 patients (6%) were given an antiarrhythmic drug and six (3%) were given atropine. Three patients (1%) were successfully resuscitated from ventricular fibrillation. No patient developed bradycardia requiring urgent admission to hospital for pacing. Table I shows that, as would be expected, active treatment was more commonly required in the group of patients who were considered to be unfit for home care and who were admitted to hospital.

TABLE I—Action taken by the hospital based team in patients with suspected myocardial infarction who were seen at home

	No (%) of patients considered to be suitable for home care (n = 181)	No (%) of patients admitted to hospital (n = 54)	Total (n = 235)
Administration of:			
Analgesics	54 (30)	25 (46)	79 (34)
Diuretics	13 (7)	15 (25)	28 (12)
Antiarrhythmics	6 (3)	9 (17)	15 (6)
Atropine	2 (1)	4 (7)	6 (3)
Resuscitation from ventricular fibrillation		3 (6)	3 (1)

Table II compares the patients whom the team considered to be suitable for home care with those whom the team decided to admit to hospital. The sex distribution and mean ages were similar except that the women kept at home were older than those admitted to hospital. More of the patients admitted to hospital than those kept at home had a history of angina or a myocardial infarction, and more of those admitted to hospital were already receiving digoxin, diuretics, or β blockers at the time of their suspected myocardial infarction.

TABLE II—Comparison of patients considered by the team to be suitable for home care with those whom the team admitted to hospital

	Patients considered to be suitable for home care (n = 181)	Patients needing admission to hospital (n = 54)
No (%) of men	133 (73)	42 (78)
Mean age:		
Men	59	61
Women	66	60
No (%) with a previous history of:		
Angina	65 (36)	25 (46)
Myocardial infarction	40 (22)	19 (35)
Hypertension	31 (17)	8 (15)
Diabetes	9 (5)	3 (6)
No (%) who had received previous treatment with:		
Digoxin	16 (9)	4 (7)
Beta blockers	23 (17)	12 (22)
Diuretics	38 (21)	13 (24)

EVENTUAL OUTCOME IN PATIENTS VISITED BY THE TEAM

Table III compares the outcome for the group of patients who were considered by the team to be fit for home care with that for the group that the team admitted to hospital. As patients with complications of myocardial infarction were admitted to hospital, the group admitted to hospital would be expected to contain a higher proportion of patients with definite or probable infarction and the death rate in this group would be expected to be higher than in the group of patients kept at home. This proved to be so in that 81 (45%) of those kept at home were eventually considered to have had a definite or probable

TABLE III—Outcome in two groups of patients with suspected myocardial infarction

	Patients considered to be suitable for home care (n = 181)	Patients needing admission to hospital (n = 54)	Total (n = 235)
No (%) in whom final diagnosis was:			
Definite or probable infarction	81 (45)	30 (56)	111 (47)
Possible infarction or ischaemic heart disease	60 (33)	16 (30)	76 (32)
Chest pain of unknown cause	35 (19)	7 (13)	42 (18)
No (%) who died within six weeks	19 (10.5)	9 (17)	28 (12)

infarction compared with 30 (56%) of those admitted to hospital. Nineteen patients (10.5%) kept at home had died by the end of the six weeks' follow up compared with nine (16.7%) of those admitted to hospital. Nineteen (10.5%) of the 181 patients who were initially kept at home were eventually admitted to hospital, nine because of persistent or recurrent chest pain, six because of heart failure, and two because of arrhythmias. Six of these 19 patients died in hospital; thus there were 13 (8%) deaths among the 162 patients who remained at home for the full duration of their illness.

Discussion

The aim of the study was to determine whether a form of management that had been subjected to a clinical trial was acceptable to general practitioners and whether the home care of patients with suspected myocardial infarction would make any appreciable impact on the need for hospital services. The initial reaction of the general practitioners to whom the service was offered was favourable, 169 of 263 (64%) registering as potential users and thus indicating their willingness in principle to manage low risk patients with myocardial infarction at home. The actual use made of the service was disappointing in that these general practitioners admitted 317 patients directly to hospital and called the team to only 271 patients. The main users of the service were, perhaps predictably, those general practitioners who had already cooperated in our earlier study⁴ and who were therefore self selected as enthusiastic people prepared to help in evaluating various forms of management of patients. The present study showed that the new service was not as acceptable to general practitioners who had not taken part in the initial study, suggesting that the new service might not find favour in other areas.

Patients with chest pain clearly preferred to call for help from their general practitioner rather than to telephone for an emergency ambulance. We do not have any information about patients who during the study were found dead on arrival at hospital, but, of 1708 patients who were either seen at home or who were admitted to a coronary care unit, only 396 (23%) had telephoned for an ambulance; 1169 (68%) had called their general practitioner, and, of these, 258 (22%) were seen by a doctor working for a deputising service. Our own educational project showed that, though patients with symptoms suggesting a myocardial infarction can be persuaded to call for help earlier, they continued to route their calls to their own general practitioners rather than to our hospital based team. While this pattern of patient behaviour persists home care will continue to be an option for the general practitioner.

Our randomised study of home *v* hospital care for patients with suspected myocardial infarction suggested that home care was as safe as admission to hospital for patients at low risk selected by our hospital based team. The offer of an identical service to all general practitioners within Nottingham had little effect on the management in the community of patients with suspected myocardial infarction. Only 181 were initially considered to be suitable for home care during a period when 1587 patients were admitted to hospital, and, of the 181, 19 were eventually admitted. The present study shows that, even within a large urban community where many of the general practitioners were familiar with the results of a study that failed to show any

benefit from hospital admission for selected patients with suspected myocardial infarction and where diagnostic or therapeutic help in the home was offered, home care did not make any substantial impact on the need for hospital services.

If general practitioners do not consider home care to be an acceptable form of management for patients with suspected myocardial infarction, then there is little point in their playing any part when patients develop suspicious symptoms. In fact, general practitioners cannot help most patients who die from a heart attack: a register of all patients with heart attacks in the Nottingham Health District confirmed earlier reports that most deaths occur soon after the onset of symptoms and before medical aid is sought.⁷⁻⁹ If virtually all patients with heart attacks who survive long enough are going to be admitted to hospital, should the general practitioners and patients be persuaded that a call for an emergency ambulance is the appropriate action and not a call for a general practitioner? There is, however, little point in instituting such a programme of public education without an ambulance that can respond appropriately. After two of our earlier studies had shown that a single "coronary" ambulance could not be used effectively,⁹⁻¹⁰ the emergency and routine functions of our ambulance service were separated, and all the emergency vehicles are now being equipped with defibrillators and their crews specially trained. A programme of community education in the need to call for an emergency ambulance rather than a general practitioner together with public education in

cardiopulmonary resuscitation is now beginning, and we shall use our heart attack register to monitor its effect.

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β Blockade, diuretics, and salt restriction for the management of mild hypertension: a randomised double blind trial

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Abstract

Ninety four patients with mild hypertension (average supine diastolic blood pressure (phase V) 95-110 mm Hg) were allocated at random to receive restriction of dietary sodium (maximum allowed 70 mmol(mEq)/24 h) or a normal diet. In addition, they received in random order 25 mg chlorthalidone, 200 mg metoprolol (slow release), and a fixed combination of these two drugs. Each drug treatment was given for four weeks and alternated with four weeks of placebo. Forty four patients were allocated to sodium restriction (group 1) and 50 to normal diet (group 2).

The mean 24 hour urinary sodium excretion in group 1

was 74 (SD 31) mmol(mEq)/24 h, and in group 2 132 (51) mmol/24 h. Compared with the screening blood pressure the average decrement of the supine blood pressure in group 1 was 16.0/8.6 mm Hg with placebo, 21.7/11.5 mm Hg with the diuretic, 28.5/17.8 mm Hg with the β blocker, and 28.9/18.4 mm Hg with the combined agent; in group 2 these values were 13.3/6.1, 20.3/9.7, 21.3/12.9, and 29.4/16.8 mm Hg, respectively. There was a sharp decrease of the average potassium concentration during chlorthalidone and combination treatment periods (average value 3.3 mmol(mEq)/l).

These results suggest that moderate salt restriction used as sole treatment has a limited though demonstrable blood pressure lowering effect but that when it is used as an adjuvant to β blocker treatment its value is greatly enhanced.

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Introduction

An abundance of therapeutic options is now available for mild hypertension, but the treatment of choice—that is, one combining maximal efficacy with minimal side effects—is still a matter of dispute. This often centres on whether to use β blockers or diuretics as the first line of treatment. Adverse reactions may occur with either of these treatments,¹ however, so that some workers favour a non-pharmaceutical approach to symptomless, mild hypertension, such as restriction of the daily sodium intake. While the effectiveness of severe sodium restriction (less than 20 mmol (mEq)/24 h) has been recognised for over 35 years² the