95 % confidence limits for various rates and sample sizes

Estimated prevalence (%)	95 % confidence limits	
	n = 500	n = 1000
2	1.0-3.7	1.2-3.1
10	7.5-13.0	8.2-12.0
20	16.6-23.8	17.6-22.6

values between two populations. These techniques may be found in the textbooks or (better) by consulting a statistician; but either way the investigator must first know exactly what he wants to achieve.

SAMPLING METHODS

Statistical inference is possible only if the sample is random, or effectively random; that is to say, if each individual in the study population has a known (usually identical) probability of selection. To achieve this a *census* or listing of the study population is first required. In a survey of adults in a hospital district the electoral register will probably serve. In an occupational group the payroll is invariably complete, and in a school there are class registers. In general practice there may be an age-sex register (although many are inaccurate); otherwise a *systematic*

sample may be obtained by taking the notes of every *n*th patient, and this should be adequately representative.

In a *simple random sample* the listed subjects are numbered serially. Numbers within the appropriate range are then read off from a table of random numbers until enough subjects have been chosen.

It may be that the investigator wishes to choose a sample in which certain subgroups (particular ages, for instance, or high-risk categories) are relatively overrepresented. To achieve this he may divide the study population into subgroups (*strata*) and then draw a separate random sample from each, but adjust the various sample sizes to suit his requirements. This is a *stratified random sample*.

The study population may be large and widely scattered—for example, all the general practices in a city—but for the sake of convenience the investigator may wish to concentrate his survey in a few areas only. He can do this by drawing first a random sample of practices, and then, within these practices, drawing a random sample of individuals. This is *two-stage sampling*. There is some loss in statistical efficiency, especially if at the first stage only a few units are selected. If the acceptable number of first-stage units is very small then random selection is unsuitable, judgment serving better than chance.

Eventually this series will be collected into a book and hence no reprints will be available from the authors.

General Practice Observed

Early treatment of myocardial infarction in the community

F G DUNN, S ELMS, D I MELVILLE, T D V LAWRIE, T S MURRAY

British Medical Journal, 1978, 2, 1143-1145

Summary and conclusions

The prehospital management of acute myocardial infarction by general practitioners and emergency-treatment service physicians was analysed in 53 patients. The correct clinical diagnosis was made or suggested before admission in 47 patients. Only 25 patients received analgesics from the general practitioner, and 32 were still in pain and needed diamorphine on admission to hospital. Only one patient received antiarrhythmic treatment.

The findings suggest that, despite accurate clinical diagnosis of acute myocardial infarction, deficiencies

exist in the prehospital phase of management and that education programmes are worth consideration.

Introduction

Early studies in the evaluation of coronary care units showed that mortality from acute myocardial infarction had improved when compared with general medical wards.¹⁻⁴ Recently, however, the exact value of coronary care units has been seriously questioned, since it is well known that most patients who die from acute myocardial infarction do so before reaching hospital.⁵ The coronary care ambulance is an important development in bringing early coronary care to patients,^{6,7} but there are both practical and economic problems in instituting this system on a widespread basis.⁸ Thus the general practitioner should take a more active role in the critical early phase of management. We aimed at assessing to what extent this was already being done and at analysing patterns of management of acute myocardial infarction by general practitioners.

Patients and methods

Fifty-three patients (40 men and 13 women) who were admitted to the coronary care unit of the Glasgow Royal Infirmary were studied. Two criteria were used for selection: (1) all patients had been seen by either their general practitioner (40 patients; 76%) or an

University Department of Medical Cardiology, Royal Infirmary, Glasgow G4 0SF

F G DUNN, MB, MRCP, senior registrar

S ELMS, MB, CHB, senior house officer

D I MELVILLE, MB, MRCP, registrar

T D V LAWRIE, MD, FRCPED&GLAS, Walton professor of medical cardiology

University Department of General Practice, Royal Infirmary, Glasgow G4 0SF

T S MURRAY, MRCP, senior lecturer

emergency-treatment service physician (13 patients; 24%) before admission, and the referring physician had sent an accompanying letter; (2) in each case there was unequivocal evidence of acute myocardial infarction based on history, results of serial cardiac enzyme studies, and electrocardiographic appearances.

Analysis of the prehospital phase of management was based on information given in the general practitioner's letter and that provided by the patients themselves. Particular attention was paid to time spent by general practitioners with the patient, clinical features described in the referral letter, suggested diagnosis, and drugs administered.

Results

The average time taken from onset of symptoms until a doctor was contacted was 4.1 hours (range 0.17-48), with a further delay of 1.26 hours (range 0.26-18) until a doctor arrived. Thus medical help did not arrive until over five hours had elapsed, which is well past the critical period after acute myocardial infarction. The average time spent with the patient was 18 minutes, and 10 doctors (19%) awaited the ambulance before leaving. Five patients (9%) were allowed to make their own way to hospital (including one whose pulse was recorded at 44 beats per minute).

Table I outlines the clinical features described in the general practitioners' referral letters. These figures do not represent true incidences, since the general practitioner might not have recorded normal features detected during the examination. Pulse rate and blood pressure were recorded in 42 (79%) and 45 (85%) patients respectively. Other features of the examination that general practitioners often commented on were auscultation of the heart (34 patients; 64%) and examination of the chest (28 patients; 53%). The general practitioner was convinced of the diagnosis of acute myocardial infarction in 16 patients (30%), and suggested this diagnosis in a further 31 (58%), giving a total of 47 (88%) in whom the diagnosis was considered. Erroneous diagnoses were given in three patients (6%) and no diagnosis was mentioned in three (6%). Thus in a high proportion of cases the diagnosis of acute myocardial infarction was seriously considered on purely clinical grounds.

Table II summarises the treatment given by general practitioners. Twenty-five patients (47%) received analgesics, and similar numbers received pethidine, pentazocine, and morphine. No patient received diamorphine. In 49 of the 53 patients an analysis of pain relief was carried out (table III). Nineteen patients received no analgesic from the general practitioner but continued to have chest pain, and

TABLE I—Information given in general practitioners' referral letters on clinical state of patients after acute myocardial infarction ($n=53$). Figures are numbers (%) of patients

Relevant past history	..	..	..	..	..	..	..	37 (70)
Relevant drug treatment	..	..	..	..	..	..	..	34 (64)
General appearance	..	..	..	..	..	..	..	32 (60)
Pulse	..	..	..	..	..	..	..	42 (79)
Blood pressure	..	..	..	..	..	..	..	45 (85)
Jugular venous pressure	..	..	..	..	..	..	..	ND
Oedema	..	..	..	..	..	..	..	2 (4)
Heart sounds	..	..	..	..	..	..	..	34 (64)
Respiratory examination	..	..	..	..	..	..	..	28 (53)
Abdominal examination	..	..	..	..	..	..	..	5 (9)

ND = Not done.

TABLE II—Treatment given by general practitioners to patients who had had acute myocardial infarction ($n=53$)

Drug	No (%) of patients
<i>Analgesics</i>	
Pethidine	7 (13)
Pentazocine	7 (13)
Morphine	6 (11)
Dihydrocodeine tartrate	1 (2)
Unspecified	4 (8)
Total	25 (47)
<i>Antiarrhythmic</i>	
Propranolol	1 (2)
<i>Other</i>	
Glyceryl trinitrate	2 (4)
Hydrocortisone	1 (2)

TABLE III—Analysis of pain relief in patients who had had acute myocardial infarction

Relief of pain by primary-care physician	..	..	..	..	..	..	..	12 (24)
Persistence of pain on admission without previous analgesics	..	..	..	..	..	..	..	19 (39)
Persistence of pain despite analgesic from primary-care physician	..	..	..	..	..	..	..	13 (27)
Spontaneous relief of pain	..	..	..	..	..	..	..	5 (10)
Total	..	..	..	..	..	..	..	49 (100)

TABLE IV—Number of patients who developed complications of acute myocardial infarction that needed treatment while in coronary care unit. Figures expressed as proportions of total number of patients ($n=53$)

Ventricular extrasystoles	..	..	..	..	..	..	..	4 (7.5)
Ventricular tachycardia	..	..	..	..	..	..	..	7 (13)
Ventricular fibrillation	..	..	..	..	..	..	..	7 (13)
Sinus bradycardia	..	..	..	..	..	..	..	4 (7.5)
Heart block	..	..	..	..	..	..	..	3 (6)
Atrial fibrillation	..	..	..	..	..	..	..	3 (6)
Supraventricular tachycardia	..	..	..	..	..	..	..	1 (2)
Cardiac failure	..	..	..	..	..	..	..	7 (13)
Total	..	..	..	..	..	..	..	36 (68)

diamorphine was needed on admission. A further 13 patients continued to have pain despite receiving an analgesic from the general practitioner. Thus a total of 32 patients had inadequate relief of pain on arrival at hospital. Antiarrhythmic treatment was given in only one patient. Nevertheless, 29 of the patients (55%) needed antiarrhythmic treatment while in the coronary care unit and a further seven (13%) required treatment for cardiac failure (table IV).

Discussion

Despite many initial reports attesting to the benefit of coronary care and the sound principles on which its evolution was based, the reduction in mortality from acute myocardial infarction has been disappointing. Undoubtedly the principal reason for this is the delay in admitting patients to the coronary care unit, and the different phases of this delay have been well documented.⁹⁻¹⁰ The concept of the coronary care ambulance represents an important step forward in reducing this delay, and has resulted in a reduction in mortality in some areas.⁶⁻⁷ None the less appreciable delay occurs even with this system, and the cost-effectiveness has been seriously questioned.⁸ The primary-care physician therefore emerges as being of key importance in the prehospital management of acute myocardial infarction, since he is in the best position to see the patient at the earliest opportunity.

In this study a clinical diagnosis of myocardial infarction was made in a high proportion of patients, and the vital signs of the pulse and blood pressure were regularly available from the referring letter. Nevertheless, the general practitioners seemed reluctant to administer drugs during this prehospital phase. It is impossible to assess whether antiarrhythmic treatment was needed in any patient, and with the lack of electrocardiographic facilities available to the general practitioner the reason why these agents were not given is understandable. None the less the number of patients requiring treatment on admission to the coronary care unit suggested that in at least some, early antiarrhythmic treatment would have been indicated. The relatively low number of patients (12) who were given effective analgesics emphasises the reticence to give drugs during this critical phase. Many general practitioners know that diamorphine is the drug of choice for analgesia, but they may think that earlier, potent treatment is not needed in cities where a rapid ambulance service is available because patients will be properly sedated after they arrive at the coronary care unit.

Current statistics suggest that an average of seven of a general practitioner's patients will have acute myocardial infarction yearly.¹¹ With current emergency treatment services, he may see only half of this number. In view of this relatively small number and the continuing high mortality from acute myocardial infarction, it is worth considering whether the facilities available

to the general practitioner for dealing with this problem should be improved. The availability of an electrocardiograph would be an undoubted advantage, not only because of its diagnostic help in acute myocardial infarction but also because it can detect dysrhythmias and thus give the general practitioner the confidence to institute treatment on the spot. Lignocaine and atropine would probably suffice as the necessary antiarrhythmic drugs to be carried. As suggested by Colling,¹² it might also be worth remaining with the patient until the ambulance arrives and even accompanying the patient to hospital. This may not be practicable in the confines of the present system, for the general practitioner may have several other urgent calls, but some form of back-up on-call system to cover the relatively infrequent event of acute myocardial infarction might solve the problem. In this study 19% of the doctors awaited the arrival of the ambulance and none travelled with the patient. Five patients were allowed to make their own way to hospital.

Recently awareness of the importance of the primary-care physician in the management of acute myocardial infarction has grown. The initial decision concerns place of treatment, and guidelines have been drawn up to show whether home or hospital treatment is better for individual patients.¹³ When the decision is made to transfer to hospital then several factors must be considered. Relief of pain and control of dysrhythmias are of paramount importance, and particularly if the patient is seen in the first two hours after onset of symptoms then the general practitioner should remain until ancillary services arrive.¹²

Our findings suggest that deficiencies exist at present in the prehospital phase of management of acute myocardial infarction, and that education programmes, possibly in the form of local meetings or a national continuing education series (which has already been started), should be considered. It would then be worth assessing, in a similar study to this, the benefit of such educational programmes.

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(Accepted 6 July 1978)

How to do it . . .

Appear on television

KARL SABBAGH

British Medical Journal, 1978, **2**, 1145-1146

In my experience, most doctors fall into one of two groups when asked to appear on television. One group refuses, often through their secretaries, to have anything at all to do with the medium—whatever the topic, and whatever the context. The other group doesn't give a moment's thought before agreeing quite amiably to do whatever the producer wants.

I suggest that neither of these options is particularly good for medicine, or for television. The first attitude deprives us of the services of people who probably do have something to contribute; the second attitude leads either to doctors so hating their experiences on television that they refuse all further requests, or to an unbalanced array of medical practitioners being allowed to ride some rare breeds of hobbyhorse in front of millions of people.

Crucial decisions

What, then, should you, a doctor sought by the media, say and do when that distant voice on the phone from Shepherd's Bush or Euston Road solicits your help? It seems to me that the crucial decision you must make is "is this a man or woman I can trust." When you first make contact don't just rely on what the producer chooses to tell you about the programme, but elicit a few things from him that he doesn't choose to tell you. Who else has he approached? What made him pick this topic in the first place? (He may be speaking from a pile of newspaper cuttings or an article you haven't read in *World Medicine*.) Is it film or studio? Will it be edited afterwards? Will you be told how much of your contribution is finally used? Will any independent medical adviser see the programme before it goes out? And so on.

If you agree to take part on this basis, the next stage is enshrining on tape or celluloid your ideas and opinions about the topic in hand. If you are to be filmed, then this is likely to occur in your office or home rather than in a studio. Here, there are two things to remember. Whatever estimate the producer gives of the time the filming will take, never estimate in your own mind less than a day. Whatever estimate the producer gives of the actual screen time to emerge from that day's filming, never estimate in your own mind more than three minutes. (It may

BBC TV, Kensington House, Richmond Way, London W14 OAX
KARL SABBAGH, MA, executive producer, science and features department