Effectiveness of the call-out system for a London Coronary Ambulance Service

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SUMMARY

St Bartholomew's Hospital, in the City of London, has for many years run a Coronary Ambulance service, called by the public via the 999 system.

During a 9-month period only 55% of 214 cardiac emergencies arriving at St Bartholomew's Hospital came with Coronary Ambulance support, although the service was available if called. In cases where the Coronary Ambulance was summoned, the call-out was inappropriate in 57% of cases. In addition, 153 cardiac emergencies arrived at the Accident and Emergency Department during hours when the Coronary Ambulance was not available.

Reasons for breakdowns in the call-out system are discussed and remedies involving the public and London Ambulance Control are suggested.

INTRODUCTION

In the UK there is no nationally organized system for provision of resuscitation for out-of-hospital cardiac arrest. Certain areas have organized their own systems and between these areas there are differences in call-out procedure, personnel and vehicles.

Resuscitation from out-of-hospital cardiac arrest, as well as the rapid management of patients with acute myocardial infarctions or dysrhythmias, depends on a 'rescue chain'. The chain is only as effective as its weakest link. We have investigated one link, namely the call-out system, for the Coronary Ambulance based at St Bartholomew's Hospital.

St Bartholomew's Hospital serves a largely commuter population in the City of London and for this and other administrative reasons the Coronary Ambulance is available from 9am to 5pm on week days only ('office hours'). It is funded by charitable donations, staffed by volunteers from the hospital and transports a doctor, nurse or

operating department assistant and a medical student to the scene of a patient suffering with chest pain or reported collapse. The Coronary Ambulance is alerted from London Ambulance Control, when the controller deems it necessary, following a 999 call from a member of the public. It meets an ordinary London Ambulance at the scene. The London Ambulance transports the patient to St Bartholomew's Hospital, accompanied by the medical team if necessary.

We report the effectiveness of the call-out system for the Coronary Ambulance based at St Bartholomew's Hospital, with particular reference to cases that were *not* brought in by the Coronary Ambulance but should have been and cases that involved the Coronary Ambulance inappropriately. We also report the numbers of patients who would be suitable for a Coronary Ambulance service 'out of hours'.

PATIENTS AND METHODS

The Coronary Ambulance service should be used to transport patients suffering from acute myocardial infarctions and other cardiac emergencies to the Coronary Care Unit (CCU), as well as attempting to resuscitate those suffering full cardiopulmonary arrest. These ischaemic heart disease (IHD) patients include those with a final diagnosis or post-mortem report of myocardial infarction, angina or cardiac dysrhythmia. The Coronary Ambulance is available for 40 out of the total of 168 hours every week. Initial complaints of IHD patients include chest pain, suspicion of heart attack, collapse, or full cardiorespiratory arrest.

To investigate the call-out effectiveness of the Coronary Ambulance the number of IHD patients arriving in office hours with and without Coronary Ambulance support was calculated. The number of non-IHD patients who used the Coronary Ambulance inappropriately was also determined. The number of IHD patients who arrived in the Accident and Emergency Department out of office hours was also recorded.

Coronary Ambulance call outs for the 9-month period between December 1986–August 1987 were analysed retrospectively to determine the ratio of IHD:non-IHD calls. This information was collected from the Coronary Ambulance and patient records.

IHD cases arriving by London Ambulance alone at times when Coronary Ambulance support was available, in the same period were also recorded, using case details from the Accident and Emergency Department Resuscitation Room Register.

Other IHD cases that walked in, arrived by car or whose mode of arrival was uncertain were excluded as it was assumed there was no chance to involve Ambulance Control.

Those cases adjudged IHD patients who arrived out-of-hours were also recorded.

RESULTS

Figure 1 shows what happened to 214 IHD patients arriving at St Bartholomew's

Hospital during office hours, as well as the final diagnosis of the 159 cases brought via the Coronary Ambulance; 68 of the 159 (43%) were finally diagnosed as having IHD and 91 (57%) were shown to be inappropriate. However, of the inappropriate cases 21 were at some stage complaining of chest pain and therefore *were* justified in calling the Coronary Ambulance.

Fifty-five suspected or proven IHD admissions came in without Coronary Ambulance support because it was *not* called; quite apart from those who made their own way to the hospital, did not ring 999 and, therefore, involved neither the London or Coronary Ambulance services. Of 123 IHD patients only 68 (55%) involved the Coronary Ambulance, although it was available.

One hundred and fifty-three IHD cases were admitted via the Accident and Emergency Department *out-of-hours* when the Coronary Ambulance was not available, that is of a total of 276 IHD cases, in *all* hours, only 25% used the Coronary Ambulance.

Figure 2 shows that of the 55 IHD patients arriving in office hours via the London Ambulance Service, *without* coronary Ambulance support, 15 died in the Accident and Emergency Department. Of the 36 patients admitted, 26 went to the Coronary Care Unit.

* Of the 17 cases, three were subsequently known from post-mortem to have had a non-cardiac cause of death

** Five calls to a local hospital, without a Coronary Care Unit, 'call-out' was appropriate and due to ischaemic heart disease

Fig. 1. Total number of cases arriving at St Bartholomew's Hospital, in office hours, with initial diagnosis of IHD. (December 1986–August 1987).

Fig. 2. 'In hours' IHD cases where the coronary ambulance was not involved. (December 1986–August 1987).

DISCUSSION

Those suffering acute myocardial infarction (MI) are at greatest risk of ventricular fibrillation during the first 2 hours, usually when they are at home, at work or on the way to hospital. Patients suffering an acute MI, and especially those already in ventricular fibrillation, will have a greater chance of survival if a Coronary Ambulance is involved in their early management (Briggs *et al.*, 1976). Survival from a life-threatening cardiac event depends on a tiered response, beginning with a 'bystander' recognizing the problem (and performing basic life support if necessary), a Coronary Ambulance offering advanced life support (particularly early defibrillation if required) and the Accident and Emergency Department and CCU continuing medical care (Eisenberg *et al.*, 1979). If this 'chain' has a weak or absent link survival from ventricular fibrillation, which can be as high as 43%, plummets (Thompson *et al.*, 1979).

This study investigated the first links of the chain—the call-out system.

The results of the study show that the Bart's Coronary Ambulance is only attending 55% of IHD cases presenting in office hours (and 25% in all hours). Given that the Coronary Ambulance always attends when called this suggests that the call-out system

is failing. This could be at the first or second link of the chain—either the public, when calling 999, are not suggesting that the victim is suffering an acute MI or cardiac arrest, or the London Ambulance Control despatcher is misinterpreting the public's information and not calling the Coronary Ambulance when indicated.

When comparing the Bart's call-out system to that of other Coronary Ambulances one particular difference is apparent. In Belfast (Pantridge & Geddes, 1967), Dundee (Callan & Irving, 1986), Dublin (Gearty *et al.*, 1971) and Brighton (Briggs *et al.*, 1976) calls are often initiated by the GP, which may lead to a higher percentage of 'appropriate' calls. In a commuter population, such as the City of London, the victim's GP is clearly not often involved in the calling of the emergency services to a possible cardiac problem. Therefore, perhaps other health workers in the City, particularly Occupational Health nurses, should be well-informed and have direct access to the Coronary Ambulance system.

However, many small companies will not have an Occupational Health nurse, and MIs and cardiac arrests do not always occur on the office premises. It has been shown (Cameron *et al.*, 1975) that the quality of information given by the lay public when calling 999 is often very poor—in 15% of cases no information was given at all—and identification of patients suffering cardiac events is difficult. Therefore, particularly in a community where the public, rather than GPs, are likely to be the callers, it is essential that the layman knows how to respond. The public must be trained in the early recognition of an acute MI, appreciate the importance of the early involvement of the emergency services and know how to call them plus, if necessary, be able to perform basic life support. Such training has been offered to the City of London community since 1986 and 10,000 people have now attended a 2-hour course, although the effects of such education on early admission of patients to hospital is hard to quantify (Skinner, 1987). City workers attending for training are also told of the Coronary Ambulance service and it is suggested that they specifically request its attendance when speaking to Ambulance Control. Such training of the lay public should also serve, as their numbers increase, to reduce the percentage of 'inappropriate' calls.

The second link in the chain is the London Ambulance Control Centre itself. Forty-five percent (55 out of 123) of IHD cases, in office hours, did not involve the coronary Ambulance because it was not called. Despatchers, like those in Seattle, should have clear protocols for questioning the caller to clarify an otherwise imprecise message (Dispatcher's Medical Desk Reference Manual). If despatchers are themselves members of the lay public, rather than trained ambulance personnel, as is frequently the case in London, they must be taught how to identify a potentially life-threatening situation. These improvements, together with advances in switchboard technology and a formal priority system, should ensure better use of the Coronary Ambulance in future.

Ideally *all* emergency ambulances should carry a defibrillator and suitably trained crew (Rowley *et al.*, 1985), especially given that 153 IHD cases arrived 'out of hours'. Already many London ambulances are thus equipped and the spread of defibrillators to all vehicles as soon as possible must be encouraged. However, even thus equipped, an effective call out system is still essential to prioritize calls and to ensure that the equipment is taken from the ambulance to the victim in cases where it is likely to be needed. It is hoped that other similar schemes may benefit from the lessons we have learnt through investigating the call-out system in the City of London.

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