Call selection for the Helicopter Emergency Medical Service: implications for ambulance control

T J Coats FRCS **A Newton** BSc *Helicopter Emergency Medical Service, The Royal London Hospital, Whitechapel, London, UK*

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Summary

The increasing sophistication of pre-hospital care, with paramedics and many types of 'rapid response' units, requires the use of advanced systems of ambulance control. The introduction of call selection by a paramedic in the ambulance control room significantly improved the tasking of the Helicopter Emergency Medical Service. This paper illustrates the need for a system to grade 999 calls, so that the appropriate pre-hospital response can be directed to each patient.

Introduction

The recent development of advanced training for ambulance personnel has led to profound changes in the delivery of pre-hospital care. The number of options available as a response to an emergency (999) call has increased, and may now include basic life support ambulances, paramedic staffed advanced life support ambulances, and a variety of 'rapid response' units such as fast cars, motorbikes and helicopters. In many parts of Britain, the physical resources for advanced pre-hospital care have developed faster than the dispatch and control systems. The increase in the range of resources available has led to the need for a control system with an ability to match the correct response to each emergency call[1]. Only 10% of all urban emergency calls require advanced treatment (paramedic or medical response)[2], 40% require first aid only (basic life support response), and as many as 50% are not true emergencies[3,4] and require no active treatment. Few '999' calls therefore require the advanced skills of the paramedic. A system to match the best trained personnel to the most serious cases is essential.

There has been little medical involvement in ambulance control and command systems and no British references to this subject in the *Index Medicus*. This contrasts with America and many European countries where hands-on medical involvement in ambulance control is mandatory[5-8]. Even in the most advanced systems, ambulance dispatch has been called the weakest link in the chain of response[9,10].

The operation of the Helicopter Emergency Medical Service (HEMS) in the Greater London Area has emphasized the importance of appropriate call selection. As this service is targeted specifically at major trauma, the two or three incidents (0.002%) that result in serious injury have to be filtered from the average of 1350 '999' calls received each day by the London Ambulance Service during helicopter operating hours.

During the first year of operation of the HEMS the aircraft was only dispatched if senior control officers working in the London Ambulance Service (LAS) control room felt that medical support was needed for an incident within their sector of London. In January 1991 this system was changed with the creation of a 'HEMS desk' within the LAS control room (now renamed the Special Incident Desk). This is staffed by one of the paramedics who were attached to the HEMS system. All 999 calls are reviewed as they pass through the ambulance control system and those that seem likely to result in severe injury are picked out.

The mechanism of injury is a sensitive but non-specific indicator of serious injury[11] so the 999 caller is rung back, reassured that an ambulance is on its way and asked for more details of the patient's condition. This 'interrogation' is a demanding skill that takes time to learn[12]. The following factors affect the dispatch of HEMS: the mechanism of the injury; the number of 999 calls received; the quality of the information obtained from the caller; the location of the incident; the patient's state of consciousness; the patient's respiratory condition; the anatomical site of the injury. The telephone becomes a triage tool[13], and the paramedic can then make an informed decision to use the helicopter. The 'HEMS desk' acts as a 'final common pathway' for requests for assistance from other ambulance services in the South-East, although this facility is rarely used[14].

A retrospective analysis was performed to assess the activity of the helicopter service under the two control systems.

Method

The activation of the helicopter service during 1990 and 1991 has been examined. The total number of missions during each of these periods was divided into three groups: those in which a patient was examined, treated and found to be injured severely enough to be escorted to hospital (by air or land) by the HEMS Registrar (patient escorted); those in which a patient was examined and treated but sent to hospital without medical escort (ground assists); and those in which a patient was not treated (not required).

No analysis of false negative decisions in ambulance control (incidents resulting in serious injury for which HEMS was not activated) could be made, as many hospitals within London do not collect trauma audit data.

Correspondence to: Mr T J Coats FRCS, A & E Department, Leeds General Infirmary, Great George Street, Leeds, West Yorkshire LS1 3EX, UK

Table 1. Helicopter Emergency Medical Services missions during 1990/1991

Year	Patient escort	Ground assist	Not required	Total
1990	110	152	774	1036
1991	401	230	623	1254

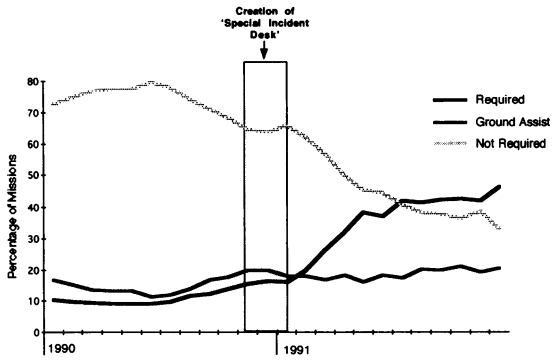

Figure 1. Three month sliding averages for percentage of Helicopter Emergency Medical Services missions in each category

Results

The proportion of HEMS missions in each category during 1990 and 1991 are shown in Table 1. In 1990 there were a total of 1036 missions flown, 110 of these were 'patient escorted', 152 were 'ground assists' and 774 were 'not required'. In 1991 there were a total of 1254 missions flown, 401 of these were 'patient escorted', 230 were 'ground assists', and 623 were 'not required'. Figure 1 shows the proportion of missions in each category as sliding averages over 3 month periods, with a lag phase followed by an increase in accuracy of tasking after introduction of the Special Incident Desk.

Discussion

Helicopter medical operations are expensive and have a small but well recognized element of risk[15]. This imposes an obligation to keep the number of inappropriate missions to a minimum. Unnecessary use of a helicopter is expensive, may disrupt air traffic, may cause congestion of road traffic, and increase the risks involved. Proper selection of incidents that require the advanced skills of the HEMS is therefore vital. These results show that when a paramedic familiar with the operation of the system 'interrogates' the caller to determine the patient's clinical condition, the need for the use of a helicopter is assessed more accurately.

Little or no interrogation of 999 callers for medical details has been previously attempted, information being limited to the location and type of incident with the nature of the patients condition noted only in lay terms (eg 'collapse' or 'difficulty in breathing'). This information is not sufficient to determine precisely which ambulance asset (basic unit, paramedic unit or medical unit) should be dispatched. The same priority is given to a twisted ankle as to a heart attack, and the level of skill allocated to an incident is only determined by who happens to be nearest. It has been recognized by the Department of Health that 'The Ambulance service is responsible for deciding the form of transport most suitable for each patient's needs'[16]. The same philosophy should be applied to the medical skills deployed.

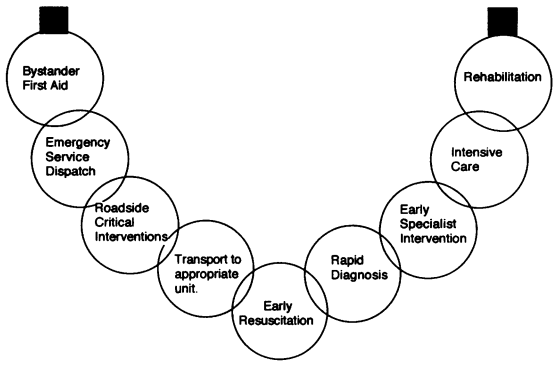

Figure 2. The trauma chain

It is current policy of the Department of Health to have a 'paramedic' on every ambulance by 1996[17]. It could be argued that this will give a single level of response rendering call selection unnecessary. However, as individual performance deteriorates over time, the retention of these complex skills is likely to be poor, especially as there would be few opportunities for any individual to practice them[18,19]. Retraining to maintain skills at a high level for this number of 'paramedics' would be prohibitively expensive, and so 'rapid response' units of personnel with higher levels of training are likely to continue. It is essential that ambulance services are medically audited to discover which skills have been used and, therefore, what re-training is necessary.

Retention of skills in trauma management is a particular problem as these patients are so uncommon in Britain compared with cardiac emergencies (for which there is clear evidence of the benefit of paramedic treatment). The increasing use of doctors in pre-hospital care also requires careful call screening. A system for the selection of appropriate emergency calls for advanced trained personnel will therefore remain a necessity.

American trauma systems have the greatest experience of telephone triage in determining ambulance response[20,21]. The best methods are based on the medical priority of a patient. They use predetermined dispatch profiles which take only 30 s to allocate the priority and resources as determined by the patient's clinical condition. Standard pre-arrival instructions can be attached to each response, requiring little medical training for control room personnel and giving medical aid in 'zero minutes'[22,23]. Even the best American methods of sorting can still allocate the highest level of priority for up to 40% of emergency calls[24,25]. If this were applied to the London area the selection would not be fine enough for the HEMS operation where only 0.002% of calls need to be selected. It is difficult to envisage a system with the required specificity that does not involve skilled 'human' decision making.

Some regard the presence of an experienced paramedic in the control room as a waste of resources. Our results refute this suggestion and coincide with the French and German experience, where medical participation in ambulance control is regarded as important enough to have a doctor permanently based in the control centre[26,27].

Each link in the chain of events that make up the medical response to the trauma victim must be integrated to form a seamless continuum of care

(Figure 2). Improvement in one area (ambulance training) may necessitate changes in other areas (ambulance control and medical involvement in pre-hospital care).

Conclusion

The control of advanced treatment units by ambulance personnel without the use of medical criteria will lead to a high level of inappropriate tasking. Current ambulance control systems are not refined enough to be used to select the correct calls for either paramedic 'rapid response' units or medical units. Call selection can increase the specificity of tasking. Adding a helicopter operation to the normal ambulance control structure leads to suboptimal utilization. However, telephone triage by an experienced paramedic enables the appropriate utilization of a helicopter to be significantly improved. All links in the chain of treatment must function effectively for a patient to receive the best treatment, advanced dispatch and control systems being needed for the effective use of advanced ambulance resources.

The experience of the HEMS using two different control systems illustrates the principle that sophisticated pre-hospital treatment requires sophisticated call selection, dispatch and control by committed, well-trained staff using medical criteria. This principle is equally applicable to paramedic 'rapid response' units and ground based medical units.

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