

MEDICAL PRACTICE

Contemporary Themes

Simple training programme for ambulance personnel in the management of cardiac arrest in the community

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Abstract

The extended training for ambulance personnel in Nottinghamshire includes a period of training in cardiac resuscitation by defibrillation, and defibrillators are now part of the standard equipment of vehicles used on the accident and emergency service. Comparison of recent results with previous attempts in the City of Nottingham to provide a service for out of hospital cardiac arrest has shown that an elementary training course and the provision of defibrillators on emergency vehicles enables the ambulance service to save the lives of a reasonable proportion of those who suffer sudden death in the community. The extended training programme as a whole has proved acceptable to ambulance personnel and we believe that this programme could be the basis for a more widespread introduction of post basic training.

Introduction

Despite pioneering efforts in Belfast and Brighton,^{1,2} the United Kingdom has lagged behind some cities in the United States of

America^{3,5} and continental Europe⁶⁻⁸ in providing emergency services equipped to manage patients who suffer a cardiac arrest outside hospital. In 1975 the Royal College of Physicians and the British Cardiac Society recommended that mobile coronary care units should be established in large cities,⁹ but in 1976 the Department of Health and Social Security advised health authorities that advanced training of ambulance personnel should be deferred.¹⁰

In Nottingham a mobile coronary care unit was introduced on an experimental basis in 1973. A series of studies followed, including a randomised trial, which showed that a single specially equipped vehicle was unlikely to be effective. The service was discontinued in 1976.¹¹⁻¹³ We concluded that the way forward lay not in providing mobile coronary care units but in making a defibrillator part of the standard equipment of ambulances carrying emergency patients, and in training all emergency crews in their use.

Between 1976 and 1983 a programme of extended training for ambulance personnel was discussed between the health authorities, the ambulance unions, and the department of medicine in Nottingham University. The training scheme eventually selected preceded but turned out to be similar to that recommended by the national staff committee and accepted by the DHSS in 1984.¹⁴

The ambulance service for the whole of Nottinghamshire, which includes three district health authorities, is organised as a single system with a central control room in Nottingham. Setting up a special service for managing patients with cardiac arrest outside hospital became a practical possibility in 1980, when the routine functions of the county service were computerised. All bookings of ambulance journeys are made 24 hours in advance, so that the day's work of each ambulance on non-emergency duties can be planned in the most efficient way. Of the 396 142 ambulance journeys made in 1981, 352 096 were organised in this way leaving 44 046 journeys that resulted from urgent calls. The key to the introduction of a resuscitation service was that the vehicles whose duties were not organised by computer could be considered "emergency" ambulances and the crews manning them could be considered "emergency crews."

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Method

TRAINING PROGRAMME

It became clear at an early stage of the discussions that extended training was more acceptable than advanced training. The ambulance service wished to improve all aspects of personnel training and not simply to provide a means of resuscitating patients with cardiac arrest. Cardiac resuscitation therefore became a course within a package of extended training options that would be available to ambulance personnel.

Selection of personnel started in January 1983. Ambulance personnel with a minimum of two years' service in the accident and emergency service were invited to apply for further training in rescue techniques, accident and emergency services, community care, and cardiac resuscitation. Selection of personnel was made after interviews with senior ambulance officers and the training courses developed after discussion with the appropriate departments at the City, University, and Mapperley hospitals in Nottingham.

We are mainly concerned with the results of the cardiac resuscitation course, but other courses have been incorporated into the extended training package.

Accident and emergency—This course is designed to raise the level of knowledge of ambulance personnel engaged in accident and emergency work. The course lasts for 80 hours and the student spends time in all the areas of the accident and emergency department. Six seminars are given by senior medical and nursing staff. So far 24 students have participated in this course.

Community care—Most patients carried by the ambulance service are not emergencies but many of these patients have special needs. In the two week course the students spend time in the departments of psychiatry, physiotherapy, occupational therapy, health care of the elderly, and in the young chronic sick unit. In addition they are introduced to the complexities of booking patient journeys and radio control of vehicle movements. Twenty four students have successfully completed this course.

Rescue—This course is run in conjunction with the Nottinghamshire fire service and is designed to give a greater appreciation of the techniques and dangers of extricating trapped patients. The four day course is practically based and covers a variety of simulated rescues. Forty eight people have undertaken this course.

Cardiac resuscitation—This course lasts three weeks (96 hours). Two ambulance personnel are seconded to the coronary care unit at the University Hospital and attend lectures on the clinical problems of cardiac arrest, myocardial infarction, recognition of arrhythmias, and management of ventricular fibrillation by cardioversion. Practical sessions in the management of simulated cardiac emergencies are supervised by nursing staff from the coronary care unit, ambulance training personnel, and medical staff from the department of medicine. During their stay they are encouraged to help the nursing staff with their activities, observe practical procedures, and talk to the patients to broaden their knowledge of the background to the common cardiac emergencies. At the end of the course the students are examined by a consultant physician, the sister in charge of the coronary care unit, and an ambulance training officer with a viva voce and with simulated arrhythmias in a mannikin. Examination success at the end of the course is followed by a practical session in a moving ambulance.

Successful personnel are permitted to use defibrillators that have been based at each ambulance station in Nottinghamshire. Each qualified ambulance person is expected to undergo an annual reassessment of their competence in the use of the defibrillator and their adherence to the simple protocol developed for the management of ventricular fibrillation or other forms of cardiac arrest.

The protocol that the ambulance personnel are trained to follow does not include the administration of drugs or the use of endotracheal intubation. Personnel are allowed to administer a maximum of four shocks from the defibrillator for any single episode of ventricular fibrillation. If cardioversion is unsuccessful cardiopulmonary resuscitation is maintained en route to hospital.

On every occasion that trained personnel use a defibrillator, either as a monitor or for resuscitation, a form is completed for the department of medicine where the assessment of the cardiac rhythm and the use of the defibrillator is monitored.

ESTIMATES OF THE NUMBER OF TRAINED PERSONNEL AND DEFIBRILLATORS REQUIRED

Forty three of the 125 vehicles in the Nottinghamshire ambulance service are equipped to deal with any potential emergency. The number of these vehicles, which are available for emergency duty, varies with the time of the day and the day of the week. The maximum number of vehicles that may be in use simultaneously reaches 28 and this is therefore the number of defibrillators required to cover all emergency shifts. Two hundred and forty

five personnel are trained for accident and emergency work. If the most efficient use is made of personnel who have undertaken the cardiac resuscitation course at least 123 require to be trained to provide maximum cover of the accident and emergency shifts in the county.

MODIFICATION OF VEHICLES

Since our emergency vehicles are identified by the work they are performing rather than by their special design it was important that any modifications needed for carrying defibrillators should be simple and cheap. The Simonson and Weel DMS 600 defibrillator, already standard equipment in Queen's Medical Centre, was selected for the ambulance service. This equipment had been shown to be robust in use, and unifying equipment in the ambulance service and in hospitals simplified both training and servicing. In each ambulance station the defibrillators are stored in their charging brackets. When trained personnel report for an accident and emergency shift they simply transfer the defibrillator to their ambulance. The only modification needed in the vehicle is a single charging bracket, wired into the vehicle's electrical circuit.

Funds for the purchase of the defibrillators were provided partly by the district health authority and partly by local subscription, but were mainly generously provided by the British Heart Foundation.

Results

CREW RECRUITMENT AND TRAINING

Training began in June 1983 and by the end of February 1985 25 individuals had been selected for the 96 hour course; 16 individuals who had attended an earlier course organised with the Association of Emergency Medical Technicians were selected for a somewhat shortened course. Three individuals failed to satisfy the examiners at their first attempt. One has been successful at re-examination and the remaining two await reassessment. A total of 39 ambulance personnel (16% of the 245 trained for accident and emergency work) have been cleared to use a defibrillator. Although use of the defibrillator is a relatively unusual event for any single individual, there have been no problems at their annual reassessment.

DISTRIBUTION OF TRAINED PERSONNEL AND DEFIBRILLATORS

A single defibrillator is now available at each of the ambulance stations in Nottinghamshire. A survey of the availability of personnel and defibrillators was undertaken in August 1984, when only 30 individuals had completed training. A total of 1607 vehicle shifts were scheduled for those stations equipped with a defibrillator at that time and 317 (19.7%) of these were covered by the combination of a trained individual and a defibrillator. Forty two additional shifts were worked by a trained individual but the single defibrillator available at the station was already in use by other personnel from the same station.

CLINICAL RESULTS

During the first 20 months of the new service defibrillation has been attempted in 72 patients who developed ventricular fibrillation in the community. Twenty (27.7%) of these patients survived to be admitted to hospital and 13 were discharged home. None of these ultimate survivors had any new neurological deficit.

As would be expected defibrillation was more successful if ventricular fibrillation occurred while the patient was actually being transported to hospital. Eight of the 72 attempts at defibrillation were made at such a time and seven of the 13 eventual survivors came from this group.

Among the 52 patients in whom defibrillation was unsuccessful the fibrillation was often low amplitude, and successful defibrillation would not have been expected.

On 44 occasions cardiopulmonary resuscitation was undertaken by ambulance personnel for apparent cardiac arrest in association with a rhythm other than ventricular fibrillation, predominantly asystole. Seven (15.9%) of these patients were admitted to hospital and four (9.1%) were subsequently discharged.

Of the 64 patients who were already in ventricular fibrillation when the ambulance arrived, 29 (45.3%) were being given cardiopulmonary resuscitation by bystanders. Fourteen of the bystanders could be considered to be experienced in the technique (general practitioners, nurses, medical students, police, and off duty ambulance personnel).

The mean duration of collapse before defibrillation, where this could be established by the ambulance crew, was 9.8 mins (SD 8.2). For patients who were in asystole or another rhythm causing arrest the mean duration of collapse was 14.7 mins (SD 7.1).

The defibrillator was used simply as a monitor in 829 patients. Among the first 500 monitored patients there were a total of 108 tachyarrhythmias or bradyarrhythmias. The ambulance personnel correctly identified 70 (64.8%) of these.

Deviation from the protocol for defibrillation occurred on only two occasions. A patient developed ventricular fibrillation in the ambulance while in the hospital grounds a short distance from the accident and emergency department. Instead of stopping the ambulance to perform defibrillation, the crew elected to perform cardiopulmonary resuscitation until arriving at the department. The second occasion concerned the administration of a greater number of shocks than prescribed by the protocol, but this was under the supervision of a general practitioner after cardiac arrest had occurred in his surgery.

Discussion

Our new service for out of hospital cardiac arrest differs considerably from various schemes that have been reported in both the United States and the United Kingdom. The system designed by Cobb for the city of Seattle provides a tiered response in which appropriate units are dispatched to an incident according to medical considerations and the site of the incident.³ The Seattle paramedical staff are trained to a level comparable to that of a doctor; they are trained in intubation, defibrillation, and drug administration. The Seattle system is undoubtedly the most effective of all in treating individuals with cardiac arrest out of hospital but it requires detailed and lengthy training of the paramedical staff. It is not certain whether the aspects of their activities additional to defibrillation are valuable, particularly in an urban environment where journey times to the nearest emergency department are short.

Our scheme bears more resemblance to that described by Eisenberg *et al* for King County, Washington,¹⁵ and Stults *et al* for rural Ohio.¹⁶ Ambulance technicians in both these areas undergo a basic training of 10 and 16 hours respectively before they are allowed to use a defibrillator, and both of these schemes have been shown to be effective. Chamberlain in Brighton recognised that the medical personnel are not necessary to deliver acute coronary care to patients with both acute myocardial infarction and primary cardiac arrest.² The system originally developed for Brighton had two specially equipped ambulances manned by trained crews who acted independently of medical advice after a six months' training period.

Our previous experience in Nottingham showed that considerable difficulty was experienced by our dispatchers in identifying the cases for whom a specialised cardiac vehicle was appropriate; our cardiac ambulance was more frequently sent to low risk cases identified by general practitioners and the routine vehicles sent to cases of primary cardiac arrest. It seemed clear that an impact could only be made on the problem when defibrillators could be made available on any ambulance called to an emergency. The training required to enable ambulance personnel to use defibrillators had to be short, and therefore other aspects of advanced training such as intubation and drug administration were not contemplated.

The provision of defibrillators in other ambulance services in England has been a haphazard affair and there is not yet a unified training scheme.¹⁷ Those that are in existence depend on the interests and enthusiasm of local physicians and anaesthetists. Various schemes incorporate the administration of drugs, intravenous infusion, and intubation in the extended training of ambulance personnel, although it is difficult to evaluate the benefits of these techniques out of hospital. Adequate airway control and ventilation by face mask may be all that is necessary in most cases of respiratory distress, and there is a real fear that the use of additional techniques may delay the transport of patients to hospital.¹⁸

Our initial results are encouraging, but have to be viewed with the knowledge that we have an evolving process of training, and during the next two years there will be a steadily increased availability of trained personnel and defibrillators. Any further improvement in patient outcome will then depend on an increased public awareness of the need to call for help quickly, and of the techniques of

cardiopulmonary resuscitation. The existence of our new service may well be changing public behaviour patterns and we have been monitoring these since 1982 with a heart attack register. We plan to mount a widespread programme of public education, and this coupled with our new ambulance service should give the best possible results for a reasonable investment of time and money.

Our programme of extended training has been enthusiastically received by the ambulance crews and its cost has been minimal. We believe that our scheme could easily be established by other ambulance services in the United Kingdom.

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Does stilboestrol still have a place in the treatment of carcinoma of the prostate?

There has been a considerable change in emphasis in the hormonal treatment of prostatic cancer, in particular in the use of stilboestrol. The publication of the Veterans Administration Co-operative Urological Research Group multicentre trial results¹ clearly showed that, although fewer patients with advanced prostatic cancer receiving stilboestrol died as a result of the disease when compared with the group treated with a placebo, this benefit was cancelled by the number receiving stilboestrol who died from cardiovascular disease. The risks of oestrogen treatment are much greater in those patients with pre-existing cardiovascular problems and are dose related. The trend, therefore, has been to reduce the dose of stilboestrol from 5 mg to 1 mg thrice daily or offer orchidectomy as an alternative. The lower dose of stilboestrol is sufficient to suppress plasma testosterone to the same low level as was achieved by the high dose regimens formerly advocated. The risks of cardiovascular complications, however, in elderly men are still of concern even with 1 mg stilboestrol thrice daily. With the advent of potent progestogens, antiandrogens, and, more recently, luteinising hormone releasing hormone analogues, the role of these agents in the management of prostatic cancer are being evaluated. The most popular alternative to stilboestrol is cyproterone acetate, 100 mg thrice daily, which is at least as effective as orchidectomy or stilboestrol in the primary treatment of advanced prostatic malignancy, without the oestrogenic side effects of the latter.²—J C GINGELL, consultant urologist and lecturer in urology, Bristol.

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