

and termination of infected pregnancies are still essential factors in preventing congenital rubella syndrome. In asymptomatic cases with no known contact, however, an affected baby may be the first sign.

The policy of selective vaccination in Britain has aimed at increasing immunity in the childbearing population rather than reducing the overall incidence of rubella. In the Manchester area a high degree of immunity has now been achieved through levels of school and postpartum vaccination approaching those recommended. Preliminary results from other laboratories participating in the study show immunity in excess of 97% in populations of pregnant women elsewhere in the country. Selective vaccination has had considerable effect, but it is clear that 1-2% of women will inevitably remain susceptible, either because they miss or refuse vaccination or because they fail to respond to vaccine. Our findings show the consequences of allowing wild rubella virus to circulate while even this small proportion of pregnant women remains susceptible.

Although this report relates to one area only, the implications are that even when the present policy is well implemented congenital rubella syndrome will not be eliminated and infection in pregnancy will continue at an unacceptable level. Vaccination of the target population should undoubtedly continue, but we believe that the policy should be supplemented by mass vaccination of infants and preschool children of both sexes to reduce circulation of the virus and thereby the risk of contact in pregnancy. The immediate and long term effects would depend both on the quality and duration of vaccine induced immunity and on the acceptance of vaccine in infancy and childhood. Discussion of these topics is outside the scope of this paper and will be presented elsewhere. If, however, the proposed additions were to be adopted the monitoring system

described here would provide the means of assessing the results of the change in policy.

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For Debate . . .

Cardiopulmonary resuscitation—American style

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The Fourth World Congress on Emergency and Disaster Medicine was held recently in Brighton on the eve of a national campaign to train people in communities in cardiopulmonary resuscitation. The Resuscitation Council of the United Kingdom, the British Heart Foundation, and the British Association for Immediate Care sponsor this scheme. People from more than 30 countries attended. These countries use a rich variety of approaches to emergencies that occur out of hospital, yet few have adopted community training schemes for cardiopulmonary resuscitation. At Brighton several concerns were expressed repeatedly. Can people trained in such schemes do harm if they perform resuscitation on people who are not in cardiac arrest? Is vigorous resuscitation harmful to people whose hearts have stopped beating? Can such schemes train people

to an adequate level of skill that will be remembered over time? Does cardiopulmonary resuscitation really save lives?

In our experience community training schemes for cardiopulmonary resuscitation are the essential foundation for improving survival from cardiac arrest that occurs out of hospital. Such schemes were begun over 14 years ago by Cobb and his colleagues in Seattle.^{1,2} By 1985 over 450 000 people had been trained in Seattle and adjoining King County. Guided by this training, people in King County initiate resuscitation for half of all cardiac arrests. We have recorded detailed information on over 3000 patients who had a cardiac arrest in King County, all of whom had cardiopulmonary resuscitation provided by people in the community or emergency medical personnel, or both.³ Can this American experience answer some of the concerns of those who attended the Brighton meeting?

"False positive" issue

Several times at Brighton we heard the comment: "Seattle and King County, Washington, are the best places in the world to have a heart attack but the worst places in the world to have a faint!" Does harm occur when overzealous people administer cardiopulmonary resuscitation to people who are not in complete cardiac arrest—for example, victims of syncope and drug

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or alcohol intoxication and individuals in a postictal state? In nine years no reports of appreciable injury have been brought to our attention. We are aware of one occasion only in which resuscitation was wrongly started on a person who had fainted during a basketball game. No harm occurred. In addition, the United States legal profession maintains what could be termed an energetic surveillance system. To our knowledge there has been no suit filed for harm resulting from unnecessary resuscitation.

Does resuscitation harm people who are in cardiac arrest?

Community training schemes have not been enthusiastically supported in some locations because of a fear that cardiopulmonary resuscitation done by minimally skilled people may cause harm. A potentially lifesaving intervention should never be withheld from a clinically dead person because of fear of causing harm. There are anecdotal reports of people who appropriately received resuscitation for cardiac arrest, were resuscitated, and then died from complications of the resuscitation, such as gastric rupture or exsanguinating liver lacerations. Such events are so rare, however, that 25 years after cardiopulmonary resuscitation was established they are still reported in medical publications.⁴ Studies evaluating this question have all been done at necropsy, and are intrinsically flawed by an inability to determine who caused any observed injuries—the people who tried to perform resuscitation or the emergency or medical personnel who arrived soon after.^{5,7}

Are such events frequent enough to justify failure to start community training schemes? There is obviously an association between cardiopulmonary resuscitation and death, particularly prolonged resuscitation, since virtually no one is pronounced dead without some attempt at resuscitation. In King County about half of the people who receive cardiopulmonary resuscitation are never resuscitated and are pronounced dead at the scene. About a quarter of patients in cardiac arrest are resuscitated, only to die later in hospital. We have no evidence, however, that damage from the resuscitation caused any of the deaths, and it is impossible to determine whether the occasional case of rib fracture or liver laceration contributed to a death. The injuries related to resuscitation observed in series of postmortem examinations, if they had occurred in patients who survived resuscitation, might impede ventilation, oxygenation, and circulation, and this would complicate postresuscitation care.^{5,7} No study, however, has reported the prevalence of injuries related to resuscitation in survivors. A detailed survey of 400 survivors of cardiac arrest in King County failed to detect any specific adverse consequences attributable to having received cardiopulmonary resuscitation.⁸ In our experience patients in cardiac arrest who have resuscitation started early by people in the community have a 50% improvement in survival when compared with patients who receive delayed resuscitation from emergency personnel.⁹ This known positive benefit of frequent, early resuscitation far outweighs possible negative consequences.

Can the lay community easily learn resuscitation and retain the skill?

To increase further the percentage of patients in cardiac arrest who receive resuscitation from a bystander a scheme has been developed to guide emergency callers through the basic steps of cardiopulmonary resuscitation when they report a cardiac arrest.¹⁰ The evaluation of this programme indicated that callers can learn enough resuscitation in an average time of four minutes to make an appreciable contribution to survival with few, if any, adverse consequences. A similar scheme of telephone resuscitation is being developed by Dr Peter Baskett in Bristol and by Dr Neville Hart in Rotterdam.

Recently the resuscitation skills of house officers at one of the London teaching hospitals were observed to be of poor calibre.¹¹ This was attributed to the medical schools not placing sufficient emphasis on this subject and not requiring house officers to learn the skills.¹² Nevertheless, the results of several studies have confirmed a paradox: the skills of cardiopulmonary resuscitation can be learnt but they quickly and inevitably decline to where they are unacceptable, depending on the criteria used in evaluation.^{13,14} Recent work by Kaye and Mancini presented at Brighton, however, questions whether retention of classroom skills is related to performance during actual resuscitation attempts or to eventual clinical outcomes. The quality of resuscitation both in our work⁹ and in Cobb's¹ has not appeared to affect patient outcome. Our experience suggests that early initiation of an approximation of standard cardiopulmonary resuscitation, rather than exact counting and sequencing, is the key.

Does resuscitation really save lives?

Over the past decade there has been vigorous research into the physiology of standard cardiopulmonary resuscitation almost entirely in American laboratories.^{15,16} Conventional closed chest resuscitation produces flow rates through the carotid and coronary arteries that are so low (less than 15% of normal) that they challenge the ability of standard cardiopulmonary resuscitation to contribute to human resuscitation. These laboratory data stand in isolated contrast, however, with a wealth of clinical experiences, as well as with many controlled clinical studies, almost all of which observe that conventional resuscitation started early by bystanders appreciably improves survival.^{9,17} A common theme in both the clinical and the field data has been the requirement to start resuscitation soon—within four minutes of the arrest is the most widely quoted period. Communities whose emergency personnel are unable to respond within this four minute limit must adopt community training schemes if many patients in cardiac arrest are to be saved.¹⁸

Limits of effectiveness

The effect of conventional cardiopulmonary resuscitation is to slow the process of dying. It can neither sustain life nor restore a perfusing rhythm. Advanced life support—that is, well trained ambulance personnel—must arrive within minutes of the initiation of resuscitation, or the effectiveness is lost and survival rates become dismally low. Chamberlain, in his landmark work with the Brighton ambulance service,^{19,20} and Pantridge with the Belfast ambulance doctors,²¹ as well as many other researchers,^{1,3,18} have confirmed repeatedly the importance of rapid arrival of advanced life support care. This concept of starting cardiopulmonary resuscitation soon and stopping it quickly has been referred to as a "therapeutic window"²² or a "window of effectiveness."²³ This window is bordered on one side by the need to start soon, within four to six minutes of the arrest, and on the other side by the need to restore a perfusing rhythm within roughly 10-15 minutes by advanced ambulance personnel.

Community resuscitation programmes and improved ambulance services

American communities in which cardiopulmonary resuscitation by bystanders seldom occurs have been disappointed when they upgrade the skills of their emergency personnel—for example, by letting those who respond first operate a defibrillator. The results of studies done in England showed the same disappointing lack of appreciable improvement in survival rates.²³ Such communities are advised not to add advanced skills unless there is frequent citizen cardiopulmonary resuscitation and short ambulance response times.^{1,3,18} Would we advise the opposite? Should communities not start a resuscitation programme if more advanced care from ambulance personnel was not readily available? Chamberlain showed in Brighton that improvements in ambulance services alone can achieve improvements in survival rates from cardiac arrest.^{19,20} To exploit fully the potential of an ambulance service the Brighton health district started a community training scheme in 1978 and reported favourable results.²⁴ In the United States the combination of early resuscitation and rapid arrival of advanced ambulance care produces the best survival rates—a perspective shared in the United Kingdom.²⁵⁻²⁷ Despite a negative review of advanced training for ambulance men in 1976²⁸ the Department of Health and Social Security has recently agreed to support ambulance services in England. The combination of widespread resuscitation by people in the community with improved ambulance services should allow the resuscitation services to produce a positive benefit.²⁹

Discussion

Financial considerations may force a choice between community resuscitation schemes and improving ambulance services. We think that communities should start with the cardiopulmonary resuscitation scheme. Not only are programmes to teach cardiopulmonary resuscitation to large numbers of the community less expensive but other benefits flow from such activity, a point made by Chamberlain and his colleagues.²⁴ Firstly, these schemes increase general awareness of the signs and symptoms of heart attack. Such awareness decreases the time from the onset of symptoms and the patients' presentation to hospital, which has been observed to improve survival in previous studies.³⁰ Secondly, both our data⁹ and

Cobb's^{1,2} suggest that when people witness a cardiac arrest those who have been trained in cardiopulmonary resuscitation are quicker to notify the ambulance service. If most people are trained in giving early resuscitation they must have, and will, we hope, demand, a good telephone dispatching system. Improvements in telephone dispatching should follow the community resuscitation scheme. Thirdly, an often ignored but unequivocal benefit from a community scheme is increased resuscitation of victims of obstructed airways, drownings, and asphyxiations. Since 1961 rescue breathing training has been a compulsory school subject in Norway.³¹ In the first 15 years of this programme over 1000 people were resuscitated by mouth to mouth breathing, and this includes a resuscitation rate of 15% for drowning victims.³² The death of healthy infants, children, and adults by obstructed airways from drownings or by asphyxiation when they may potentially be resuscitated by someone trained in the technique is a tragedy.

Lingering issues remain about community cardiopulmonary resuscitation. Our experience, though extensive, has not answered definitively any of the questions. Harm from either necessary or inappropriate resuscitation occurs, but, in light of the well documented benefits of early resuscitation, at an acceptably low rate. Even though people quickly forget many of the details of their resuscitation training something about early, citizen initiated resuscitation helps to save lives. We caution, however, against overly optimistic expectations for the benefits of this. Unless resuscitation is started within minutes of the collapse and followed closely by advanced cardiac care improvements in survival will be minimal. Nevertheless, we encourage and congratulate those people who train large numbers of people in cardiopulmonary resuscitation. Their efforts will help communities take the first step towards improved survival.

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What treatment is advised for a child who suffers from febrile convulsions? Are anticonvulsants suitable and, if so, which ones?

It is not easy to devise a satisfactory regimen for preventing febrile convulsions. The onset of a fairly mild febrile illness may overtake the child before it is recognised that the temperature is rising and the seizure may have occurred before useful medication has been given. In general, sick children should be kept cool while the source of fever is sought and appropriate treatment given. Some paediatricians recommend the use of rectal diazepam (available in rectal tubes containing 2 or 4 mg/ml and listed in the *British National Formulary* under the proprietary name Stesolid) given in a dose of 0.5 mg/kg. This may be given by a parent at the onset of a febrile illness in a child who is prone to seizures, though the most usual procedure is to administer this drug as soon as a fit is recognised either rectally before medical aid can be obtained or intravenously by the doctor, who must be prepared to deal with any respiratory depression that may result. The decision to try medium term prophylaxis may be appropriate in a child who already has neurodevelopmental delay or who has had several febrile convulsions or when fits have been prolonged. Another indication may be epilepsy in first degree relatives. Evidence that daily phenobarbitone is successful is not strong, but that does not mean that alternative drugs are better. An appropriate dose of phenobarbitone in these circumstances is 3-4 mg/kg/day, though in many instances there will be unwelcome side effects in the form of irritability and overactivity and possibly some learning difficulties. To minimise the chance of side effects an alternative approach is to give 5 mg/kg at night. Sodium valproate (15-30 mg/kg/day) may also be used, although this entails the minimal risk of liver toxicity. Carbamazepine is not thought to be effective.—C B S WOOD, professor of child health, London.

A woman of 90 has been immobilised since fracturing her femur. She is causing problems in the family because her sleep pattern has been disturbed and she is sleeping by day and is awake at night. What advice should be given?

It is not clear from the question whether or not this woman is demented, but there is evidence that some people with dementia suffer a disturbance of their circadian rhythms. This may affect both sleeping and waking and the secretion of urine so that more urine is passed during the night and less in the day, a reversal of the normal pattern.¹ The problem of the old person who sleeps all day and is wakeful all night is all too common. The questioner has evidently tried to organise activities to prevent the patient falling asleep during the day and to encourage more sleep at night. The more that can be done along these lines the better. Why is the patient immobile after her fractured neck of femur? If she has had proper orthopaedic surgery she ought to be able to walk almost as well as before the fracture and should certainly be trying to do so. Can amphetamines help? Amphetamine has been used to encourage rehabilitation among poorly motivated people in a geriatric ward with some success.² Patients vary greatly in their sensitivity to this drug and it is not unreasonable to try a starting dose of 2.5 mg twice daily. Side effects reported have included disturbed behaviour, delusions, vomiting, and constipation. Some patients tolerate doses up to 20 mg daily but not all respond. The nocturnal frequency may respond to oxybutinin 5 mg at bedtime and this would certainly be worth trying.—R E IRVINE, consultant physician, Hastings.

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