Out-of-hospital cardiac arrest

EVERY year in England and Wales over 110,000 people die from ischaemic heart disease (OPCS, 1981). Many of these deaths are unheralded and a little over half take place outside hospital, either suddenly or within an hour or two of the onset of symptoms. Experience in the United States is parallel, with 650,000 deaths from ischaemic heart disease (IHD) every year, of which 350,000 occur before admission to hospital (Kuller *et al.*, 1972). Sudden death from ischaemic heart disease has been described as the most important medical emergency and 'since 60 to 70 per cent of sudden deaths caused by cardiac arrest occur before hospitalization, it is clear that the community deserves to be regarded as the ultimate coronary care unit' (American Heart Association, 1980). How is the community to respond? Four strategies are available:

1. Primary prevention by research, education and intervention in risk factors associated with coronary artery disease—for example, hypertension, obesity and smoking (Oliver, 1982).

2. Secondary prevention by identification of patients at risk either of myocardial infarction or, for those with known ischaemic heart disease, of sudden death; implementation of appropriate preventive measures—for example, anti-arrhythmic or antithrombotic drug therapy (Mitchell, 1982).

3. Education and instruction of the public in the recognition of symptoms related to ischaemic heart disease and in basic cardiopulmonary resuscitation.

4. Provision of mobile expertise, medical or paramedical, for rapid response to cardiovascular collapse—mobile resuscitation units or coronary ambulances.

How well does the community perform in implementation of these strategies? Although we are now aware of some risk factors related to ischaemic heart disease, education and intervention in adverse cases are difficult and uncertainties remain about the value of drug regimes in the post-myocardial infarction case. Nonetheless the primary care physician has a crucial role to play in these preventive measures.

In the education of the public and the provision of mobile resuscitation units, we have little to congratulate ourselves upon. This may relate to a circular published by the Department of Health in 1976 (HN(76)204) which contained the statement, 'No firm evidence has emerged that the use of specially equipped ambulances manned by ambulancemen who have received training in advanced techniques significantly affects the overall mortality rate of patients suffering from acute myocardial infarction', and recommended 'Authorities are advised to defer the introduction of new schemes and the extension of existing advanced training schemes for ambulancemen.' Since this notice was circulated, no further directives have been forthcoming from the DHSS. One effect of this inertia has been the growth of the Association of Emergency Medical Technicians, which has more than 700 ambulance service members.

At present there are only nine resuscitation ambulance schemes in five out of the 11 health regions in England (Jones, 1982). The approach of these schemes is heterogeneous; in York, for example, the ambulance crews are trained to defibrillate but have no further training in infusion and intubation. In Brighton, by contrast, the ambulancemen are highly trained in interpretation of electrocardiograms and are allowed to administer a variety of drugs intravenously; although they are a coronary élite they also respond to other emergencies. For ambulance crews in Avon and in the Gloucester area of the South-Western Region there is comprehensive advanced training in intubation, infusion and defibrillation techniques, and this service is highly developed in the Oxford region. In Nottingham, where the coronary ambulance scheme is being redesigned, there has at least been some research into the efficacy of different strategies involving mobile resuscitation units (Hampton and Nicholas, 1978). It is noteworthy that no more than anecdotal evidence of 'successes' has been published in any of the other areas, and there are no data to show that community mortality is affected. Education of the public in cardiopulmonary resuscitation is undoubtedly of great importance in this respect as demonstrated by the experience in Seattle (Thompson *et al.*, 1979). These uncertainties do not, however, diminish local enthusiasm for resuscitation schemes, which are often heavily dependent on charitable funding.

Despite the absence of reliable information about the success of resuscitation ambulances in reducing mortality in ischaemic heart disease, there seems no doubt that only good can come of training ambulancemen in techniques of artificial respiration, fluid replacement and cardiopulmonary resuscitation, including defibrilla-

tion. These personnel are almost invariably first on the scenes of accidents and medical emergencies, and appropriate early action may be lifesaving for the patient with severe hypovolaemia, airways obstruction or hypoxaemia. This is also the rationale for the existence of the British Association of Immediate Care Scheme (BACICS), which is a general practitioner based national organization with about 1,350 members which attempts to respond rapidly to medical emergencies. However, very few of these doctors have access to defibrillators, so that they are unlikely to make much contribution to the treatment of out-of-hospital cardiac arrest. We must now look to the DHSS for direction in the development of advanced training for ambulancemen. The Department, by the same token, must look to those schemes which receive their blessing for good evidence that their funds are being well spent.

ROGER H. JONES
General Practitioner, Andover

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Decisions and errors

IN the working day of the general practitioner, many decisions have to be made in a short time, with the knowledge of possible serious consequences. When the significance of signs and symptoms is clear, decisions are easy to make, deductions are straightforward and courses of action simple. However, such situations are unusual: more often the signs and symptoms are equivocal, the deductions at best are statistical probabilities, and the courses of action have serious potential hazards.

During our years of training and practical work, our internal computer has been programmed to calculate the odds of many factors and to add them up in order to arrive at highly complex solutions. Decision theory helps to sort out and list the various components of a patient's problem, to give appropriate weight to each according to probability and seriousness, and to find the course of action which involves the least risk. This step-by-step approach reveals stages where irrational impulses and emotions might have played a part in our assessment. Of course, emotions are important factors in decision-making: 'objectivity' is not served if emotions are ignored. They should be recognized and discussed.

In making decisions we have to remember that errors arise out of every human activity. Primary errors stem from bad perception, from faults in the brain computer's estimation of perceived signals, from mistakes in the 'computer program', and of course from the interactions of idiosyncrasies of patient and doctor. No amount of postgraduate education can eradicate the inherent uncertainty of human perception and thought, nor fill all the gaps in our knowledge. It is necessary to admit this fact to ourselves, to our students and, with due caution, to our patients. It is easier to accept this fact if we eliminate moralistic or puritanical attitudes about making mistakes. By admitting the inevitability of primary errors we will not avoid them, but we will learn to detect them earlier and so avoid secondary errors. Fortunately primary errors rarely cause the patient any serious harm.

Secondary errors arise from the non-recognition of primary errors and from wishful thinking. In the fervent hope that a mistake has not been made, wishful-thinking clouds our perception and judgment. The possibility of a primary error is denied and the mistake is compounded with new erroneous interpretations.

The attitude, bordering on arrogance, that doctors must be perfect and omniscient is not only a conceit of medicine; patients also have these fantasies about doctors. Ill-health may allow a patient to regress to a child-like pattern of behaviour, a feeling of absolute trust in the people who care for him, viewing them as godlike and omnipotent. To deny a patient the benefit of this regression would be unkind, since it is one basis for the therapeutic effect of the drug 'doctor'. What the doctor must avoid is letting himself be seduced by the patient into sharing this delusion.

In order to deal with the emotions evoked by this subject, related sciences like psychology and statistics can be brought in to assist. It is still necessary to have the moral courage to admit our mistakes and to stop being ashamed of them. This will enable us to learn to deal with mistakes as we have learned to deal with other difficult problems in the exercise of our art.

SUSANNE BURKE-SALVISBERG
General Practitioner, Thun, Switzerland