of 35 generators a centre and about 20% with full services. In terms of the proportion of complex pacing systems implanted then Britain (9%) tends to use more advanced devices than the major European countries (typically 3-4%); the rate in Britain is comparable with that in the United States (11%) on 1981 figures. Indeed, many of the more recent conceptual advances in pacing have arisen in Britain.⁴⁻⁷

This centralisation of services gives a clue to an important difference between practice in Britain and that in other countries. Each pacing centre in the United States serves on average a population of 67 000. No major west European country has centres serving more than 500 000, and only in Portugal does a centre have to cope with more than 1 million. In Britain each centre services a population of 900 000. There is a statistically highly significant correlation ($r = -0.68$; $p < 0.001$) between the population served by a pacing centre and implant rate in the North American and European countries. Assessed in terms of efficiency (where a country has a high implant rate concentrated in a limited number of facilities) then East Germany, Austria, and France lead the rankings.

The low implant rate in Britain should not be a natural consequence of the concentration of cardiological skills. The facilities exist, and, though struggling, do not appear to be restricted by cost. The bald fact seems to be that patients are not being referred appropriately for consideration of pacing.

In England in 1982 there were only 107 adult cardiologists in post, each therefore being responsible for a population of 387 000 adults. Even when one adds the 111 physicians de facto practising cardiology (defined as more than 40% of their workload) then each cardiovascular physician appears to be responsible for 190 000 adults. Equally remarkable is the fact that 55 of the 206 health districts, serving a population in excess of 10 million, appear to have no physician with special training in the management of cardiovascular disease.⁸ Though the overall number of doctors per head of population is moderately less than in North America and western Europe (79% of the United States figure),³ the number of cardiologists in Britain is very low, at roughly one eleventh of that recommended for the United States.⁹

I suspect that pacing practice, being well documented and easy to audit, highlights a more general problem of cardiovascular care in the British population. Such underprovision of services is likely to influence the death rate from coronary disease in this country, which is not showing the same rate of decline as that seen in the United States.¹⁰

The problem is not primarily one for our political and economic masters, though the solution will require their support. The profession itself must take responsibility for the training and deployment of medical skills in both general practitioner and hospital doctors, and must be prepared to adapt career structures and specialist distribution according to need. Audit of pacing practice leads to the inescapable conclusion that the British patient with cardiovascular disease is not well served by the medical profession.

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Death in the street

When a man or woman collapses in the street, or is injured in a road accident, or is pulled unconscious from water his or her chances of survival depend on chance. If the victim is lucky the onlookers will include someone trained in cardiopulmonary resuscitation; but without luck he may die. Asphyxia is an unforgiving enemy.

The visitor from Britain to Rotterdam will see stickers in the windows of many shops announcing that the staff have been trained in resuscitation. Australian television shows regular commercials encouraging people to attend training courses. All the Scandinavian countries have established training schemes, some of which extend to all schoolchildren.

Here in Britain—as became plain last week at a symposium at the Royal Society of Medicine—we have the familiar pattern of indifference and apathy at the Department of Health, a few committed medical enthusiasts, good intentions in the voluntary associations that provide first aid, and no single body with the duty—let alone the intention—of coordinating the efforts being made by these groups to organise a national training scheme.

Nearly 20 years have passed since Pantridge and his colleagues began their work in Belfast with the use of coronary ambulances to cut mortality from heart disease.¹ Chamberlain's efforts in Brighton have shown that education of the public not only saves lives in the street and in the home but also—and possibly this is more important in terms of lives saved—leads to many more patients reaching hospital within an hour of the onset of symptoms of myocardial infarction.² Yet the sceptics remain unconvinced of the value of training ambulance staff and equipping vehicles with defibrillators. This scepticism provided ammunition for the Department of Health when it decided in 1976 that there was "no firm evidence" that the use of coronary ambulances saved lives.³ A recent survey found only nine ambulance based resuscitation schemes in England.⁴

With so few coronary ambulances, is there any point in encouraging Britons to acquire the basic skills of cardiopulmonary resuscitation? Will they find themselves kneeling in the rain, waiting 20 minutes for an ambulance that eventually arrives with untrained staff and no defibrillator? That is, in current jargon, a worst case scenario. A mass education campaign would certainly save lives from asphyxia associated with drowning, electrocution, and trauma, and would—if the Brighton experience is a guide—cut mortality from myocardial infarction even in cities without coronary ambulances.

The Resuscitation Council—a small, informal medical advisory panel—has just published a booklet describing the necessary lifesaving techniques in simple words.⁵ Sadly, its

members admit the lack of short simple training courses around the country for citizens who want to acquire these skills. The first aid organisations appear still to be undecided about the merits of short, single session training in cardiopulmonary resuscitation as opposed to longer, fuller training in first aid.

An initiative needs to be taken by a body that can stamp its authority on details of the techniques, train the trainers, and coordinate publicity with the help of journalists on newspapers, radio, and television. Surely this should be a priority item on the agenda of the Department of Health's new Chief Medical Officer, Dr Donald Acheson.

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Prophylaxis in haemophilus meningitis

Epidemics of meningococcal septicaemia and meningitis have been recorded since the early nineteenth century and still occur in many parts of the world, notably in some areas of Africa. Brazil experienced a huge epidemic in 1974-5 caused by strains of groups A and C. Soon after their introduction sulphonamides were shown to be dramatically effective in treating the disease and also in controlling epidemics by reducing the rate of nasopharyngeal carriage of the meningococcus. Recent infections in Britain have usually been sporadic but it has been customary to give prophylactic antibiotics to household and preschool contacts of the index case. Health service staff who attempt mouth to mouth resuscitation of patients with meningococcal septicaemia are also given prophylactic treatment, and the anxiety which this infection engenders often prompts other nursing and medical staff surreptitiously to treat themselves. Sulphonamides were always used for prophylaxis until resistant organisms emerged, and rifampicin is now the drug of choice unless the strain in the index case is known to be sensitive to sulphonamide.

Less attention has been directed towards the risk of infection in contacts of patients with *Haemophilus influenzae* meningitis, but recent studies have shown that risk to child contacts is similar to that recorded in meningococcal infection. A prospective study in the United States showed that the risk of meningitis in household contacts was more than 500 times greater than the age adjusted risk in the general population.¹ This and other studies have established an overall risk of about 0.5% in all contacts²; children are especially vulnerable, and in household contacts aged under 5 the risk is about 2%. The added risk of disease in child contacts is associated with an increased rate of nasopharyngeal carriage of *H influenzae* type b.³ This suggests that chemoprophylaxis should be used, as it is with meningococcal infections, to prevent secondary cases.

Although several drugs are effective against *H influenzae* in vitro, they do not reduce the rate of nasopharyngeal carriage. These include ampicillin,⁴ co-trimoxazole,⁵ cefaclor, and erythromycin with sulphonamide.⁶ Rifampicin, however, does greatly diminish carriage rates.⁷⁻⁸ An effective dose is 10 mg/kg body weight twice daily for four days; the same dose given for two days gives poor results.⁹ A recent double blind prospective trial showed that the effect of a course of rifampicin persisted, but to a decreasing extent, for several weeks.⁷ One month later a quarter of the under 5 year old children had become re-colonised, whereas three quarters of the carriers treated with placebo remained positive. Most of the strains of *H influenzae* reisolated after prophylactic treatment with rifampicin are still susceptible to the drug, although highly resistant strains have been found. There is also a small increase in the level of resistance even in supposedly sensitive strains.

These factors provide a reasonable basis for the American recommendations that chemoprophylaxis should be given to the index patient (since treatment of the disease does not eradicate nasal carriage), to all household contacts when the household includes a child aged under 4, and to children and adults in day centres if invasive *H influenzae* disease occurs. Although such a policy may reduce the incidence of the disease in contacts, it is not yet known whether the benefits outweigh the drawbacks and difficulties of prophylaxis with rifampicin. Certainly there are many reasons why attempts at prophylaxis may fail, and any scheme of chemoprophylaxis in no way removes the need for a good information system about contacts and for early reporting and evaluation of any illness that they may develop.

How widely, then, should the net be cast? In Murphy's study carriers were found in seven out of 19 households who would not have received prophylaxis by the conventional recommendations, and carrier rates in contact households with young children without a case were little different from those in the index households.⁷ The larger the group given prophylaxis the greater the problems of logistics and drug compliance. Recolonisation of treated carriers is an unsolved problem, and one child developed meningitis three weeks after receiving correct prophylaxis.¹⁰ The importance of rifampicin resistance is uncertain; that such strains may not be at any great selective disadvantage is indicated by their persistence in a mother and her child for one and a half months.⁷ Even without a change of resistance rifampicin sometimes fails to eradicate nasopharyngeal carriage of *H influenzae* in young children.

What should be done in Britain? Reports of *H influenzae* bacteraemia and meningitis are increasing. In 1980 and 1982 this organism was the most commonly reported cause of meningitis, although associated cases in families or nurseries have rarely been reported here.¹¹ There is a case, albeit a weak one, for giving rifampicin prophylaxis to contacts aged under 4, either in households or in nurseries. Nevertheless, selective chemoprophylaxis must not be regarded as a substitute for a careful watch over all those who have had contact with the index case.

A better solution would be the production of an effective *H influenzae* vaccine, and this may not be too far off.¹²

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