treatment before considering epidural spinal cord stimulation. But it is clear that patients prefer the totally implantable system. TENS systems are bulky, cumbersome, and pain reactions are common. Dr Colquhoun’s arguments are similar to those put forward when the external Lucas pacemaker system was used. That was also much cheaper but it was not totally effective. Improved pacemaker systems. There are problems with the present epidural electrodes which slip too frequently; but with further developments it should be possible to overcome these, and we are now trying new designs.

It is not our experience that all forms of electrical neurostimulation are equally effective. Some patients respond better to TENS than epidural stimulation and vice versa. For this reason we now insert a temporary electrode that can remain in place for 2-3 weeks to assess effectiveness before we implant the permanent unit; this also ensures that an expensive unit is not implanted unnecessarily.

Finally, I was interested in Dr Colquhoun’s comments about the optimal frequency of stimulation and the work by Hartman. We have tried stimulating at 15 Hz and it seems to be effective but some patients describe it as a rather unpleasant sensation compared with higher frequency stimulation. But this subject is in its infancy (in the West) and there is much more to explore about mechanisms and the best techniques.

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Limited potential of special ambulance services in the management of cardiac arrest

Sir,—We agree with Dr Rowley and colleagues that there has not been sufficient critical analysis of the effectiveness of ambulance personnel with advanced training (Br Heart J 1990;64:309-12). However, we wish to make the following observations about their findings and raise important questions about the development of the emergency ambulance service.

Concentration on those patients with prehospital cardiac arrest brought to the accident and emergency department excludes an unknown number of resuscitation attempts terminated by attending doctors. It may be that crews with defibrillator training spend more time at the scene of an arrest, increasing the likelihood that a general practitioner will arrive to certify that the patient is dead, and release the ambulance. The basic emergency crew will “scoop-and-run”, leaving less scope for GP involvement. This may explain why larger numbers of patients were transported to hospital by the crews with a more basic training. What were the total number of resuscitation attempts made by each type of crew, regardless of later hospital transfer?

In our area ambulances only attempt to resuscitate victims in the street if arrest to hospital if resuscitation is in progress. When resuscitation is inappropriate a doctor is called to certify death and the patient is left at the scene or taken to the mortuary. We were surprised therefore that 64 of 147 patients were taken to hospital by defibrillator trained crews without any attempt at resuscitation. These patients had not been pronounced dead by a medical practitioner. What criteria did the ambulance personnel use to withhold resuscitation from these individuals?

While the conclusion that the addition of other skills (drug administration and intubation) might save “a few extra lives” is probably correct, we are concerned that this study together with the results of the Scottish experience of semiautomatic defibrillators may stop full extended training in ambulance aid being given to paramedics.

We have already shown the effectiveness of personnel with extended training in the management of hypoglycaemic coma.9 There is recent evidence that patients with acute myocardial infarction complicated by hypotension and bradycardia have a better outcome when transported to hospital by a paramedic vehicle rather than an ordinary ambulance.1 Personnel with extended training also treat patients with acute asthma,4 hypovolaemic shock, and respiratory arrest, and in the future may administer thrombolytic agents.

We are sure that the provision of a defibrillator on every emergency ambulance is an essential short term aim for improving the prehospital management of cardiac arrest. We are equally certain that the provision of a paramedic on every vehicle, coupled with a strict clinical audit, is the essential long term approach to improving all aspects of prehospital emergency care.

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