ABC of Resuscitation

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RESUSCITATION BY AMBULANCE CREWS

Sudden death outside hospital is common: in England alone more than 50 000 medically unattended deaths occur each year. While they are remote from hospital victims of acute myocardial infarction, cardiac arrhythmia, trauma, or vascular catastrophe risk death through lack of urgent care. The case for providing prompt and effective resuscitation at the scene of an emergency is overwhelming but until recently has received far less attention than it deserves.

Development of resuscitation ambulances

The delivery of emergency care to patients before admission to hospital was pioneered in Europe in the late 1960s. Pilot schemes showed that resuscitation vehicles manned by medical or nursing staff could bring effective treatment to the victims of coronary disease or trauma.

The use of emergency vehicles carrying only paramedic personnel—either in telephone contact with the hospital or acting independently—was explored early in the 1970s, mainly in the United States. The widely acclaimed Medic I scheme began in Seattle in 1970 under Dr Leonard Cobb. In a highly coordinated fire service the Seattle tenders can reach an emergency in any part of the city within three minutes. All fire fighters are trained in basic life support and are backed up if necessary by emergency medical technicians arriving in an "aid car" three to five minutes later. Third line support—the extensively equipped Medic I ambulances—is also available; these are crewed by paramedics who have received at least 12 months' full time training in emergency care.

In the UK paramedic schemes have been slow to develop. The Brighton experiment in ambulance training began in 1971, and schemes in other centres followed independently over the next few years. But rapid progress in paramedic training has been hindered by the hesitation of senior hospital staff to accept the role of prehospital care and by the initial caution of the DHSS in advising health authorities *against* developments in this field. Moreover, since paramedic trained crews have received little or no extra pay for their added skills and responsibility, and since the ambulance service until recently has been regarded as a facility for transport rather than for treatment, progress in the past 15 years has been achieved only through individual enthusiasm for training and private donations for equipment.

Resuscitation ambulances—Black areas are where ambulances are crewed only by ambulance men and hatched areas where they are crewed by doctors or nurses. The districts shown are: East Anglia (Peterborough), Mersey (Macclesfield), Northern (North Tynes), North East Thames (City and Hackney), North Western (Blackburn, Hyndburn, and Ribbles Valley; Preston; North Manchester), Oxford (Oxfordshire), South East Thames (Brighton, Eastbourne, Hastings), South West Thames (North West Surrey, Mid Surrey, Chichester, East Surrey), South West (Cheltenham, Gloucester, Bristol and Weston, Frenchay), Trent (Nottingham, Barnsley), Wessex (East Dorset, Winchester, Basingstoke), West Midlands (Dudley, South Warwickshire), Yorkshire (Hull, Airedale), Wales (Royal Gwent).

Training

An outline syllabus for paramedic training*

Theoretical knowledge

Basic anatomy and physiology
respiratory system (especially mouth and larynx)
heart and circulation
central and autonomic nervous system

Presentation of common disorders
respiratory obstruction/distress/failure
presentations of ischaemic heart disease
differential diagnosis of chest pain
complications and management of acute myocardial infarction
acute abdominal emergencies
open and closed injury to the chest and abdomen
limb fractures
head injury
fitting
burns
maxillofacial injuries
paediatric emergencies

Practical skills

Observation and assessment of the patient
assessing the scene of the emergency
taking a brief medical history
observing general appearance, pulse, blood pressure (using sphygmomanometer), conscious level (using Glasgow scale)
undertaking systematic external examination for injury
recording and interpreting 12 lead electrocardiogram and rhythm monitor

Interventions

basic life support
defibrillation
intubation
venous cannulation and infusion
drug administration

*Based on draft from National Staff Committee for Ambulance Staff.

Paramedic training in the UK has varied widely between different pilot schemes; there has been no uniformity in the content, standard, duration, or organisation of training programmes, or in the evaluation or use of the skills of newly trained paramedics. All schemes have included instruction in basic life support and defibrillation. Training in intubation, infusion, and interpreting the electrocardiogram has also been common; but less emphasis has been placed on the use of drugs and other emergency procedures.

The Association of Emergency Medical Technicians (AEMT) was founded in 1978 to promote and encourage advanced education for professional ambulance staff in the UK. Since then the association has developed a four stage national programme for advanced training, the last stage of which includes full cardiopulmonary resuscitation techniques taught in hospital. Staff who pass a national registration examination organised by the association are issued with a certificate of proficiency, though ambulance authorities and the DHSS have granted little recognition to this qualification. At present the AEMT has 650 registered members trained in advanced skills (350 in the civilian ambulance service) and over 1450 associated members who have joined the organisation to increase their skill and achieve "paramedic" status.

More recently—following suggestions in the Miller Report (1966-7) and a new recognition by the DHSS of the value of prehospital care—a national course for extended training in ambulance aid has been launched by the National Staff Committee for Ambulance Staff in association with the NHS Training Authority. The course extends the six week introductory tuition given to all ambulance staff and emphasises the extended skills of venous cannulation, recording and interpreting the electrocardiogram, intubation, infusion, and defibrillation. Training in the use of drugs remains controversial, though experience in Brighton suggests that with adequate training paramedics may use unsupervised a variety of agents to good effect and without harm.

Benefits

Emergencies handled by a trained crew

Life threatening arrhythmias
Respiratory arrest
Hypovolaemic shock
from internal haemorrhage
from trauma
Uncomplicated myocardial infarction
Severe left ventricular failure
Airway obstruction
Severe bronchospasm
Hypoglycaemic coma and precoma
Head injury
Drug overdose

The benefits of a resuscitation ambulance service include:

Reduction in delay to hospital admission
Successful cardiopulmonary resuscitation
Increased awareness of the need for a rapid response to emergencies
Improved monitoring and support of the critically ill
Improved standard of care for non-urgent cases

The time to hospital admission and the number of successful resuscitations per year are the easiest benefits to quantify. Rates at well established centres vary from 20 to 100 successful resuscitations each year for populations of about 350 000 (success means the discharge from hospital of a patient who is active and alert but who would have stood no chance of survival without prehospital care). Techniques which aid comfort and prevent complications are less readily assessed but cannot be dismissed.

A strategy for resuscitation and prehospital care

EAST SUSSEX AMBULANCE SERVICE

AS 5A

SERIAL NO	FINISH MILEAGE	NAME	ORIGIN				
DATE	START MILEAGE	ADDRESS	DOCTOR				
STATION	TOTAL		FAMILY				
CALL SIGN	VEH No	IN ATTENDANCE	(OTHER)				
CREW 1:	POLICE (No)	MALE FEMALE AGE	ONSET OF SYMPTOMS				
2:	FIRE		DR CALLED				
INCIDENT	DOCTOR	REC HOSPITAL	TIME OF CALL				
LOCATION			MOBILE				
AMBULANCE LOCATION	CLASSIFICATION	St Cn Wk	AT SCENE				
	GLASGOW COMA SCALE						
	EYE OPENING	SPONTANEOUS TO PAIN	4 3 2 1				
	MOTOR RESPONSE	OBEYS LOCALIZES FLEXION WITHDRAWAL EXTENSOR RESPONSE	5 4 3 2 1				
	VERBAL RESPONSE	ORIENTATED CONFUSED CONVERSATION INAPPROPRIATE WORDS INCOMPREHENSIBLE SOUNDS	5 4 3 2 1				
	TIMED	TOTAL					
AIRWAY	BREATHING	CIRCULATION	COLOUR				
CLEAR NOISY	ABSENT SHALLOW DEEP NORMAL REGULAR IRREGULAR	B P PULSE RATE REGULAR IRREGULAR	NORMAL CYANOSSED PALE SWEATING				
VOMITING	RATE PER MIN	WEAK VOL BLOOD LOSS	REACTION TO LIGHT				
YES NO	TIMED	TIMED	R YES NO L YES NO				
ARRHYTHMIAS	SINO ATRIAL BLOCK	SINUS RHYTHM	VENTRICULAR EXTRASYSTOLE				
HEART RATE	1 AV BLOCK	SINUS BRADYCARDIA	IDIOVENTRICULAR RHYTHM				
	2 AV BLOCK (WENCKEBACH)	SINUS TACHYCARDIA	VENTRICULAR TACHYCARDIA				
	2 AV BLOCK (MOBITZ II)	ATRIAL JUNC EXTRASYSTOLE	VENTRICULAR FIBRILLATION				
VENOUS CANNULA	3 AV BLOCK (NARROW QRS)	JUNCTIONAL RHYTHM	PROBABLE INFARCT PATTERN				
YES NO	3 AV BLOCK (WIDE QRS)	SUPRAVENTRICULAR TACHYCARDIA	ST/T CHANGES				
	ASYSTOLE WITH P WAVES	ATRIAL FLUTTER	LEFT BUNDLE BRANCH BLOCK				
	ASYSTOLE WITHOUT P WAVES	ATRIAL FIBRILLATION	RIGHT BUNDLE BRANCH BLOCK				
PACING	YES/NO	INFUSION	FLUID QUANTITY TIME				
RESPONSE		DRUG	AMOUNT ROUTE TIME RESPONSE BY				
		OXYGEN					I DO NOT WISH TO BE TAKEN TO HOSPITAL ALTHOUGH I HAVE BEEN ADVISED TO GO BY THE AMBULANCE CREW
		ENTONOX					
							SIGNED
DR	ASKED TO CALL VIA CONTROL VIA OUR TELEPHONE CALL TIMED						
OTHER COMMENTS							
	INITIALS						

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The working relationship between paramedic crews and the general practitioner is usually amicable and productive. Most general practitioners welcome the facilities offered by a resuscitation ambulance service and often speak highly of the individual performance of paramedics at an emergency. Many admit that the skills of the paramedics—and occasionally the equipment in the resuscitation ambulances—complement their own in dealing with life threatening conditions. Any conflicts that have arisen usually reflect overenthusiasm of the ambulance staff; misunderstandings can almost always be resolved in mutual discussion with the senior hospital staff overseeing the scheme.

Resuscitation ambulances should be regarded as one important part of a pattern for emergency care in the community; the hospital, the general practitioner, and the community itself make equally important contributions to the optimum treatment of the injured or seriously ill.

The hospital service provides not only the facilities for continuing care of the patient but also a resource for training, encouragement, review, and in some centres research in resuscitation techniques, both simple and advanced.

The role of the community can be vital. Even with a rapidly responsive and well drilled paramedic service, delay is inevitable between a 999 call and the arrival of the resuscitation ambulance; in circulatory arrest this delay may be crucial. Cardiopulmonary resuscitation by bystanders in the vulnerable few minutes before the ambulance arrives has been shown to improve appreciably the short term and long term outcome of prehospital care.

The future

Two important factors give optimism for new growth in the resuscitation ambulance service: an increasing interest in advanced training by the National Staff Committee and the DHSS and the enthusiasm of ambulance staff themselves for paramedic training, reflected, for example, in the growing membership of the AEMT. But these factors alone are insufficient: vision and commitment by senior medical staff are mandatory if local facilities for prehospital care are to be established and maintained, and if lives are to be saved by skills which can be learned and applied effectively by ambulance personnel.