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INSTITUTE FOR RESEARCH IN THE SOCIAL SCIENCES
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Extended Training of Ambulance Staff

by

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DISCUSSION PAPER 2

INSTITUTE FOR RESEARCH IN THE SOCIAL SCIENCES

CENTRE FOR HEALTH ECONOMICS

EXTENDED TRAINING OF AMBULANCE STAFF

K. Wright
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Extended Training of Ambulance Staff

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Part I Current Schemes

Extended Training of Ambulance Staff.

A. Introduction

1.1 The extended training of ambulance staff entails the use of one or more of the following elements in addition to the usual ambulance aid qualification required of staff undertaking all duties:

- a. Endotracheal Intubation - is used to establish and maintain an airway in unconscious patients.
- b. Ventricular defibrillation - Since most deaths from cardio pulmonary arrest are due to ventricular fibrillation and may occur within an hour of the onset of symptoms, there has been some pressure to develop mobile coronary care units. However, these have proved to be rather ineffective in practice and have been replaced in some areas by installing the necessary cardiac monitoring and defibrillating equipment into ambulances. It is in these areas that ambulance staff have been trained to use this equipment.
- c. Infusion - Intravenous infusion is indicated following severe blood loss to replace fluid and maintain circulatory pressure. Intravenous drips are also established in the treatment of cardiac arrest.

1.2 The objective of this paper is to cost the schemes currently in operation. The costs have been calculated on a real resource basis (with the exception of the loss of leisure time voluntarily surrendered by ambulance staff, instructors, nurses and clinicians, although the effects of this omission are set out in Section C). This means that certain elements of the schemes have been costed (e.g. cardiac monitors/defibrillators) although, because equipment is often donated, it is rarely at present a charge on the ambulance service budget or the public sector account generally.

1.3 All costs in this paper were based on wages and prices at 1st April 1981. The effect of recent wage awards would be to raise costs by 10.7% (August 1983).

B. The Costs of Training.

2.1 The costs of existing training schemes depend very much on the scale (i.e. no. of staff trained in a period) of training, the length of time needed, the way in which spare capacity is used in the training system and how many of the three major parts of extended training are to be taught. Schemes have been costed as set out in detail in Appendix 1 and summarised below to give a general indication of the problems encountered in costing present schemes and in developing estimates of the cost of expanding the schemes.

SCHEME NO.	TRAINING COSTS		POST QUALIFICATION COST	
	£ per person		£ per person per year	
	<u>Min.</u>	<u>Max.</u>	<u>Min.</u>	<u>Max.</u>
1	970	1292	566	611
2	2628	3404	641	687
3	1776	1776	626	626
4*	942	1205	143	175
5	812	1043	424	470
6*	706	741	319	365

* Intubation and Infusion Courses.

2.2 These costs have been developed on the assumption that the cover for staff on training courses is provided either by overtime working or the use of relief staff. The minimum figures represent wages paid at time and one half and the maximum represents wages paid at double time. Cover is provided by relief staff in Area 3. These summaries hide some general difficulties. Firstly, some ambulance officers maintain that they can cover some training without resorting to using extra working time, because the scale of the training is small, i.e. it involves only one member of staff on fairly large stations. Thus, the estimates are exaggerated for Area 5 where extended training has been introduced without having to provide extra cover for all absences. Nevertheless, it was thought that it would be best to present these figures on the grounds that schemes will tend in the

long run to be covered by overtime working. Secondly, scheme 2 is expensive because the full 16 week period of hospital training undertaken by fully trained staff is covered by overtime working. However, the staff on training courses man an emergency ambulance (a specially equipped mobile resuscitation unit) and some allowance ought possibly to be made for this since the net cost would be lower e.g. a vehicle may be saved elsewhere.

2.3 None of the cost estimates include any allowance for the use of premises. This is because extended training is carried out in the main in hospital and its claim on ambulance training premises is very small compared with the whole training load. This assumption would have to be questioned if rapid expansion of extended training were to take effect.

2.4 The post qualification costs depend very much on whether or not areas are using cardiac monitoring/defibrillating equipment. In the main, this equipment is donated either by local subscription or by the British Heart Foundation. Thus some areas such as Area 3 have 17 cardiac monitors/defibrillators which have been costed, but is not a charge on the budget of the ambulance service.

2.5 No allowance has been made for the leisure time sacrificed by ambulance staff although quite a large amount of private study is required in some schemes. In fact, it is difficult to see what pecuniary reward these staff are gaining from the training. In two areas (4 and 5) the staff receive no wage supplement for training, in Area 2 and 3 they receive £2.63 per week supplementation and in Area 1, where they are qualified to administer certain drugs, the supplementation is £3.90 per week. There is little evidence of wastage in the service, although in one area, 6 qualified personnel had been appointed to services overseas. There is some evidence that extended trained personnel receive quicker promotion than other personnel, but it is difficult to interpret this evidence since extended trained personnel tend to be the more keen, competent and skilful members of the staff anyway.

C. Major Uncertainties in the Costing and the Extension to the Scheme.

3.1 The present schemes have certain characteristics which are worth noting

- a. They are quite small - training about 12 or so staff per year.
- b. They use quite a lot of voluntary effort - e.g. the ambulance staff are generally matching an hour's tuition with an hour of their own study time. Clinicians are giving lectures and providing supervision on a voluntary basis. Many services receive donations of equipment from local or national charities.
- c. The schemes have the backing of the local medical and nursing staff.
- d. One or two clinicians are usually very enthusiastic about the training and have greatly helped with the setting up and running of schemes.
- e. The qualified staff receive very small financial recompense for their extra skills.
- f. High standards are set for joining and successfully completing the schemes. In many schemes less than 25% of volunteers are able to successfully complete the pre-selection examination.

3.2 Although these schemes contain several voluntary elements, the main causes of higher costs would be if ambulance staff insisted on more study leave to compensate for the hours of private study they presently supply and if there was strong pressure to increase the level of wage supplementation. Since on average an hour's leave of absence costs about £4 with overtime and national insurance charges, given say 200-300 extra hours study this could raise costs by £800-1200 per staff member trained.

3.3 An increase in the wage supplementation would be more costly. Originally, it is believed that the level of wage supplementation was set at 10% and 15% according to the level of skill provided. If this level was paid at present costs would rise by £315 per qualified person per year for those schemes presently paying £2.63 per week and by £495 per year per person for schemes paying £3.90 per week.

3.4 The other uncertainty in the costings refer to the provision of cardiac monitors/defibrillators. The figures in paragraph 2.1 have been calculated at discount rates of 5% over 5 years. The effect of using 7% would raise post-qualification costs by £14 per year. Additionally, a more serious omission is the lack of data on maintenance costs for this equipment. In some cases this is due to the use of hospital-based technicians who maintain and repair equipment without charge. In other cases the figures is based on an apportionment of technicians time. For example, it costs about £3,000 per year in Area 1 for all cardiac monitoring equipment on all four vehicles or about £83 per year per extended trained member of staff. Maintenance costs for this equipment are likely to vary locally according to the capacity of medical physics departments to cope with the load.

D. The Benefits of Extended Training.

4.1 The objectives of extended training for ambulance staff have been stated in terms of providing ambulance staff with the necessary skills to provide immediate care to a victim of injury or disease. The essential aim of immediate care is to give all the treatment possible outside a hospital to maximise the patient's chances of survival. In other words, immediate care means providing for the following essential needs of a patient: respiratory support by ensuring an airway, if necessary, by intubation and assisted or positive pressure artificial ventilation; circulatory support by intravenous infusion, possible monitoring of the heart beat by electro-cardiogram, and injection of suitable drugs if need be; pain relief by the inhalation of Entonox; and the ordinary first aid measures such as splinting, bandaging and arrest of bleeding. (Medical Commission on Accident Prevention, 1979, p.9).

4.2 However, it is very difficult from the existing literature to see the effects of immediate care beyond what one might call the intuitive benefits of the scheme. It is easy to imagine that the provision of immediate care in certain circumstances is the difference between life and death. Ambulance services already have startling examples of lives saved by immediate care. However, in a vast majority of cases it is difficult to establish whether the immediate care provided by the ambulance staff made a difference to the patient's recovery. There are no controlled trials of immediate care procedures which would

provide evidence and given the ethical problems involved it is difficult to see how any trial could be established. This problem pervades the whole of the literature on the benefits of the use of extended training skills. The literature is itself dominated by the coronary care controversy and there is very little information available about the effectiveness of immediate care provided by extended trained ambulance staff in the general management of trauma. This is a pity because some Chief Ambulance Officers stressed the importance of infusion and intubation skills and one maintained that the acquisition of skills in intravenous infusion is probably the most important aspect of extended ambulance aid training so far as the saving of life is concerned.

4.3 The literature on immediate treatment of cardio-pulmonary arrest illustrates the major difficulties in identifying the benefits of extended training. For example, one important dilemma in the provision of extended training is whether to provide immediate care at the scene of the incident or to transport the patient to a hospital without delay. This dilemma is illustrated in an article by McSwain and others (1980) which concluded the "Our data document a definite relationship between the length of time spent at the scene and successful outcome. Although it may be argued that a person who will ultimately respond does so quickly and can thus be transported sooner, the data suggests that prolonged attempts at on-the-scene resuscitations and stabilization are rarely successful and may be dangerous ... Most of the delay at the scene involved attempts to obtain a history, start intravenous fluids, administer drugs, and stabilize the patient before transport. Although those patients who were not delayed at the scene for an IV attempt had a better success rate, it cannot definitely be concluded that the establishment of an IV and administration of certain drugs were not useful. Clearly, in some patients (e.g. those with severe acidosis or marked hypovolemia) it is important, particularly if they face a long ride to the emergency center."

4.4 The counter to this, of course, is that correct training would ensure that ambulance staff would be able to differentiate correctly between treating on site and speedy removal to the hospital.

4.5 The strongest evidence for out-of-hospital immediate care in cardio-pulmonary arrest comes from Seattle, U.S.A. and Brighton, England. In a controlled prospective trial of the treatment of cardio-pulmonary arrest, the Seattle team showed that the effect of introducing specially trained paramedical staff was to increase by 10% the number of cardio-pulmonary arrest victims who were able to survive to hospital discharge (Eisenberg et al., 1980). A subsequent follow-up study of a four year cohort of cardio-pulmonary arrest patients showed that out of a total of 302 patients 26 (8.6%) were not included in the follow-up, 102 (33.8%) people died and 174 (57.4%) were still alive at the end of the follow-up period.

4.6 In Brighton 101 patients were admitted to hospital after pre-hospital resuscitation between 1974 and 1976 and 40 were discharged after hospital treatment of whom 32 were alive in June, 1977. (Mackintosh et. al. 1978). Over a more recent 12-month period the records of 25 resuscitated patients shows some evidence of the value of extended training: "In a 12-month series 15 of the 25 patients had suffered apparent cardiac or respiratory arrest before the ambulance was summoned and 16 had had an arrest before the ambulance arrived on the scene. Recovery from this situation in the absence of on-the-spot resuscitation hardly ever occurs." (Chamberlain and Studd 1982). It has been pointed out (Lancet 1979) that in both Brighton and Seattle a considerable proportion of the population have been instructed to recognise cardio-pulmonary arrest and to commence resuscitation. Each Centre is also equipped with trained ambulance personnel and first class coronary care facilities in their hospitals. "These elements are interdependent, and probably not susceptible to formal individual trial" (Lancet 8.7.79 p.509).

4.7 Most trials which have taken place have not been on the general use of extended trained ambulance personnel, but have concentrated on the use of specific, specially equipped vehicles sometimes staffed by extended trained personnel. For example, the Nottingham study of mobile coronary care units (Hampton and Nicholas, 1978) found that these units were not very effective in saving lives and that it was difficult to identify patients who needed the MCCU from the general mass of emergency calls. However, these authors concluded that the provision of specially trained ambulance staff may well save a few lives per staffed vehicle per year. There were similar problems for

accident flying squads (Rowley and Collins 1979). A retrospective study in Derby showed that only 2 cases out of 17 survived to leave hospital and the authors concluded that "at the present time, there is little justification in flying squads attending medical emergencies until a more complete primary care service can be developed".

4.8 The Derby accident flying squad had no extended trained personnel. In a retrospective study of a mobile resuscitation unit (Baskett et. al. 1976) using extended trained personnel, it was estimated by those involved that 56% of the calls to the MRU were "valuable" or "potentially valuable" and that over a four month period the lives of 6 patients were "definitely saved" and a further 18 lives were "possibly saved".

4.9 The literature mentions some factors which have also emerged from talking to the trained personnel and people in both hospitals and the Ambulance services. These are the benefits which accrue to having a more skilled work force in that it raises the morale of the staff concerned, it improves other aspects of their work apart from the treatment of trauma as they become more interested generally in the welfare of all patients carried and improves skills such as patient monitoring and the noting of incidents which becomes an important source of information for medical and nursing staff who are responsible for subsequent treatment. Unfortunately, these benefits too, are very difficult to quantify.

4.10 Summarising, the most pessimistic outlook on the benefits of extended training would suggest that a vehicle staffed for 24 hours per day, 365 days per year would expect to save about 3 lives per year in the event of cardio-pulmonary arrest (Hampton, 1978) and possibly another 1 or 2 from road accidents or other acute conditions (Baskett, 1976).

E. Relating Costs to Estimated Benefits.

5.1 As shown in paragraph 2.1, the costs of extended training vary from one area to another depending on the content and length of the taught courses, the amount of working time lost and the availability of hospital staff to provide the necessary training and supervision. The post-qualification costs vary in the main according to the amount of wage supplementation paid to staff following successful completion of

an extended training course. In order to convert the training course costs to an equivalent annual value it is necessary to treat the investment in the training of staff on a par with the investment in capital equipment and buildings. In the schemes examined, many of the staff undertaking extended training are under forty years of age and therefore likely to serve another 20-25 years. If the staff remain in the ambulance service, as they tend to do at the moment, it would not be unreasonable to discount the investment at 5% over 25 years to produce an annual equivalent value. This means that the current maximum costs of the schemes in paragraph 2.1 would be:

Scheme	<u>Training Costs</u> per trainee	<u>Post-Qualification Costs</u> per trainee	<u>Total (£ per year)</u> per trainee
	£	£	£
1	92	611	703
2	214	687	901
3	126	626	752
4	86	175	261
5	74	470	544
6	53	365	418

5.2 If we take the most conservative estimates of the present literature that a full-time emergency vehicle staffed every hour of every day by extended trained personnel will save the life of four or five people per year and take the most extreme assumptions about cost e.g. take the most costly scheme i.e. £901 and add £100 for extra maintenance of monitoring equipment, then the cost of providing 10 extended trained personnel per vehicle would be £10,010 per year. This gives an implied value of life of £2,502 - £2,002.* In the case of Area 4 where training in cardio-pulmonary resuscitation is not included in the course, the cost of training ten staff is £2610 and if this group of ambulance staff saved only one or two lives per year, the implied value of life is £2,610 - £1305. The most likely cause of high annual costs would be an increase in post-qualification wage supplementation which could add £120 - 150 per life saved for each £1 per week of extra supplementation for authorities who are now paying such a supplement.

* This covers the cost of the ambulance aid given, it does not, of course, include the cost of subsequent hospital treatment.

5.3 The problem of setting costs against life saved implies that the value of extended training is to be seen mostly in these dramatic terms. However, if the objective of extended training is to improve the management of trauma generally other measures might be used. For example, the cost per incident

$$= \frac{(\text{no. of persons trained} \times \text{cost per year})}{\text{no. of incidents}}$$

would give an indication of the costs per case where extended training skills are used. For the two services where data is readily available (Areas 2 and 5), the cost per incident is £250 (Area 2) and £192 (Area 5). A further possibility would be to relate costs to all emergency calls, in which case the cost per call will be around £3 - £4. The appropriate measure to be used* depends upon the way in which people view the objectives of extended training. The problem with these latter two measures is that there is no other programme to which the unit costs can be compared, whereas the implied value of life figure is comparable across other health care programmes or other public sector programmes (e.g. road safety investments).

5.4 Figures for "implied value of life" are based upon a single unit of 10 extended trained staff and one vehicle. As the numbers increase, there may be a reduction in the number of lives saved per vehicle thereby increasing the overall estimate for the "implied value of life"

* NOTE: Technically, the economic literature would suggest that one ought to develop measures in terms of the increased probability of saving life by use of extended aid skills. Unfortunately, the literature is not well enough developed to reach this level of sophistication. The nearest approach is the follow-up of people who are discharged from hospital after receiving out-of-hospital cardio-pulmonary resuscitation (Eisenberg et al., 1982). In this case there are data (not age or sex specific) on probability of surviving 1, 2, 3, 4 or 5 or more years but these figures cannot be extrapolated to probabilities of saving life at the time of first resuscitation. The other possibility is to use extra years of life expectation (quality adjusted) as in the recent report on bone-marrow transplantation (DHSS 1982) where an extra year of life achieved was costed between

£740 - £1360. Again, it is not possible from existing data to give such a figure for the use of extended ambulance aid where age and sex statistics are not quoted in the studies so far published. This brings us back to the implied value of life figures which are notoriously variable as demonstrated in recent discussions (Mooney, 1977). Mooney (p.159-161) shows that implied values of life vary from £50 (screening of women to prevent still-births) through to £1,000 (decision not to introduce child-proof containers for drugs) to £100,000 (legislation on tractor cabs) to £1 million (improved safety of trawlers) to £20 million (change in building regulations following collapse of Rowan Point high-rise flats). The current value of life used in road investment appraisals is approximately £123,000.

Appendix

THE SCHEMES.

- Notes:
1. Wage costs include employers N.I. and superannuation contributions and suitable allowance is made for holiday entitlement.
 2. Equipment costs are converted to equivalent annual values at 5% for the appropriate length of life.
 3. Cardiac monitoring/defibrillating equipment is costed although most of this is donated from charities, and is not, therefore, a charge on the Ambulance Service Account.
 4. All costs are based on April 1981 prices.

A. SCHEME 11. Pre-course examination

The pre-selection examination is open to ambulance staff who hold a current qualification in ambulance aide (The Millar Certificate) and have completed at least two years on the full range of duties. Those successful in the written examination are then interviewed to ensure that they have no personal problems which are likely to impede their progress on the training course. The selection tests occur in the candidate's own time.

2. Stage I - Cardiac Course - Hospital based

This course is provided at the hospital for both ambulance staff and qualified nurses on a part-time basis (1½ hours per week for 26 weeks). These lectures are followed by a four week (full-time) hospital based course. The same pass mark of 70% is required of all course members.

3. Stage II - Intubation and Infusion (2 weeks full-time - hospital based).4. Refresher training - hospital based - annually (1 week full-time).Resources usedAmbulance Staff time

	<u>Costs</u>	
	covered at	
	Time & a half	Double Time
Stage I P.T. Day Course		
- 39 hours	£136	£181
F.T. hospital course		
- 160 hours	£556	£742
Stage II - 80 hours	£278	£371
	—	—
Total	£970	£1294
	—	—
Refresher training - 40 hours	£139	£185

Tuition - 26 lectures @ 1½ hours = 39 hours given as part of normal hospital routine ∴ not costed.

Wages supplement

On completion of Stage I = £2.63 per week
 over 52 weeks + N.I. = £153 per year

On completion of Stage II = £3.90 per week
 over 52 weeks + N.I. = £228 per year.

Personal Equipment

Box and equipment = £150
 Equivalent annual value @ 5% for 5 years
 = £35 per year.

Ambulance Equipment

Cardiac monitor/defibrillator - present cost £3,120
 1 machine per 9 qualified men
 discounted at 5% over 5 years = £80 per person per year.
 maintenance costs of £3,000 p.a. for all vehicles = £750 p.a.
 per vehicle = £83 per person per year.

B. SCHEME 21. Pre-selection Examination (2 Hours)

Suitably qualified personnel are invited to volunteer for the pre-selection examination. Pre-examination courses can be held for anyone who wishes to avail themselves of the opportunity.

2. Short-term courses (2 days preliminary training at the Ambulance Training Centre followed by 4 weeks at Hospital).

This course consists mainly of a four week course at the hospital and is designed to give trainees an introduction to anatomy, physiology and the use of equipment and techniques used in the next part of the course. Each trainee completes an examination booklet which requires him or her to gain knowledge of the accident and emergency services, intensive care therapy and anaesthetics.

3. Long-term Course (2 days preliminary training at the Ambulance Training Centre followed by 12 weeks hospital training).

The long-term course has several elements in it. Firstly the development of the extended training skills and familiarisation with the relevant equipment and techniques. Secondly, attendance at 24 lectures on all aspects of immediate care. Thirdly, the staffing of the hospital mobile resuscitation unit.

4. Refresher training

Each extended trained person is given a week's refresher training once per year at a local hospital.

5. Number of Trainees

Each 12 weeks there are 2 long-term trainees plus 1 short-term trainee (4 weeks) and 6 (1 week) refresher course persons.

Resources Used

Ambulance Trainees Time

<u>Course</u>	<u>Location</u>	<u>Time</u>	<u>Cost at 1½ time</u>	<u>Cost at 2 time</u>
Pre-course selection exam	Ambulance Training Centre	2 hours	-	-
Pre-hospital course	"	16 hours	56	74
Short-term course	Hospital	160 hours	556	741
Pre-return course	Ambulance Training Centre	16 hours	56	74
Long-term course	Hospital	480 hours	1668	2223
		Total	<u>2336</u>	<u>3112</u>
Refresher courses	Hospital	40 hours	139	185

Nursing Officers' time administration of short and long-term hospital based course assessment work. 25% of salary costs @ 9 persons year = £238 = £155 + £83 refresher.

Ambulance Training Officers Time

Pre-course voluntary training
 Pre-hospital courses
 Administration of the scheme

16 hours for 2 staff + 16 hours for
 4 staff = £66 per person.

Lecture Time

24 lectures by visiting consultants - voluntary

Training Equipment

Intubation head	300	£3290 @ 5% over 10 years = £426 for 6 persons per year = £71 per person per year.
Infusion arm	74	
Cardiac Simulator	2916	

Post-qualification Equipment

Personal equipment box	£113 = @ 5% over 5 years = £26
Cardiac monitors/defibrillators	£3120 @ 1 per 3 qualified persons @ 5% over 5 years = £240 per person per year.

Post-qualification wage award £2.63 per week = £153 per year.

C. SCHEME 3

1. Pre-course examination - 1½ hours (own time).
2. Extended training course - 12 weeks full time hospital based - covered by relief staff.

This course is mainly taught by a nursing sister 6 weeks being used up in theoretical teaching and 6 weeks in various hospital departments. The course includes all three major modules of advanced training.

Resources UsedAmbulance Staff Time

Pre-course exam	- 1½ hours - own time
Extended Training Course	- 480 hours - covered by relief staff = £1257
Refresher course	- 40 hours - covered by relief staff = £105

Senior Instructor's Time = 10% of salary = £24 per course - £6 per person.

Sister tutor's time Salary + overheads = £7700 1 week = £171
 12 week course for 4 persons = £513
 1 week course for 4 persons = £43.

Post-qualification equipment

Box and equipment £300 @ 5% over 5 years = £69 per person per year.

Cardiac/defibrillator/monitor = £3120 @ 5% over 5 years
 = 17 for 49 staff = £250 per person per year.

Post-qualification wage supplement £2.63 per week = £153 per year.

D. SCHEME 4

This scheme does not include the technique of defibrillation and concentrates on intubation and infusion.

1. Selection Test 4 hours (working time)
2. Intubation and Infusion Course - Training Centre, Ambulance H/Q -
2 weeks (80 hours working time).
3. Hospital Course - 3 weeks (120 hours working time).
4. Refresher Course - twice per year 1 day at hospital and $\frac{1}{2}$ day at
Ambulance H/Q.

Resources Used

<u>Course</u>	<u>Time</u> Hours	<u>Cost</u>	
		<u>at 1$\frac{1}{2}$ time</u> £	<u>at 2 time</u> £
Selection Test	4	16	21
+ Travelling + subsistence		3	3
Intubation and Infusion	80	322	419
+ Travelling + subsistence		33	33
Hospital Course	120	483	644
+ Travelling + subsistence		50	50
	Total	907	1170
Refresher Course	12	48	64
+Travelling + subsistence	6	6	6
		54	70
		X2 108	140

Instructor's time 2 weeks for 12 staff per course = £35 per person.

Post-qualification Equipment £150 @ 5% over 5 years = £35 per year.

E. SCHEME 5

1. Pre-Selection Examination (2 hours)

The pre-selection examination can be taken by ambulance staff who hold a current certificate in first aid proficiency and have completed a minimum of two years on the full range of duties. The entrance examination requires an elementary knowledge of anatomy and physiology. A high standard is expected and the pass mark is 80%.

2. Pre-hospital Training Course (1 day per week for 5 weeks)

The pre-hospital Training Course is meant to give the personnel a grounding in the physics and chemistry of the human body. The syllabus is designed to introduce the trainees to anatomy and physiology and to the techniques and equipment they will use in the hospital based programme.

3. Hospital Training Course (4 weeks)

This part of the course is designed to give the trainee practical experience in the techniques of cardiac monitoring, defibrillation, intubation and infusion and each person follows a pre-designed programme of work in such departments as Coronary Care Unit, Venepuncture clinic, theatre, accident service and anaesthetics.

4. Post-hospital Cardiology Course (7 sessions of 2 hours)

This course is a set of lectures/tutorials given by a cardiologist and includes a more detailed study of the anatomy and physiology of the circulatory system, relevant pathology and the therapies and drugs available. The course is given in off-duty hours, usually in the evening.

5. Number of trainees per year = 12.

6. Refresher Training

A refresher course is provided annually for each extended trained person and is based in hospitals.

Resources UsedAmbulance Staff Time

<u>Course</u>	<u>Location</u>	<u>Time</u>	<u>Own or Working Time</u>	<u>Cost</u>	
				<u>1 1/2 time</u> £	<u>2 time</u> £
Pre-course selection	Ambulance Training Centre	2 hours	Own	-	-
Pre-hospital Course	Ambulance Training Centre	40 hours	Working	139	185
Hospital course	Hospital	160 hours	Working	556	741
Post-hospital follow-up	Ambulance Centre	14 hours	Own	-	-
Total				695	926
Refresher Course	Hospital	40 hours	Working	139	185

Lecture Time

Pre-hospital follow-up 14 hours lectures @ £15 per hour for 12 staff
= £18 per person.

Ambulance Training Officers' Time

Pre-selection course 2 hours
Pre-hospital course 40 hours 56 hours per 4 persons = £53 per person.
Post-hospital follow-up 14 hours

Training Equipment

<u>Item</u>	<u>Cost</u>	
Intubation head	300	
Infusion arm	70	@ 5% for 10 years @ 12 people per year = £46 per person per year
Cardiac arrhythmia simulator	450	
Cardiac monitor/defibrillator	3400	
	4220	

Post-qualification equipment

<u>Item</u>	<u>Cost</u>	
Personal box and equipment	100	@ 5% for 5 years = £23
Cardiac monitor/defibrillator	3400	@ 5% for 5 years for 3 persons = £262

F. SCHEME 6

This course concentrates on training in infusion and intubation techniques. Selection tests for the course include a written examination and personal interview. At present about 25-30% of volunteers proceed to the extended training course.

Stage 1 (Based at the Ambulance Training School)

Stage 1 consists of 3 one-week modules covering anatomy, physiology and the development of skills for endotracheal intubation and intravenous infusion

Stage 2 (Day release course - Ambulance Training School - 24 attendances)

This stage includes practical and theoretical training in the training school and outside on field work exercises. The course is given by Ambulance Instructors, a General Practitioner and a Consultant Anaesthetist.

Stage 3 (Hospital based)
and 4

Each trainee is seconded for two weeks of hospital practice including introductory training and practical training in the pathology, outpatient and coronary care departments. Each afternoon of this course involves practical training in the use of intubation and infusion techniques.

Number of trainees per course = 10.

Refresher Training is given as and when required and consists of one week's training in hospital.

Resources Used

Working time = 120 hours Stage 1
 144 hours Stage 2
 80 hours Stage 3 and 4
 ———
 344 hours.
 ———

The cost of cover for the last course for 10 students was supplied from Station records and totalled £3,192 including employers' National Insurance and Superannuation Contributions.

	£
	3,192
Teaching expenses and meals	768
Instructors' salaries	2,000
Doctors' fees and expenses	161
Disposable items used in training	334
	<hr/>
	6,455
*In addition there are administrative costs estimated at	355
*and the use of premises estimated at	250
	<hr/>
	7,060

for 10 students the average cost is £706 per person trained.

*These are very difficult amounts to cost given the mix of training that is taking place in the authority and this represents the best estimate that the service can provide from existing records.

This course also included one officer whose absence was not covered by overtime working. It is possible therefore that a course of 10 staff all covered by overtime working might add £350 to the above total giving a cost of £741 per person trained.

Refresher training

If staff have 1 week course per year covered by overtime the cost will vary between £139-£185 per person.

Post-qualification costs

Wage Supplementation

Extended trained staff are paid £2.63 per week supplementation
= £153 gross per year

Equipment

10 vehicles are equipped with Infusion and Intubation equipment of which £246 is durable equipment. At 5% discount rate over 5 years this gives an equivalent annual cost of £57 per vehicle. With 21 trained staff, the cost is £27 per trained person.

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PART II

Extended Training of Ambulance StaffCosts of the Recommendations on Extended Ambulance Aid Training.

These cost estimates are for the provision of extended ambulance aid training, they do not include the extra operational costs which might be incurred as a result of employing extended trained staff.

A. Entrance Examination

The entrance examination is to be 2 hours. Presently in most existing schemes this element is taken in the staff's own time. However, if in future staff may be paid for taking the examination and for travelling it would be better to include some costs for this stage say

* 3 hours at 1½ time = 12.00
at 2 time = 15.00

if care includes equal mix of overtime
working at 1½ time or double time

Cost of cover = £13

B. Stages I & IIPre-Clinical and Clinical Training

1. Cost of cover for 4 weeks @ 1½ time = £615
@ 2 time = £820

If cover includes equal mix of overtime
working at 1½ time & double time = £717.

2. Residential and ambulance tuition fees 4 weeks at £112 per week = £448.

Ø3. Clinical tuition fees 24 sessions @ £15 per session
= 360 = £30 per person £30

* Note: prices are based on rates of pay at 1st April 1983 and include employment costs such as National Insurance and Superannuation. London weighting has not been included, since London Ambulance Service has its own scheme and that has been costed separately.

Ø Note: Fee based on present sessional rate in authorities paying for clinical lectures to extended trained staff.

+ 4. Nursing tuition fees 35 hours @ £3.7 per hour
= £130 = £11 per person £11

5. Training Equipment

The costs of Regional Training Centres would normally include the costs of equipment such as Intubation Heads, Cardiac Simulators, Defibrillators and training mannequins. However, if authorities wish to make such equipment available locally so that staff can practise the appropriate techniques to maintain their skills, the cost of equipment from other schemes is around £4,500 which discounted at 5% over 5 years gives an annual equivalent cost of £1040. Assuming use by 50 trainee or trained staff gives a cost of £21. £21

Total cost of stages I & II = £1227

C. Stage III

Hospital Training - 4 weeks

1. Cover for Staff 4 weeks @ 1½ time = £615

4 weeks @ 2 time = £820

If cover includes equal mix of overtime working at 1½ times and 2 times cost = £717

2. Co-ordination The progress of trainees through the various procedures they are learning to undertake will be monitored by nursing, clinical or ambulance staff. For the purposes of this exercise, the costs have been derived from the one scheme where a Nursing Officer devotes about 25% of her time to monitoring progress, setting examinations and arranging lectures. Since this last duty will now be replaced by the clinical lectures in Stage II it might be more reasonable to take 20% of time. The Nursing Officer usually has nine trainees per year

∴ the cost per person is $\frac{1}{9} \times \frac{1}{20} \times \text{Nursing Officer Salary} + \text{overheads}$

$= \frac{1}{180} \times 9474 = £53 \text{ per person.}$

Cost per trainee Stage III = £770.

+ Note: based on hourly rate for Sister Grade II as used in authorities paying for nursing lectures to extended trained staff.

D. Refresher Course

1. Cover for 24 hours @ $1\frac{1}{2}$ times = £92
@ 2 times = £123

Cost if overtime is mixed equally between
 $1\frac{1}{2}$ and double time = £108 per person.

<u>Total Costs.</u>	A. Entrance Examination	13
	B. Stages I & II	1227
	C. Stage III	770
	D. Refresher	108
	Total	<u>£2118</u>

Extended Training of Ambulance StaffSummary Cost Statement.

	Cost per Trainee
A. <u>Entrance Examination</u> 2 hours	£
Cover for staff attending	13
Total Pre-entrance	<u>13</u>
<u>Stages I & II</u>	
<u>Pre-Clinical & Clinical</u> 4 weeks	
Cover for staff attending	717
Residence and ambulance aid instruction	448
Clinical Instruction	30
Nursing Instruction	11
Training equipment	21
Total Stages I & II	<u>1227</u>
<u>Stage III</u>	
<u>Hospital Practice</u> 4 weeks	
Cover for staff attending	717
Co-ordination	53
Total Stage III	<u>770</u>
<u>Refresher Course</u> 3 days	
Cover for staff attending	<u>108</u>
Total Cost =	<u><u>£2118</u></u>