Resuscitation training of paediatricians

F Jewkes, B Phillips

Intensive, didactic courses teaching resuscitation training are currently not only very popular, but are also required curricula content for certain aspects of medical training. There are a number of such courses available in the field of paediatrics, each with a different emphasis and target audience. They are not inexpensive, as they utilise large amounts of training equipment and have a high instructor to student ratio. This review will examine the course structures, instructor training, the need for such courses, and effect they may have on patient outcome.

Children have the right to expect the same standard of care as that afforded to adults, suitably adapted to their particular requirements. With the advent of evidence based medicine, it is expected that the junior doctor in paediatrics is equipped not only to attend to the basic initial management of a very sick child, but also to address all aspects of immediate care to preset standards in a logical, sequential, and timely fashion. It is therefore important that the doctor has been taught the knowledge and skills required to face the task clearly, concisely, and in a manner to allow easy recall. In the resuscitation room, delays of even seconds may affect the outcome adversely. Simple guidelines (such as those for basic and advanced paediatric life support) have therefore been created by experts, based on best available evidence, to allow rapid decision making at a time of crisis.1-4

IS THERE A NEED FOR TRAINING?
Repeated studies of paediatric junior staff in the UK and in other Western countries have shown both a lack of knowledge and a poor ability to carry out basic lifesaving skills.5 6 In the UK, Buss et al surveyed 88 junior paediatricians in 1992 and asked a variety of questions about basic resuscitation. Knowledge was poor—only 9% had had formal training in emergency paediatrics and 94% expressed a desire for further training.7 The situation remained poor in 1996, when 57 middle grade doctors were questioned about cardiac arrest protocols and only 26% provided answers compatible with European Resuscitation Council (ERC) guidelines. Thirty per cent had received in house training in emergency paediatrics, but only 9% were trained in Advanced Paediatric Life Support (APLS).8 More recently in the USA, where PALS training is compulsory at a junior level of training in paediatrics, senior residents still lacked adequate performance in basic resuscitation skills, although their theoretical knowledge and confidence levels were good.9 Currently, in addition to the advice of the Royal College of Paediatrics and Child Health that paediatricians should undertake an APLS course, other documents concerned with maintenance of quality care, such as the National Confidential Enquiry into Perioperative Deaths, also recommend that staff working in centres that receive injured children should be familiar with APLS guidelines.10

TEACHING THE NECESSARY SKILLS AND KNOWLEDGE
These intensive, short courses in resuscitation were pioneered in the United States, the first courses being for adult care. Other courses followed, including the Pediatric Advanced Life Support Course (PALS) in 1988. PALS has been running in the UK in its original American form since 1992. The APLS course was developed in the UK, and was piloted in 1992. Over the past 10 years other, similar resuscitation courses have sprung up, of which those relevant to paediatrics are summarised in table 1.

GENERAL COURSE OVERVIEW
All the courses have a similar structure and present clinical material in a systematic way known as “ABC”-This approach dictates that the pathology most likely to threaten the patient’s life is examined and treated first. An airway problem, (A), will kill the patient before a breathing problem and will therefore be addressed immediately. Breathing (B) requires more urgent attention than a circulatory problem (C). D represents disability (neurology) which, in turn, is less urgent than C. E (exposure of the patient) is undertaken when A, B, C, and D have been stabilised. While this is logical, it is contrary to the way in which medicine is traditionally taught, where the history and full examination are completed before treatment is commenced.

The course manual (often obtainable as a stand alone publication) is sent to candidates before the course begins and the candidate is expected to read and learn the material. To facilitate this and provide feedback on knowledge retention, a precourse multiple choice examination paper is completed by the candidate and brought to day one of the course, marked, and returned. The courses themselves comprise a knowledge section, presented as lectures, sometimes with the

Abbreviations: ACLS, Advanced Cardiac Life Support; ALSG, Advanced Life Support Group; APLS, Advanced Paediatric Life Support; ATLS, Advanced Trauma Life Support; ERC, European Resuscitation Council; GIC, Generic Instructors Course; NLS, Neonatal Life Support; PALS, Pediatric Advanced Life Support
The course itself has also been extensively revised, with new course materials, including a CD-ROM with instructor material and slides being available from the beginning of 2001. An interactive CD-ROM for candidates can also be purchased. This contains still pictures and video clips of signs and procedures, and also a revision and self-assessment facility, both for precourse preparation and for post-course revision.

The course is divided into three days—the first day teaches life support skills, recognition of serious illness, and management of cardiac arrest; the second, paediatric medical emergencies; and on the final day the emphasis is on the management of major trauma. The prevention of cardiac arrest and early recognition of serious illness are stressed throughout the course. Lectures and case directed workshops aim to consolidate knowledge gained from the course manual. The skills required to treat seriously ill children are undertaken on the first and third day and include basic skills such as airway management, as well as more advanced skills such as venous cutdown and surgical airway.

To provide integration of skills and knowledge, scenarios are practised on each day. Basic life support and airway skills are tested during the course and, on the final day, there is a test comprising a multiple choice question paper and a scenario. A special module for nurses has been designed to ensure that the course material is relevant to their practice. Successful completion results in certification that must be reverified every four years. Two other courses have also been designed to complement APLS and promote seamless patient care—the one day Paediatric Life Support Course, for more junior staff less likely to encounter children with life threatening emergencies, and the Prehospital Paediatric Life Support Course for those attending critically ill children before arrival at hospital. APLS is required for higher professional training in paediatrics and emergency medicine. APLS is accredited, developed and administered by the Advanced Life Support Group, and has been adopted by the European Resuscitation Council and others for paediatric training.

### Table 1: Summary of major paediatric life support courses in the UK

<table>
<thead>
<tr>
<th>Course</th>
<th>Organising body</th>
<th>Subject</th>
<th>Duration (days)</th>
<th>Audience</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Paediatric Life Support (APLS)</td>
<td>ALSG</td>
<td>BLS and ALS for children: Paediatric emergencies, including serious illness and major trauma; some neonatal life support</td>
<td>3</td>
<td>Paediatricians, Emergency medicine doctors, Some anaesthetists, Senior paediatric nurses</td>
<td>Recommended for higher professional training for paediatrics and accident and emergency in the UK</td>
</tr>
<tr>
<td>Neonatal Life Support (NLS)</td>
<td>RC (UK)</td>
<td>Neonatal resuscitation</td>
<td>1</td>
<td>Midwives, Paediatricians, GPs</td>
<td></td>
</tr>
<tr>
<td>Paediatric Life Support (PLS)</td>
<td>ALSG</td>
<td>BLS and ALS for children: Recognition of paediatric emergencies</td>
<td>2</td>
<td>Doctors and nurses involved in paediatric care</td>
<td></td>
</tr>
<tr>
<td>Pediatric Advanced Life Support (PALS)</td>
<td>RC (UK)</td>
<td>BLS and ALS for children: Recognition of paediatric emergencies; Some neonatal life support</td>
<td>2</td>
<td>Doctors and nurses involved in paediatric care, Franchised by the American Heart Association</td>
<td></td>
</tr>
<tr>
<td>Prehospital Paediatric Life Support (PPALS)</td>
<td>ALSG</td>
<td>Prehospital paediatric emergency care</td>
<td>2+</td>
<td>OPs, Paramedics, Some nurses, Emergency medicine staff</td>
<td></td>
</tr>
</tbody>
</table>

### APLS

This course was developed in the UK by a group of specialists in emergency medicine, paediatrics, anaesthesia, and surgery and was piloted in 1992 under the aegis of the British Paediatric Accident and Emergency Group, a specialty group of the Royal College of Paediatrics and Child Health. Its stated remit is to “teach doctors and nurses the skills and knowledge required to treat children with life threatening illness or injury in the first hour after presentation” and its target audience is doctors and senior nurses who are likely to encounter critically ill children on a regular basis. A 300 page book accompanies the course, also available as a stand alone purchase, and is now into its third edition. The course itself has also been extensively revised, with new course materials, including a CD-ROM with instructor material and slides being available from the beginning of 2001. An interactive CD-ROM for candidates can also be purchased. This contains still pictures and video clips of signs and procedures, and also a revision and self-assessment facility, both for precourse preparation and for post-course revision.

### PALS

PALS was piloted in the USA in 1988 and came to the UK in 1992. The course is open to all health care providers, covers all aspects of resuscitation, and provides a general approach to resuscitation. The course manual, which can be purchased separately, is approximately 160 pages in length. Recognition of serious illness and prevention of cardiac arrest are emphasised. The course reflects an overall ABC approach throughout the two days rather than concentrating in depth on specific disease processes, although trauma and neonatology are discussed in both lectures and interactive stations. Lectures support the book and there are skill stations on basic life support, airway, vascular access, and defibrillation. Interactive stations are designed to promote understanding and integration of course material. There is a multiple choice, basic airway, defibrillation, and scenario exam at the end of the course.
PALS is administered overall by the American Heart Association and in the UK by the Resuscitation Council (UK).

It is probable that PALS will eventually cease in the UK, being replaced by a new European Resuscitation Council course (see below). However it continues to be run extensively throughout the UK at the present time.

NLS
NLS is a one day course about resuscitation at birth. Designed on the same lines as the other two courses, a course manual is available and lectures are supported with skill stations pertinent to neonatal resuscitation. Integration takes place with scenario practice and there is a final examination on airway management as well as a multiple choice questionnaire. NLS is administered by the Resuscitation Council (UK) and is based on the successful Northern Neonatal Network course.

This course is aimed at SHOs starting in neonatology and at midwives.

INSTRUCTOR TRAINING

Education may be defined as “a planned experience that leads to a change in behaviour”. To be effective, adult learning must have relevance and involve the learner. In addition, most adults learn best when they have set objectives, receive positive feedback, and are allowed to reflect on the overall process. Many doctors and nurses have never learned how to teach and indeed their previous exposure to learning may have been negative. Much research therefore has gone into teaching methodology for modern resuscitation courses, and the recognised principles of adult learning are reflected in the course that has been developed to train instructors.

The Resuscitation Council (UK) and the ALSG have agreed that it is only appropriate to have one (Generic) Instructors Course (GIC) for APLS, NLS, and PALS and indeed their previous exposure to learning may have been negative. Much research therefore has gone into teaching methodology for modern resuscitation courses, and the recognised principles of adult learning are reflected in the course that has been developed to train instructors.

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DO THEY WORK?

There are a number of difficulties in establishing whether patients have an improved outcome when cared for by those who have undertaken a paediatric life support course, but accumulating evidence suggests that this may be the case.
the recertification time periods for the courses are too infrequent for optimal skill retention. To recertify more frequently would be impractical in terms of absence from work, instructors required to teach, and other resources. One alternative under consideration is an initial course, followed by a planned programme of reinforcement. The APLS interactive CD-ROM will enable students to undertake revision study and self assessment as their own needs dictate. Information technology may soon also allow more interactive resuscitation software⁷ to allow some form of scenario practice and thus skill and knowledge integration.

OTHER COUNTRIES
The American Heart Association’s PALS course has been widely used, especially in South America. APLS has been introduced to a number of countries worldwide, including Australia, New Zealand, South Africa, and several other European countries. APLS allows minor adaptations according to the needs of the country—for example, Australia has introduced a workshop on envenomation. Variations in protocols also have been made for countries which do not have the same drug availability as the UK, but the basic principles of patient management are maintained. There is evidence from other similar courses that this type of teaching may benefit patient outcome in less developed countries.⁸ In conjunction with Child Advocacy International, a charity dedicated to improving hospital care and advocacy for children in the poorest countries, APLS, together with courses for maternal and newborn health, are developing a course relevant to the needs of developing nations.

THE FUTURE
The European Resuscitation Council is working to introduce a course for paediatric training. This will include basic and advanced life support for children, resuscitation at birth, and resuscitation in trauma, but not the management of life threatening illness. The course is under discussion by a multinational group chaired in Belgium and was piloted in Italy in October 2002. It is likely that if the course meets the needs of UK training requirements for resuscitation, it will replace the American Heart Association PALS course run by the Resuscitation Council (UK), but will not replace APLS.

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Authors’ affiliations
F Jewkes, Avon Valley Practice, Upavon, Pewsey, Wils, UK
B Phillips, Royal Liverpool Childrens Hospital, Alder Hey, Liverpool, UK

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