

Paediatric and Neonatal Resuscitation

M S Kibirige,

Consultant Paediatrician, South Cleveland Hospital
Marton Road, Middlesbrough, TS4 3BW England. Phone 01642 854869 Fax 01642 854636
Email: M.S.Kibirige@ncl.ac.uk

Resuscitation:

Saving lives is the primary responsibility of secondary care services. Many patients arrive in hospitals when they are acutely ill and are hoping for rescue treatment that will save their lives, but also deal with the primary cause of the acute illness. It is therefore important that all staff involved in the care of such patients is adequately trained and proficient in delivering that service.

Resuscitation can be defined as the act of reviving. Many of our patients who are acutely ill do require resuscitation, if further treatment is to be effective and successful. Thus, the necessity for resuscitation is not questionable.

In Mulago teaching hospital many children are admitted via the acute care unit (assessment unit) and babies in the maternity unit as well as those in special care baby unit do require resuscitation. In this paper I have tried to discuss the various components of resuscitation, provide experience of the training programme, that has recently been performed and the results.

Basic life support (BLS): BLS comprises the following elements: initial assessment, airway maintenance, rescue breathing (expired air ventilation), and chest compression. Thus, in BLS, no equipment is employed: where a simple airway or facemask for mouth to mouth ventilation is used, this is defined as basic life support, with airway adjunct. It is important to recognise that BLS should maintain adequate ventilation and circulation until means can be obtained to reverse the underlying cause of the arrest. Although it is a holding operation it may reverse the cause and allow full recovery. This is particularly applicable to many children and neonates where the primary pathology is respiratory.

Failure of the circulation for 3-4 minutes will lead to irreversible cerebral damage. Delay, within that time, will lessen the eventual chances of a successful outcome. Emphasis must therefore be placed on rapid institution of BLS by a rescuer, who nonetheless should follow the recommended sequence of action.

Mouth to Mouth:

Historians will know that the earliest reference to mouth to mouth ventilation is the biblical revival of a child by the prophet Elisha. The first medical report however, was in 1744, by Tossach. In the 1950's mouth to mouth ventilation became accepted universally, as the method of choice. This however, does not seem to be practised by many practitioners for various reasons, which include the fear of contracting contagious diseases from the patients.

Chest Compression:

Chest compression or cardiac massage also referred to as external cardiac massage reflects the theory as to how chest compressions are achieved and artificial circulation by squeezing the heart. The recommended rate of 100 per minute reflects a compromise between scientific evidence in favour of fast compression and the ability of the rescuers to maintain the higher speeds. Even when performed optimally, chest compressions do not achieve more than 30% of the normal cerebral perfusion. This however is much better than doing nothing.

With this background it is obvious that there are three basic elements of basic life support after initial assessment and are commonly remembered as **A/B/C**: airway/breathing/circulation.

The basic principles of resuscitation:

These include a **SAFE** (**S**hout for help, **A**pproach with care, **F**ree from danger and **E**valuate) approach, ABC and practical manoeuvres, which are highlighted in the manuals for resuscitation, which are provided for participants (1,2).

Such details will therefore not be included in this paper. The paediatric life support (PLS) and neonatal life support (NLS) constitute of BLS, advanced airway management and management of the common primary pathology scenarios. Such details will not be included in this paper as space does not allow for that. APLS constitutes of BLS, PLS, NLS, trauma and transport.

However, it is important to note that many children arriving in acute care unit may be moribund due to cerebral malaria, gastroenteritis, upper and lower respiratory tract infection, septicaemia and meningitis, diabetic keto-acidosis, complications of measles and severe anaemia. Thus it is important that such common problems in this environment must be emphasised during scenario sessions.

In maternity or special care baby unit, neonatal asphyxia, hypoglycaemia, meconium aspirations, infections and congenital heart disease and other malformation may contribute to situations that necessitate urgent resuscitation.

Who needs to learn how to resuscitate?

The information highlighted above dictates that all those members of staff, medical or nurses and other carers must be proficient in BLS. They should also be able to provide either PLS or NLS depending on their areas of practice.

The staff in acute care units, special care baby units, accident and emergency, theatres, intensive care units and x-ray departments must be trained. This

Should not only be applicable to government hospitals, but all private practitioners and institutions that look after children. It is envisaged that unnecessary deaths can only be avoided if a team approach is similar to all practitioners. It is also important to have written guidelines for practical management purposes and to know when to stop resuscitation.

Training in Mulago Hospital Department of Paediatrics and Child Health: A training programme has been instituted at Mulago teaching hospital, department of paediatrics to run a half- day BLS training course, a one-day PLS training course, a one- day NLS training course and 3-4 days APLS training course. The latter course is much more intensive and has only been done once.

Pre-training reading is strongly recommended. The training covers theory and practical scenarios. There is a pre and post training theoretical test and there is a post training practical test, after which a candidate can be declared successful. The candidates who distinguish themselves are recommended to learn to become instructors. The programme can be self-propagating and allow cascade of knowledge.

APLS (modified for Uganda) training programme:

Methodology:

A paediatrician from the department of paediatrics from Mulago attended an APLS course in England, which she passed. PLS was set up and run by two paediatricians (1 local and 1 from England) and a nurse from England. A faculty of 7 instructors was set up with six from overseas and the local paediatrician. The faculty also consisted of 2 nurses; one of which was the resuscitation training co-ordinator and the other one had been working in Mulago hospital for a year. It was agreed that 12 candidates would be taken through the modified APLS. The 12 candidates consisted of 8 doctors and 4 nurses. Before the training started all candidates were given a test on the theory in the training manual.

Results and Discussion:

| | Pre-training | Post- training |
|-----------------------|--------------|----------------|
| Modified APLS: | | |
| Theory | 84%(63-95%) | 84%(72-95%) |
| Practical (pass) | | 83% |
| Potential instructors | | 7 out of 12 |
| NLS: | | |
| Theory | 74%(50-86%) | 82%(72-92%) |
| Practical (pass) | | 100% |
| Potential instructors | | 7 out of 12 |

Although the average score in theory on APLS did not improve, the range improved from a lower margin of 63% to 72% and one candidate did not complete the training. Practical resuscitation scenarios were passed in 83% with a 17% failure. It is important to note however; that all the candidates who had done a one-day PLS course prior to doing the APLS passed.

Thus in this in this set up it is very important for people to do the one day PLS course as this covers the basic principles and many areas of their clinical practice. This also gives an opportunity to candidates to get used to the objective structured practical performance and team- work.

On the NLS course we had the same 7 instructors from the faculty. There were 12 candidates, but of these 12, 4 nurses worked in special care baby unit. The pre-training test average score was 74% with a range of 50-86%. The post training theoretical score increased to 82%, with a range of 72-92%. The performance on the practical scenario test, all candidates passed.

7 of the 16 candidates who did the course were identified as potential instructors. 4 of these were potential instructors for both PLS and NLS. One person was proficient to provide for PLS and 2 were proficient to provide for NLS. Thus a 3 day modified programme would be able to train 16 people with a possibility of identifying future instructors.

Since the inception of the training programme, PLS and NLS training courses have been done by the local team of instructors, and a resuscitation officer has been identified.

In summary, resuscitation is part and parcel of our daily clinical practice. It is essential for all those who come in contact with acutely ill children. The training is achievable within a day. PLS training is strongly recommended as it alters not only perception but also the clinical practice by all involved. Most important of all it saves lives.

References:

1. Advanced Paediatric Life support The Practical Approach; 3rd edition. Eds: Mackway-Jones K, Molyneux E, Phillips B, and Wieteska S. Pub BMJ 2001.
2. Newborn life support Manual. Ed. Richmond S. Publ. Resuscitation Council(UK) 2001

Table 1.

Modified APLS course content:

1. Recognition of the seriously ill child
2. Basic life support and Initial test
3. Airway and Ventilation
4. Skill stations for 2 and 3
5. Management of cardiac arrest
6. Cardiac and Airway Scenario Demonstration
7. Scenario teaching session on airway and cardiac
8. Respiratory emergencies
9. Shock
10. Coma and Convulsions
11. Workshops on seriously ill child covering fluids and electrolytes, septic and sick child, neurological Assessment with and without laboratory support.
12. Trauma scenario demonstration, including initial assessment and management.
13. Trauma to head and neck, spine, chest, abdomen and genito-urinary tract.
14. Final test
15. Feedback

Table2.

NLS Training course content:

1. History and physiology
2. Resuscitation at birth
3. Special cases
4. Intubation
5. Skill stations covering Equipment, vascular access and Airway management
6. Scenario demonstration
7. Testing
8. Feedback session.

Table3.

Equipment:

- | | | |
|--|------------------------|-----------------|
| 1. Manikins: resuscitation baby, airway baby training, | Chest Torso, and child | |
| 2. Suction equipment | Laryngoscopes | |
| Airways | Fluid giving sets | Chest drains |
| Cannula | Intraosseous needles | Collars |
| Syringes | Needles | Baycast plaster |
| Bag/valve masks | Stethoscopes | feeding tubes |
| Forceps/scissors | Scalpels | Sutures |
| Bandages | Sterets | Tape |
| Seldinger Catheter | Manometer pieces | Pocket masks |
| Endotracheal tubes | Nasogastric tubes | Catheters |
| Extension sets, | | |