

Paediatric module for DAN Basic Life Support and Automated External Defibrillation

Student book / EN

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Editor: Massimiliano Stirparo
Authors: Guy Thomas, Massimiliano Stirparo
Contributors: Jeff Myers
Photos: Jenny Brover, Massimiliano Stirparo

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Medical Programme Coordinator: Prof. Alessandro Marroni
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Divers Alert Network Contact Information

DAN Southern Africa
Private Bag X197, Halfway House, 1685
DAN Building, Rosen Office Park
Cnr Invicta & Third Roads
Halway Gardens, Midrand
Tel: +27 11 266 4900
Fax: +27 11 312 0054
Website: www.dansa.org
Email: training@dansa.org

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The publication (for educational purposes) of images of children present in this manual have been authorised by their parents/guardians, and respect the standards and regulations of privacy and protection of minors.

DAN Training would also like to thank all those individuals that assisted in the development, creation and testing of the training materials for this program.

Introduction



Program Purpose

Most medical emergencies with children are most likely to be handled by providers without, or with limited, medical background. Many children do not receive BLS at all, due to fear of doing something wrong or making the situation worse, particularly in the case of providers who have not been taught paediatric care or resuscitation.

Knowing infant and child BLS, which includes learning how to deal with breathing emergencies such as choking, is a step one can take towards preventing unnecessary death in infants and children. Basic care for breathing and cardiac emergencies in infants and children should be given until advanced medical personnel arrive and take over care.

Those participating in the normal DAN Basic Life Support program may be parents or have a responsibility for children. This can be a useful supplement to the standard courses, specifically designed for parents or child/infant caregivers.

Disclaimer

This material should only be used in conjunction with a DAN BLS or BLSD Course. It is not sufficient as a stand-alone program, as there is no review of other life threatening medical emergencies which are treated in the same way as adults. It is designed as a supplementary program.

Paediatric Basic Life Support

1.1 Description of the Problem

According to research in Finland by the Critical Care Medicine Research Group, Tampere University Hospital, out-of-hospital cardiac arrest in children occurs most commonly (88%) in a non-public location, such as the residence. The majority (66-77%) of arrests are not witnessed and the bystanders initiate cardiopulmonary resuscitation (CPR) in only 23-35% of cases. Bystander use of an automated external defibrillator is practically nonexistent. The most common causes of arrest have been reported to be sudden infant death syndrome, trauma, and respiratory.



The overall survival to hospital discharge after paediatric pre-hospital cardiac arrest is low with the reported percentages of 2.0-9.6%. Survival to hospital discharge is more common among children and adolescents than in infants.

A life-threatening medical emergency is outside the range of the usual human experience, it has the potential to easily overcome a person's normal abilities. The emotional, most likely parental, bond between (potential) rescuer and child increases the incident stress levels tremendously. This emotional impact can be sufficient to overwhelm the effective coping skills of a rescuer. Handling this incident stress requires knowledge, confidence and skill. That's the easy part, some basic training, regular refresh and practice, will do the trick.

Rescuers who have only been taught adult BLS and who have no specific knowledge of paediatric resuscitation may use that adult sequence, as the outcome will be far worse if they do nothing. Non-specialists who wish to learn paediatric resuscitation because they have responsibility over children (e.g. teachers, school nurses, lifeguards and also parents) should be taught to modify adult BLS and perform five initial breaths followed by, if they are alone, approximately 1 minute of CPR before they go for help. Furthermore they should get acquainted with some resuscitation techniques for infants and children.

Paediatric Resuscitation

Children and infants are still developing and should be handled with care. With the knowledge and experience you have from your BLS course you can imagine that it is not advisable to do 2-hand resuscitation on an infant. Infants and children do not have the lung capacities of adults, so this technique also needs to be adapted to them.

The differences between adult and paediatric resuscitation sequences are largely based on differing medical causes. Primary cardiac arrest is more common in adults, while children are more likely to suffer from secondary cardiac arrest. For example, but not limited to, respiratory arrest causes severe low oxygen levels in the arteries and low blood pressure, which eventually leads to cardiac arrest. Children are very responsive to lack of oxygen and thus they should get 5 initial rescue breaths before starting chest compressions. A lone rescuer should give 1 min of CPR before leaving the child to get help.

Rescue breaths

2.1

Rescue breathing is the single most important step in rescuing a non-breathing child or infant. If repeated rescue breathing attempts do not result in achieving airflow into the lungs, the airway maybe obstructed.

Open the child's mouth and remove any visible obstruction making sure you do not push the blockage further down and do not perform a blind finger sweep. Check head tilt and chin lift, make sure that the neck is not extend too far back. If after 5 attempts you are not able to achieve effective breaths, move on to chest compressions.

Blow steadily into the infant's or child over 1 to 1,5 seconds, sufficient to see the chest rise. Remember that an infant needs less air than a larger child or an adult. You should adjust your rescue breaths accordingly. Note that although you breathe less volume into the child or infant, the time needed is a bit longer than adult breathing (1 second), so go slowly.

2.2 Using a face shield or oronasal resuscitation mask

Personal protection is important. Although there is a minimal risk, it should not be ignored, particularly when providing care for an unknown child or infant.

Face shields are very compact and can easily be carried with you at all times, for example as a key ring. After you have checked for normal breathing, place the plastic shield over the child's face and ensure that the filter is over the mouth. Tilt the head back and lift the chin. Pinch the nose and deliver breaths through the filter. An oronasal resuscitation mask is sturdier and has a filter and valve which you breathe through. Place it over the mouth and nose, place the narrow end towards the body (the opposite direction to adults). Open the airway and ensure there is a proper seal on the child's skin. Give breaths through the mouthpiece.

2.4 Chest Compressions

Chest compressions for children and infants should be done on the lower part of the chest bone. To avoid compressing the upper abdomen, locate the xiphoid process by finding the angle where the lowest ribs join in the middle, compress the width of one finger above that point. Or put one finger on the imaginary nipple line and compress the chest below this finger.

Depress the chest bone by at least one third of the height of the chest. Do not be afraid to push too hard: "Push hard and fast". Let the chest bone fully bounce back, but keep your fingers, hand or hands in contact with the chest.

Compress the chest at a rate of at least 100 compressions per minute, but not exceeding 120 compressions per minute.

In larger children or for smaller rescuers, it may be advised to use both hands with fingers interlocked, as you have already learned for adults.

Compress the chest to at least one third of the anterior posterior chest diameter in all children (i.e., approximately 4 cm in infants and approximately 5 cm in children).



Fig. 1:
Key ring with the face
shield inside



Fig. 2:
Oronasal
resuscitation mask

When to call for help

2.3



Fig. 3:

112 is the emergency telephone number that can be dialed in order to reach emergency services. In the UK the numbers 999 and 112 can be used interchangeably.

When more than one rescuer is available

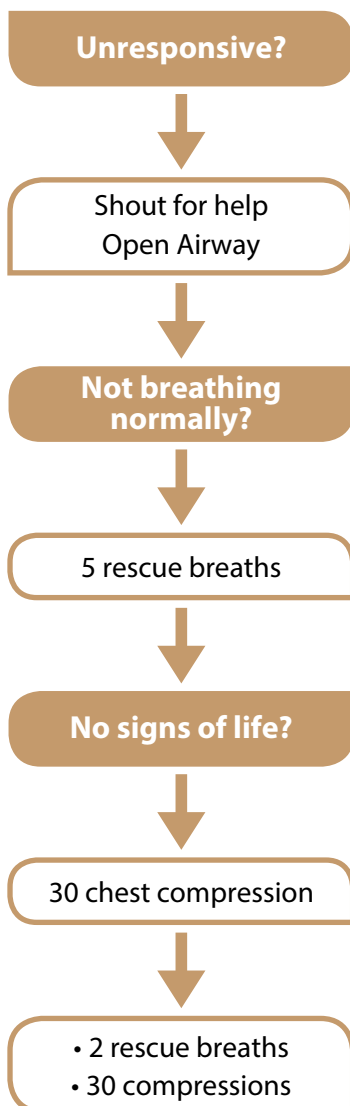
- One starts resuscitation, the other calls for help

Only one rescuer

- Use your mobile phone or start CPR for 1 minute, before you call for help
- Minimise interruption in CPR, it may be possible to carry an infant or small child with you

The only exception to performing 1 minute CPR before going for help is in the case of a child with a witnessed, sudden collapse when the rescuer is alone. In this case, cardiac arrest is likely to be caused by an arrhythmia and the child will need defibrillation. Seek help immediately if there is no one to go for you.

Paediatric Basic Life Support Lay Rescuer (overview)



*After 1 minute of CPR call national emergency number (or 112),
then continue CPR*

Skill

Child Resuscitation



4

- **Ensure the safety of rescuer and child**

Make sure that you and the child are safe, locate first aid equipment such as an AED and personal protection

- **Check the child's responsiveness**

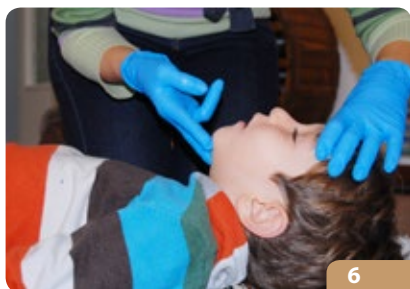
Gently stimulate the child (*Fig. 4*) and ask loudly: are you all right?



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- **IF THE CHILD RESPONDS BY ANSWERING OR MOVING**

- Leave the child in the position in which you find the child (provided that the child is not in further danger). Try to find out what happened and get help if needed. Re-assess the child regularly



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- **IF THE CHILD DOES NOT RESPOND**

- Shout for help (*Fig. 5*); try to get attention from someone around you. Turn the child carefully on to his/her back and open the airway by tilting the head and lifting the chin
 - Place your hand on the child's forehead and gently tilt the child's head back (*Fig. 6*). At the same time, with your finger tip(s) under the point of the child's chin, lift the chin. Do not push on the soft tissues under the chin as it may obstruct the airway. Have a quick look in the mouth (*Fig. 7*) and look for any visible foreign body object, which may obstruct the airway
 - If you have difficulty in opening the airway or if you suspect an injury to

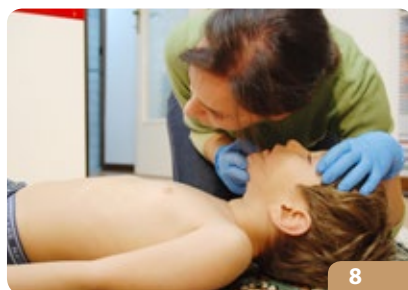


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the neck, try the Jaw Thrust. Place the first two fingers of each hand behind each side of the child's mandible and push the jaw forward

- **Check if the child is breathing normally**

- Look for chest movement. Listen at the child's mouth and nose for breath sounds. Feel for air on your cheek. Decide if breathing is normal, not normal or absent
- Look, listen and feel for no more than 10 seconds (*Fig. 8*) to determine whether the child's breathing is normal. If you have any doubt whether breathing is normal, act as if it is not normal



- **IF THE CHILD IS BREATHING NORMALLY**

- Turn the child on his/her side into the recovery position. Send or go for help and continue to monitor his/her breathing



- **IF BREATHING IS ABSENT OR NOT NORMAL**

- Ensure a proper head tilt and chin lift, allow the mouth to open, but maintain the chin lift. Pinch the soft part of the nose and cover the child's mouth with your mouth ensuring a good seal
- Give five initial rescue breaths using mouth-to-mouth (*Fig. 9*), mouth-to-nose or mouth-to-mouth-and-nose as you find suitable. Note any gagging or coughing in response to your action



- **Assess the child's circulation (signs of life)**

Take no more than 10 seconds to:

- Look for signs of life (*Fig. 10*) – this includes any movement, coughing or normal breathing (not abnormal gasps or infrequent, irregular breaths)

- If you are confident that you can detect signs of life within 10 seconds:
 - Continue rescue breaths, if necessary, until the child starts breathing effectively on his/her own



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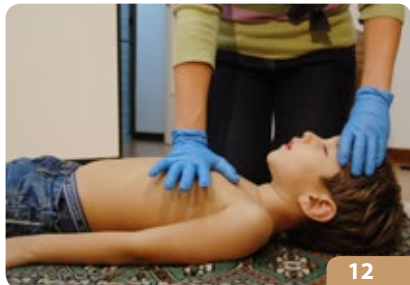
- If there are no signs of life:
 - Start chest compressions
 - Combine rescue breaths and chest compressions

• Start chest compressions

Use the appropriate technique

▪ 1-HAND TECHNIQUE

- Place the heel of one hand on the lower part of the chest bone. Use the imaginary line between the nipples as a reference (*Fig. 11*). Lift your fingers off the chest to make sure that you do not apply pressure over the child's ribs
- Position yourself vertically above the child's chest and, with your arm straight, compress the chest bone to depress (*Fig. 12*)



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▪ 2-HAND TECHNIQUE (IN CASE OF LARGER CHILDREN OR FOR SMALLER RESCUERS) (*Fig. 13*)

- Like you do with adults
- 30 chest compression
- At least 100 compression a minute (but not exceeding 120 compressions a minute)
- Combine rescue breaths and chest compressions 30:2
- After 1 min, call for help
- Continue CPR 30:2 once EMS had been activated



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Do not interrupt resuscitation until

- The child shows signs of life: starts to wake up, to move, opens eyes and to breathe normally
- Qualified help arrives and takes over
- You become exhausted

Skill

Infant Resuscitation

- **Ensure the safety of rescuer and infant**

Make sure that you and the infant are safe, locate first aid equipment such as personal protection



- **Check for a response**

Gently stimulate the infant (*Fig. 14*), tap or rub the sole of the infant's foot and call his/her name to see if he/she responds. Never shake an infant

- **IF HE RESPONDS OR MOVES AS REACTION TO THE STIMULI**

- Leave him/her in the position in which you found him/her provided there is no further danger. Try to find out what is wrong with him / her and get help if needed. Reassess him/ her regularly

- **IF HE DOES NOT RESPOND**

- Shout for help. Ensure head tilt and chin lift.
- Place your hand on its forehead (*Fig. 15*). At the same time, with your finger tip(s) under the point of the infant's chin, lift the chin. Do not push on the soft tissues under the chin as it may obstruct the airway. Have a quick look in the mouth and look for any visible foreign body object (*Fig. 16*), which may obstruct the airway
- If you have difficulty in opening the airway or if you suspect an injury to the neck, try the Jaw Thrust. Place the first two fingers of each hand behind each side of the child's mandible and push the jaw forward



- **Keeping the airway open; look, listen and feel for breathing**

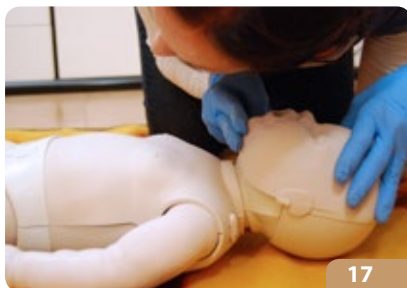
- Look for the chest movement. Listen at the infant's mouth and nose for breath sounds. Feel for air on your cheek. Decide if the breathing is normal, not normal or absent
- Look, listen and feel for no more than 10 seconds to determine whether the infant is breathing normally (*Fig. 17*). If you have any doubt whether breathing is normal, act as if not normal

- **IF HE IS BREATHING NORMALLY**

- Hold the infant in the recovery position
- Cradle the infant in your arms, against your body, with his /her head tilted little downwards. This prevents him/her from choking on his/her tongue or inhaling vomit
- Send or go for help and continue to monitor his breathing

- **IF THE BREATHING IS ABSENT OR NOT NORMAL**

- Ensure a neutral position of the head (as an infant's head is usually flexed when supine, this may require some extension) and a chin lift (*Fig. 18*)
- Place the infant on a hard surface, e.g. a table, this will facilitate resuscitation. If no suitable hard surface is available, or you need to go and call for help, you can take small infants in a supine position on your lower arm. Place your free arm along the infants back and encircle the back of the head with your hand





- Give five initial rescue breaths using mouth-to-mouth, mouth-to-nose or mouth-to-mouth-and-nose as you find suitable (*Fig. 19*). Note any gagging or coughing in response to your action
- Take a breath and cover the mouth and the nose of the infant with your mouth and ensure a good seal, mouth-to-mouth-and-nose breathing. If this is not possible you can either choose to cover only the nose (make sure the lips are closed to prevent air escaping), or you can choose normal mouth-to-mouth rescue breathing
- Maintain the head position and chin lift, take your mouth away from the infant and watch the chest fall while you take another breath and continue rescue breathing

- **Assess the infant's circulation (signs of life)**

Take no more than 10 seconds to:

- Look for signs of life (*Fig. 20*) – this includes any movement, coughing or normal breathing (not abnormal gasps or infrequent, irregular breaths)
- If you are confident that you can detect signs of life within 10 seconds:
 - Continue rescue breathing, if necessary, until the child starts breathing effectively on his/her own
- If there are no signs of life:
 - Start chest compressions
 - Combine rescue breathing and chest compressions

• Start chest compressions

Use the appropriate technique as described

■ 2-FINGER TECHNIQUE

- Compress the chest with the tip of 2 fingers (*Fig. 21*)
- Place three fingers in the center of the infant's chest, the top finger on an imaginary line between the infant's nipples. Raise the top finger up and compress with the bottom 2 fingers, while the other hand remains on the head to maintain the neutral position



■ ENCIRCLING TECHNIQUE

- If there are two or more rescuers, the encircling technique is an option. Positioning of the hand/thumbs may take some time, so not effective when you are alone
- Place both thumbs flat side by side on the lower part of the chest bone (*Fig. 22*) (same positions as with the 2-finger technique), the tips pointing towards the head of the infant. Spread the rest of both hands with the fingers together to encircle the lower part of the infant's rib cage with the tips of the fingers supporting the infant's back



- 30 chest compressions
- At least 100 compressions a minute (but not exceeding 120 compressions a minute)
- Combine rescue breaths and chest compressions 30:2
- After 1 min call for help (*Fig. 23*)
- Continue CPR 30:2 once EMS had been activated



Do not interrupt resuscitation until

- The child shows signs of life: starts to wake up, to move, opens eyes and to breath normally
- Qualified help arrives and takes over
- You become exhausted

Haven't You Heard ?



The DAN BLS-D Course
Now Has a Paediatric Module Too...

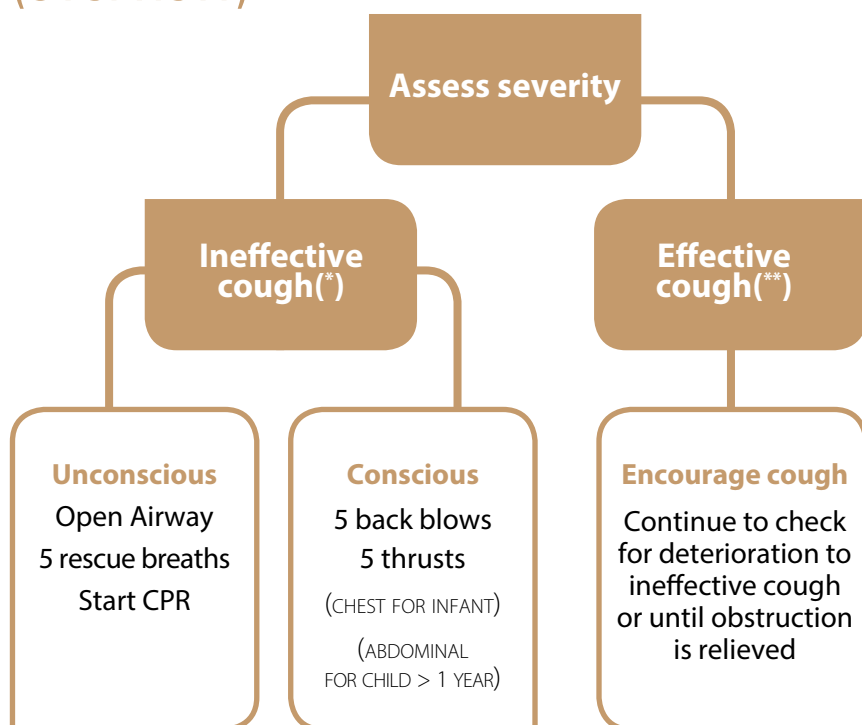
Make it known to everyone!

Foreign-body Airway Obstruction

The sequence for treating children with foreign-body airway obstruction is the same as adults. Look for more detailed information in the DAN Basic Life Support Student Manual.

The techniques are slightly different.

Foreign-body Airway Obstruction (overview)



(*) Unable to vocalise, quiet or silent cough, unable to breathe, chest movement without air intake or exhalation, cyanosis, decreasing level of consciousness

(**) Crying or verbal response to questions, loud cough, able to take a breath before coughing, fully responsive

Skill

Foreign Airway obstruction - Child

Assess severity

- **Effective cough**

- Crying or verbal response to questions, loud cough, able to take a breath before coughing, fully responsive
- Encourage coughing (*Fig. 24*)
- Continue to check for deterioration to ineffective cough or until obstruction is relieved

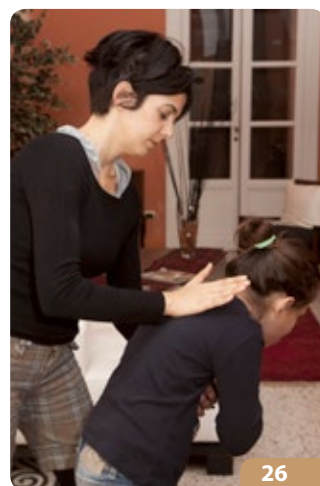
- **Ineffective cough**

- Unable to vocalise, quiet or silent cough, unable to breathe, cyanosis, decreasing level of consciousness

- **Conscious**

- **5 BACK BLOWS**

- Back blows are more effective if the child is positioned head down (*Fig. 25*). A small child may be placed across the rescuer's lap as with the infant. If this is not possible, kneel behind/beside the child, support the child in a forward leaning position and deliver up to 5 back blows from behind (*Fig. 26*). Prevent the child from falling face down





- Deliver up to five forceful back blows with the heel of the hand in the middle of the back between the shoulder blades. The aim is to relieve the obstruction with each blow, rather than to give all five
- If the 5 back blows fail to dislodge the object and the child is still conscious, use abdominal thrusts (Heimlich manoeuvre)

■ 5 ABDOMINAL THRUSTS

- Bend over or kneel behind the child, place your arms under the child's arms and encircle the trunk (*Fig. 27*). If you stand up straight and bend over the weight of the child and gravity will increase the force of the abdominal thrust. Administering abdominal thrusts in children is similar to adults, but is administered with less force
 - After 5 back blows and 5 thrusts, re-assess the child. If the object is not expelled and the child is still conscious, continue the sequence of back blows and chest thrusts. Call out, or send for help if it is still not available. Do not leave the child at this stage
 - If the object is expelled successfully, assess the child's condition. Part of the object may remain in the respiratory tract and cause complications
 - Abdominal thrust may cause internal injuries and all treated with thrusts should be examined by a doctor
- **Unconscious**
 - Open airway
 - 5 rescue breaths
 - Start CPR

Skill

Foreign Airway obstruction - Infant

Assess severity

- **Effective cough**

- Crying or verbal response to questions, loud cough, able to take a breath before coughing, fully responsive
- Encourage coughing
- Continue to check for deterioration to ineffective cough or until obstruction is relieved



- **Ineffective cough**

- Unable to vocalise, quiet or silent cough, unable to breathe, cyanosis, decreasing level of consciousness

- **Conscious**

- **5 BACK BLOWS**

- Place the infant face down over hand and forearm, trunk and body straddled on your arm (*Fig. 28*). Support the infants head and neck by placing the thumb at the angle of the lower jaw, and two fingers at the same point on the opposite side. Do not compress the soft tissues under the infant's jaw, as this will exacerbate the airway obstruction
- Support the infant in a head down, prone position. This enables gravity to assist removal of the foreign body. A seated or kneeling rescuer should be able to support the infant safely across their lap
- Deliver up to five forceful back blows with the heel of the hand in the middle of the back between the shoulder blades. The aim is to relieve the obstruction with each blow, rather than to give all five
- If the 5 back blows fail to dislodge the object, use chest thrusts



■ 5 CHEST THRUSTS

- Sandwich the infant between your arms and turn him / her on his / her back with his / her head lower than the trunk, facing up. Downward supine position and encircle the occiput with your hand. Place your arm down or across your thigh
- Identify the landmark for chest compressions (on the lower half of the chest bone) and give five chest thrusts (*Fig. 29*). These are similar to chest compressions but sharper and delivered at a slower rate

Do not use abdominal thrust (Heimlich manoeuvre) in infants

- Chest thrust may cause internal injuries and all treated with thrusts should be examined by a doctor
- **Unconscious**
 - Open airway
 - 5 rescue breaths
 - Start CPR

Paediatric Automated External Defibrillation

4.1 Recommendations for Use of AEDs for Children

Case reports published since International Guidelines 2000 have reported safe and successful use of AEDs in children less than 8 years of age. The content of this manual is in accordance with the European Resuscitation Council Guidelines for Paediatric Resuscitation 2010.

Automated external defibrillators (AEDs) may be used for children 1 to 8 years of age who are not breathing normally.

Ideally the device should deliver a paediatric shock. The arrhythmia detection algorithm used in the device should demonstrate high specificity for paediatric shockable rhythms: i.e., it will not recommend delivery of a shock for non-shockable rhythms (Class IIb).

Currently there is insufficient evidence to support a recommendation for or against the use of AEDs in children younger than 1 year of age.

For a lone rescuer responding to a child who is not breathing normally, the task force continues to recommend the provision of (or providing) one minute of CPR (cardiopulmonary resuscitation) before any other action, such as activating the emergency medical services (EMS) system or attaching the AED.

Because of the availability of AEDs to the general public and the use of AEDs by non-traditional responders, the likelihood of AEDs being used for smaller (less than 25 kg), younger (less than 8 years of age) patients is now a reality.

4.2 Description of the Problem

For many years, the medical community believed, and many studies showed, that ventricular fibrillation (VF) was not a common heart rhythm in paediatric cases of cardiac arrest. Recent studies have shown, however, that VF is more common than originally thought.

Children, for the purposes of this program, include any child younger than 8 years old or who weighs less than (25 kg).

Anyone above those ranges is considered an adult for the purposes of emergency care. Children younger than 1 year old are considered infants and will not be addressed in this program.

Some causes of cardiac arrest in children include: sudden infant death syndrome (SIDS), trauma, motor vehicle accident, electrocution, drowning, overdose / poisoning, illness and congenital heart disease. A hard blow to the chest has also been known to cause cardiac arrest, as when a child is playing sports.

Research

4.3

According to the International Liaison Committee on Resuscitation in the Advisory Statement on Use of Automated External Defibrillators for Children: An Update from July 2003: "Two studies reported VF as the initial rhythm in 19 percent to 24 percent of out-of-hospital paediatric cardiac deaths if sudden infant death syndrome (SIDS) were excluded.

In studies that included SIDS victims, however, the frequency dropped to 6 to 10 percent. The rationale for the exclusion of SIDS patients is that SIDS is not amenable to treatment, so patients with SIDS should not be included in studies that may influence potential treatments for cardiac arrest. "Recent data suggest that VF is not a rare rhythm in paediatric arrest. This is encouraging because VF is the arrest arrhythmia associated with improved survival rate in most studies of children." The reason for some of this confusion is that, in typical emergency care situations involving children, monitoring equipment is not attached until late in the response. There is very little information on what goes on in the first few minutes of a paediatric cardiac arrest.

When asystole (flat line) is found in a paediatric case, rescuers often assume it was preceded by bradycardia (a progressively slowing heart rate). Bradycardia is not shockable by an AED. It is usually brought on by respiratory arrest. Many researchers now suspect that VF may occur in children early on and then degenerate into a non-shockable rhythm by the time the emergency responders attach monitoring equipment.

Protocol

This change in approach is a positive step for paediatric care, as the presence of VF is actually an opportunity to save a child if it is detected.

Typical respiratory arrest treatment protocols focus on airway management and rescue breathing. If a child moves into cardiac arrest as a result of the respiratory arrest, the focus must turn to getting the heart started again; airway procedures are not enough. In the last decade since treatment protocols were changed to focus more on airway management, the survival rate from paediatric cardiac arrest has not improved.

Therefore, having AEDs available and rescuers trained to use them presents the only opportunity rescuers have to establish a normal heart rhythm prior to the arrival of advanced cardiac life support.

Testing the AED



Fig. 30:

AED are capable of identifying arrhythmias in children accurately; in particular, they are extremely unlikely to advise a shock inappropriately.

According to information released by HeartStart in the publication *Paediatric Defibrillation: Frequently Asked Questions*, researchers tested the HeartStart's Patient Analysis System included in the FR2 for Sensitivity (deciding to deliver a shock) and Specificity (correctly deciding not to shock) on a database of 696 human Paediatric rhythms. The system recognized VF 96 percent of the time (sensitivity) and specificity was 100 percent – both well above the European Resuscitation Council goals for AEDs. The unit never chose to deliver a shock based on a rhythm that did not require one. The Patient Analysis System decides to shock or not shock based on four factors – rate, conduction, am-

plitude and stability. Some AEDs base their shock / no-shock decisions solely on heart rate alone.

Children tend to experience very fast heart rates under high stress conditions, yet a shock may be inappropriate.

Paediatric AED Pads

Standard AEDs are suitable for use in children older than 8 years. For children between 1 and 8 years use paediatric pads or a paediatric mode if available; if these are not available, use the AED as it is.

Many manufacturers now supply purpose-made paediatric pads or programmes, which typically attenuate the output of the machine to 50–75 J. For instance paediatric pads from Philips Medical System have an attenuator that automatically reduces the energy coming out of the defibrillator, delivering a lower energy shock. The child receives a shock of 50 joules instead of the 150 joules delivered to adults.



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Fig. 31:
Many manufacturers now supply purpose-made paediatric pads or programmes

According to guidelines released by the European Resuscitation Council 2010, 50 joules provides sufficient energy to ensure that children up to 8 years receive at least 3–4 J/kg. As other manufacturers introduce paediatric pads for their AEDs, this program will be equally suitable to those units.

Most of the manufacturers clearly mark their child pads. For instance The HeartStart Paediatric AED Pads come with a plug in the shape of a teddy bear so there is never any confusion about which pads to use on a child. This reduces concerns from the least experienced and most stressed responder.



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Fig. 32:
The AED should be equipped with a shock attenuator which decreases the delivered energy to a lower dose more suitable for children aged 1–8 years

Pad Placement

Antero-lateral Position

8.1

Apply the pads firmly on the bare chest in the antero-lateral position, one pad placed below the right collarbone and the other in the left armpit (see DAN Automated External Defibrillation Student Book).

Antero-posterior Position

8.2

If the pads are too large, e.g. (adult) pads on a small child, one should be placed on the upper back, below the left scapula and the other on the front, to the left of the sternum. This is known as the antero-posterior position and is also acceptable.

In testing, most rescuers found it easier to use the antero-posterior (A/P) pad position when working with small children. When both are performed correctly, there is no difference in the delivery of the shock between this pad position and using the antero-lateral placement common in a fibrillating adult.

The child's small chest makes it difficult to properly place the pads in the antero-lateral position. Proper placement for the pads is discussed in greater detail in the skills section.



Fig. 33:
Automated external defibrillators (AEDs) are preset for all variables including the energy dose



Fig. 34:
To decrease transthoracic impedance during defibrillation the pads should be applied firmly

Skill

Proper Pad Placement

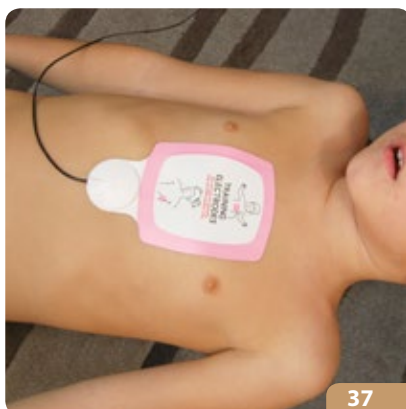
- Position the pads on a child in antero-lateral position
- Position the pads on a child in the antero-posterior position
- Open the pad package to determine which pad goes in which position. Follow the illustrations on the pads

Note

If there is any concern about spinal cord injury, have another rescuer immobilize the head and neck while you perform a rolling technique on the child to gain access to the child's back. Alternatively, you can use the antero-lateral used with adults, although it is more difficult to achieve proper pad placement this way.

Antero-posterior position

- Proper pad positioning and contact are very important. Take a moment to make sure you have positioned the pads correctly (Fig 35)
- Place one pad vertically, on the upper back, below the left scapula (Fig 36)
- Place the second pad on the front of the child's chest, to the left of the sternum (Fig 37)
- Also, practice the rolling technique skill to make sure you are comfortable immobilising the head and neck



37



35



36

Skill

Providing Care with an AED

After securing the ABCs (Airway, Breathing, Circulation) and you have verified that the child is not breathing normally, give a minute of CPR. Children often respond quickly to a CPR.

If no response is received within the first minute, then open the AED and turn it on. Proceed as normal.

Ensure your safety and the safety of the child

Unresponsive?

- Shout for help

Not breathing normally?

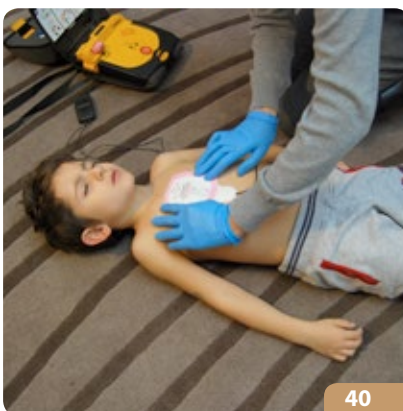
- Start 5 rescue breaths, CPR 30:2 for 1 minute
- Send or go for an AED and call EMS (*Fig 39*)



Attach the defibrillator pads (*Fig 40*)

Allow the AED to analyse heart rhythm

- Don't touch the patient

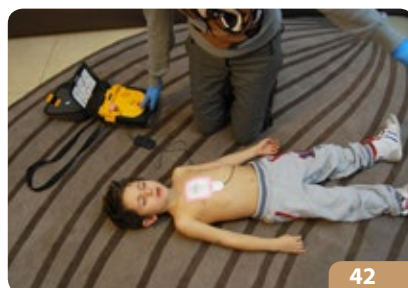


If shock required:

- Follow the AED unit's prompts
- Visually and physically clear the patient (Fig 41)
- Say "Clear"
- Administer shock (Fig 42)
- Resume CPR 30:2 for 2 minutes
- Continue as directed by the voice/visual prompts

**If no shock is required:**

- Continue CPR 30:2 until the injured person starts to wake up, open eyes and to breathe normally
- Continue as directed by the voice/visual prompts

**Note**


While AEDs can be used in an aquatic environment, you must dry off the chest before placing the pads. The AED pads should be placed on the injured person's chest according to the diagrams on the pads, and then the first aid provider should follow the unit's prompts.

References

- ♦ *DAN Basic Life Support Student Manual*
- ♦ *DAN Automated External Defibrillation Student Manual*
- ♦ *European Resuscitation Council Guidelines for Resuscitation 2010. Section 6. Paediatric life support*
- ♦ *Kamarainen A. Out-of-hospital cardiac arrests in children. J Emerg Trauma Shock 2010; 3: 273-6*
- ♦ *FR2 Infant / Child Attenuated Defibrillator Pads. Philips Medical Systems: November 2002.*
- ♦ *Paediatric Defibrillation: Frequently Asked Questions. Philips Medical Systems: August 2002.*
- ♦ *Samson et al. ILCOR Advisory Statement: Use of Automated External Defibrillators for Children: An Update July 2003.*



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DAN Southern Africa

Private Bag X197, Halfway House, 1685
DAN Building, Rosen Office Park
Cnr Invicta & Third Roads
Halfway Gardens, Midrand
Tel: +27 11 266 4900
Fax: +27 11 312 0054
Email: training@dansa.org
Website: www.dansa.org

