Complete Summary

GUIDELINE TITLE

Resuscitation and defibrillation in the health care setting — 2004 revision & update.

BIBLIOGRAPHIC SOURCE(S)

American Association for Respiratory Care. Resuscitation and defibrillation in the health care setting--2004 revision & update. Respir Care 2004 Sep;49(9):1085-99. [161 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: American Association for Respirator Care (AARC). AARC clinical practice guideline. Resuscitation in acute care hospitals. Respir Care 1993 Dec;38(12):1179-88.

COMPLETE SUMMARY CONTENT

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SCOPE

DISEASE/CONDITION(S)

- Cardiac arrest
- Respiratory arrest
- Conditions that may lead to cardiopulmonary arrest, such as:
    - Airway obstruction - partial or complete
    - Acute myocardial infarction with cardiodynamic instability
    - Life-threatening dysrhythmias
    - Hypovolemic shock
    - Severe infections

- Spinal cord or head injury
- Drug overdose
- Pulmonary edema
- Anaphylaxis
- Pulmonary embolus
- Smoke inhalation
- Pulseless ventricular tachycardia

GUIDELINE CATEGORY

Evaluation
Management
Treatment

CLINICAL SPECIALTY

Cardiology
Emergency Medicine
Pulmonary Medicine

INTENDED USERS

Respiratory Care Practitioners

GUIDELINE OBJECTIVE(S)

- To improve the consistency and appropriateness of respiratory care and serve as a guide for education and research
- To provide clinical practice guidelines on recognition of signs suggesting the possibility or the presence of cardiopulmonary arrest and initiation of resuscitation and life-support measures in adults

TARGET POPULATION

Adults in health care settings with cardiac arrest, respiratory arrest, or the presence of conditions that may lead to cardiopulmonary arrest as indicated by rapid deterioration in vital signs, level of consciousness, and blood gas values.

Note: This guideline applies to a variety of settings including but not limited to hospitals, long-term facilities, outpatient clinics, rehabilitation centers, skilled nursing facilities, and pre-and inter-hospital transport.

INTERVENTIONS AND PRACTICES CONSIDERED

Resuscitation in the health care setting for the purpose of this guideline encompasses all care necessary to deal with sudden and often life-threatening events affecting the cardiopulmonary system, and involves the identification, assessment, and treatment of patients in danger of or in frank arrest, including the high-risk delivery patient. This includes (1) alerting the resuscitation team and the managing physician; (2) using adjunctive equipment and special techniques for establishing, maintaining, and monitoring effective ventilation and circulation;

(3) monitoring the electrocardiograph and recognizing dysrhythmias; (4) using defibrillators and mechanical ventilators; (5) administering oxygen and drugs, including instillation of drugs via the endotracheal tube; and (6) stabilizing such patients in the post-arrest period.

MAJOR OUTCOMES CONSIDERED

- Efficacy and safety of resuscitation and defibrillation procedures and equipment
- Patient outcomes, such as survival and level of function
- Utility of monitoring devices
- Hazards and complications related to resuscitation procedures and equipment

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Not stated

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Not stated

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Consultants to the Working Group may review the initial draft of the guideline. After the Working Group completes its review, the draft is reviewed by the entire Steering Committee and then by a Review Panel (i.e., persons engaged in all facets of the delivery of respiratory care who have volunteered to review drafts of the Guidelines before publication).

The 2004 update was approved by the 2003 Clinical Practice Guideline (CPG) Steering Committee.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Procedure

Recognition of signs suggesting the possibility or the presence of cardiopulmonary arrest, initiation of resuscitation, and therapeutic use of defibrillation in adults

Description/Definition

Resuscitation in the health care setting for the purpose of the guideline encompasses all care necessary to deal with sudden and often life-threatening events affecting the cardiopulmonary system, and involves the identification, assessment, and treatment of patients in danger of or in frank arrest, including the high-risk delivery patient. This includes (1) alerting the resuscitation team and the managing physician; (2) using adjunctive equipment and special techniques for establishing, maintaining, and monitoring effective ventilation and circulation; (3) monitoring the electrocardiograph and recognizing dysrhythmias; (4) using defibrillators (this includes the use of conventional defibrillators and automated

[automatic or semi-automatic] external defibrillators [AEDs]) and mechanical ventilators; (5) administering oxygen and drugs, including instillation of drugs via the endotracheal tube; and (6) stabilizing such patients in the post-arrest period.

Setting

The guideline applies to a variety of settings including but not limited to hospitals, long-term facilities, outpatient clinics, rehabilitation centers, skilled nursing facilities, and pre- and inter-hospital transport.

Indications

Cardiac arrest, respiratory arrest, or the presence of conditions that may lead to cardiopulmonary arrest as indicated by rapid deterioration in vital signs, level of consciousness, and blood gas values--included in those conditions are:

- Airway obstruction--partial or complete
- Acute myocardial infarction with cardiodynamic instability
- Life-threatening dysrhythmias
- Hypovolemic shock
- Severe infections
- Spinal cord or head injury
- Drug overdose
- Pulmonary edema
- Anaphylaxis
- Pulmonary embolus
- Smoke inhalation
- Defibrillation is indicated when cardiac arrest results in or is due to ventricular fibrillation.
- Pulseless ventricular tachycardia

Contraindications

Refer to the "Contraindications" field or see the original guideline document for information.

Precautions/Hazards and/or Complications

Refer to the "Potential Harms" field or see the original guideline document for information.

Limitations of Procedure

Despite adequate efforts, resuscitation may fail because of the patient's underlying disease. Institution of resuscitation may be limited by patient or surrogate/guardian request.

Additional limitations to defibrillation:

- Response is poor in subjects with extremely low core temperatures, and shocks should be limited to 3 until temperature has risen above 86 degrees F (30 degrees C). Warming may improve success.
- Subjects whose cardiac arrest occurs as a direct result of trauma may not respond to defibrillation.
- The patient must not move or be moved while analysis is occurring when the automated or semi-automated defibrillator is used. (Compressions must be stopped, and the patient should not be moving.)

Assessment of Need

Assessment of patient condition

- Pre-arrest-Identification of patients in danger of imminent arrest and in whom consequent early intervention may prevent arrest and improve outcome. These are patients with conditions that may lead to cardiopulmonary arrest as indicated by rapid deterioration in vital signs, level of consciousness, and blood gas values (see Section on "Indications" above).
- Arrest-absence of spontaneous breathing and/or circulation
- Post-arrest-Once a patient has sustained an arrest, the likelihood of additional life-threatening problems is high, and continued vigilance and aggressive action using this Guideline are indicated. Control of the airway and cardiac monitoring must be continued and optimal oxygenation and ventilation assured.
    - After arrival of defibrillator: The patient should be evaluated immediately for the presence of ventricular fibrillation or ventricular tachycardia by the operator (conventional) or the defibrillator (automated or semi-automated). Inappropriate defibrillation can cause harm.

Assessment of Process and Outcome

Timely, high-quality resuscitation improves patient outcome in terms of survival and level of function. Despite optimal resuscitation performance, outcomes are affected by patient-specific factors. Patient condition post-arrest should be evaluated from this perspective.

Documentation and evaluation of the resuscitation process (e.g., system activation, team member performance, functioning of equipment, and adherence to guidelines and algorithms) should occur continuously and improvements made.

Equipment management issues. Use of standard checklists can improve defibrillator dependability.

Defibrillation process issues

- System access
- Response time
- First-responder actions
- Adherence to established algorithms
- Patient selection and outcome

- First responder authorization to defibrillate

Resources

Emergency response system--A designated resuscitation team should be continuously available (24 hours/day, 7 days/week) to respond to emergencies. Specialty resuscitation teams trained to meet the needs of different hospital populations are desirable (e.g., trauma, stroke). Team members should be notified simultaneously. All hospital workers must know how to activate the hospital's emergency response system.

Equipment should be rapidly available and functional. Durability, portability, reliability, and cost should be considered.

- Ventilation devices
    - Mouth-to-mask devices must:
        - provide a way to increase F_{DO2}
        - separate inhaled and exhaled gas
        - incorporate an effective filter (one-way valve or bacteria filter)
        - be transparent
        - easily achieve an air tight seal
        - have extension tube to facilitate visual monitoring and ventilation
        - have dead space as low as practical
    - Manual resuscitators must:
        - be capable of providing an F_{DO2} of 1.0 even when large volumes are delivered
        - have no pressure-relief valve for adults
        - have a bag volume of approximately 1,600 mL for adults
        - have minimal forward and back leak
        - have standard 15- and 22-mm fitting
        - be impossible to misassemble
        - be easily sterilized or for single-patient use
        - provide for measurement of exhaled tidal volume
        - provide some indication that supplemental oxygen is being supplied (easily ascertained with bag reservoir but difficult with tube-type reservoir)
        - be capable of being restored to proper function after being disabled with vomitus
        - be able to be restored to proper function after being dropped from a height of 1 meter onto concrete floor
        - be designed so that pressure generated at the patient connection port is <5 cm H_2O during exhalation (at a flow of 5 L/min for patients weighing <10 kg and 50 L/min for all others)
        - be designed so that pressure generated at the patient connection port does not exceed 5 cm H_2O during inspiration (at a flow of 5 L/ min for patients weighing <10 kg and 50 L/min for all others)
        - be capable of providing a high F_{DO2} during spontaneous breathing with low inspiratory and expiratory resistance

    - Face-mask design should allow a tight seal, provide minimal internal dead space, and have a clear mask body. A variety of sizes should be available.
    - Non-self-inflating bags vary in size from 500-2,000 mL, are inflated by a controlled gas source, have variable flow outlets, and conform to the same standards listed elsewhere in the guideline (where appropriate).
    - Gas-powered resuscitators (manually triggered, commonly called demand valves) are not recommended.
    - Transport ventilators are recommended for resuscitation if they provide control over tidal volume, inspiratory time, and inspiratory flow, and deliver F_{DO2} of 1.0.
    - The continued use of the mechanical ventilator is indicated when a patient already being mechanically ventilated is resuscitated if the ventilator provides control over tidal volume, inspiratory time, and flow; can be manually triggered; and delivers an F_{DO2} of l.0
- Circulation devices
    - Manually operated mechanical chest compressors are appropriate for adults and may be advantageous during transport. They must be capable of providing an adjustable stroke of 1.5 to 2 in (3.9 to 5.0 cm), deliver the compression for 50% of the compression-relaxation cycle, and should be placed in use with only brief interruption of manual cardio-pulmonary resuscitation (CPR). The compressor head should be designed to limit shift in position and stroke adjustment and should have a locking mechanism. The device must be portable, stored easily, and assembled quickly.
    - Automatic mechanical chest compressors are appropriate for adults and adolescents and should have the capabilities of the manual devices plus the advantage of delivering optimal rate and depth of compression by eliminating the variables of operator technique and fatigue. The device should allow electrocardiogram (ECG) recording, and defibrillation should not require that the device be stopped or removed. It is not recommended that these devices be used for ventilation unless a cuffed endotracheal tube is in place.
- Airway management devices
    - Oropharyngeal airways should be available in a variety of sizes for adults, children, and infants. Design should incorporate a flange, a short bite-block segment, and a curved body containing a channel for air movement and suctioning.
    - Nasopharyngeal airways should be available in a variety of sizes for adults. They consist of a soft rubber or plastic tube with a beveled tip and a flange that preferably is adjustable.
    - Endotracheal tubes should be available in a variety of sizes for adults. Tubes should meet the American Society for Testing and Materials (ASTM) standards.
    - Intubation devices facilitate intubation and access to the difficult airway. Such devices may include laryngoscope and blades (straight & curved), wire guide/stylet, forceps, fiberoptic laryngoscope or bronchoscope, "light wand," or tube changing stent.
    - Tube stabilization should be reliable and effective and allow for atraumatic extubation and reintubation when necessary.
    - Suctioning devices should be capable of subatmospheric pressure levels of > -120 cm H_2O for pharyngeal suctioning and between -80 and -120 cm H_2O for tracheobronchial suctioning in adults. A portable

system should be available for transport. A variety of rigid pharyngeal tips and a variety of sizes of sterile tracheal catheters should be available. The tracheal suction catheter selected should have an outside diameter of <1/2 the inside diameter of the endotracheal (or tracheostomy) tube and have a means of manual control (thumb port).

- Electrical therapy devices
    - Defibrillators
    - Monophasic or biphasic defibrillator waveforms
        - With monophasic devices the current is delivered in one direction. The recommended first energy shock is 200 J, the second is 200 or 300 J, and the third is 360 J. This escalating energy level is used to find the lowest level that terminates ventricular fibrillation while minimizing injury from the shock.
        - With biphasic devices the current is delivered in 2 phases. In one phase it is delivered in a positive direction, and in the second it is delivered in the negative direction. Low energy ($\leq$200 J) from biphasic devices can terminate ventricular fibrillation safely with as much or more efficacy compared to escalating energy from monophasic devices.
        - Since randomized prospective studies comparing these devices are lacking, the committee cannot recommend one type of defibrillator over the other.
    - Manual defibrillators depend upon operator for analysis of rhythm, charging, proper application of paddles to patient's thorax, and delivery of countershock; use of self-adhesive pads may increase efficacy and speed of countershock. Using self-adhesive pads will also prevent the application of the wrong contact gel during defibrillation.
    - Semiautomatic/automatic defibrillators utilize large, self-adhesive pads to optimize electrical contact with the patient's thorax and allow delivery of countershock more rapidly than manual defibrillators. Automatic defibrillators, when attached to patient, analyze rhythm and deliver countershock when appropriate without intervention by operator; semiautomatic defibrillators require pressing a button to initiate rhythm analysis and advise operator when delivery of counter-shock (by pressing a button) is appropriate.
    - External pacemakers allow noninvasive cardiac pacing via large, self-adhesive pads, in cases of bradycardia with a pulse or high-grade block when a conducted beat results in a pulse.
- Monitoring devices
    - ECG monitors-Continuous electrocardiographic monitoring is essential for detection of dysrhythmias and for directing therapy.
    - CO_2 monitors-CO_2 detectors are useful for identification of correct endotracheal tube placement and for monitoring of cardiac function during resuscitation.
    - Ventilation monitors-Because artificial ventilation, either manual or mechanical, is often inconsistent during resuscitation, monitoring of exhaled volume is recommended.
    - Pulse oximeters-Pulse oximeters, if used in the pre- and post-arrest situation, may provide useful information regarding oxygenation and cardiovascular performance. Those that display pulse waveform are preferred.

    - Invasive hemodynamic monitoring devices-Continuous monitoring of intravascular waveforms and pressures provides useful information for diagnosis and treatment of cardiovascular compromise.
    - Airway pressure monitoring is useful in adults.

Personnel: A high percentage of patients in nontraumatic cardiac arrest are in ventricular fibrillation within the first few minutes after their collapse. As time after arrest increases, the likelihood of a successful outcome decreases rapidly. Early defibrillation as a standard has been expanded to include the use of automated external defibrillators (AEDs) by first responders trained in basic life support (BLS), for both prehospital and in-hospital cardiac arrest due to ventricular fibrillation. All health care providers must recognize the need for and know how to activate the facility's emergency response system. They should be trained, evaluated at frequent intervals by monitoring performance, and retrained as necessary in the skills of BLS. Health care providers who are primary members of resuscitation teams in acute care hospitals should be skilled in emergency cardiac care (ECC) and advanced cardiac life support (ACLS).

- Level I
    - Training: All Level I personnel should be trained, evaluated by performance, and retrained as necessary in BLS and the use of AED at frequent intervals that do not exceed 2 years. Retraining should focus on identified deficiencies.
    - Responsibilities: Level I: All health care providers who have direct patient care responsibilities and may be the first responder to patients in cardiac arrest are considered Level I caregivers. No special professional credential is necessary to qualify as Level I, by this definition. Designated first responders must be able to recognize that the patient is unresponsive, apneic, and pulseless. They should be able to attach automated defibrillator electrodes, operate AEDs, and complete an AED checklist at least every shift. Level I personnel also assist the primary (Level II) members of the resuscitation team. They should be capable of assisting Level II personnel by (1) assessing patients for respiratory and/or cardiac arrest, (2) activating the resuscitation team, (3) administering BLS, (4) providing mouth-to-mask ventilation, (5) attaching ECG and automatic defibrillator electrodes, (6) assisting with tracheal intubation, (7) defibrillating with automatic electronic defibrillators, (8) attaching pulse oximeter and capnograph, (9) preparing a written record of resuscitation effort, (10) moving resuscitation equipment to the scene, and (11) collecting arterial blood for analysis.
    - Credentials: Level I health providers should have a current BLS health-care provider course completion card from the American Heart Association. Hospital personnel should at a minimum be capable of assessing the patient for respiratory and/or cardiac arrest, activating the resuscitation team, and administering BLS until the team arrives.
- Level II
    - Training: Level II personnel should be trained, evaluated by performance, and retrained as necessary in ECC and ACLS as appropriate at intervals that should not exceed 2 years. Retraining should focus on identified deficiencies.

- Responsibilities: Level II health professionals should be capable of serving as primary members of the resuscitation team and as team leader when they are the best qualified respondent. They may respond not only to resuscitation calls in their work areas but also to other areas of the hospital. They are skilled in the use of all adjunctive equipment and special techniques for ECC/ACLS (e.g., establishing, maintaining, and monitoring effective ventilation and circulation). They have the skills of Level I personnel and the following capabilities: (1) advanced ECG monitoring and dysrhythmia recognition, (2) tracheal intubation, (3) capability to deliver shocks with automated and conventional external defibrillators, (4) use of continuous and transport mechanical ventilators, (5) use of manual or automatic external chest compressors, (6) preparation and administration of cardiac drugs, (7) stabilization of patients in the post-arrest period, (8) provision of access for rapid administration of intravenous fluids, (9) managing ventilation via transtracheal catheter and cricothyrotomy, (10) emergency treatment of tension pneumo- or hemothorax with large bore needle, (11) interpretation of hemodynamic data, (12) preparing patients for emergency transport, and (13) evaluating oxygenation, ventilation, and acid-base balance from blood gas reports.
- Credentials: Level II health professionals should have a current BLS and ACLS certification from the American Heart Association.

Monitoring

Patient

- Clinical assessment: Continuous observation of the patient and repeated clinical assessment by a trained observer provide optimal monitoring of the resuscitation process. Special consideration should be given to the following:
    - Level of consciousness
    - Adequacy of airway
    - Adequacy of ventilation
    - Peripheral/apical pulse and character
    - Evidence of chest and head trauma
    - Pulmonary compliance and airway resistance
    - Presence of seizure activity
- Assessment of physiologic parameters: Repeat assessment of physiologic data by trained professionals supplements clinical assessment in managing patients throughout the resuscitation process. Monitoring devices should be available, accessible, functional, and periodically evaluated for function. These data include but are not limited to:
    - Arterial blood gas studies (although investigators have suggested that such values may have a limited role in decision-making during CPR)
    - Hemodynamic data
    - Cardiac rhythm
    - Ventilatory frequency, tidal volume, and airway pressure
    - Exhaled CO_2
    - Neurologic status

Resuscitation process: Properly performed resuscitation should improve patient outcome. Continuous monitoring of the process will identify areas needing improvement. Among these areas are response time, equipment function, equipment availability, team member performance, team performance, complication rate, and patient survival and functional status.

Equipment: All maintenance should be documented and records preserved. Included in documentation should be routine checks of energy output, condition of batteries, proper functioning of monitor and recorder, and presence of disposables needed for function of defibrillator, including electrodes and defibrillation pads. Defibrillators should be checked and documented each shift for presence, condition, and function of cables and paddles; presence of defibrillating and monitoring electrodes, paper, and spare batteries (as applicable); and charging, message/light indicators, monitors, and ECG recorder (as applicable). AEDs should be checked and documented each day for function and appropriate maintenance.

Training: Records should be kept of initial training and continuing education of all personnel who perform defibrillation as part of their professional activities.

Frequency/Availability/Duration

Because the need for resuscitation occurs unpredictably, resources need to be available to respond to one or more locations simultaneously 24 hours a day, 7 days a week. BLS response should be immediate, and ACLS should be available as soon as feasible based upon the resources of the institution. Resuscitation continues until vital signs are restored. If vital signs are not restored, resuscitation efforts should continue until a physician decides further efforts are futile.

Personnel who respond to cardiac arrests should be trained to operate, equipped with, and permitted to operate a defibrillator. No other therapeutic intervention, including setting up oxygen delivery systems, suction equipment, advanced airway procedures, intravenous lines, or mechanical CPR devices, should take precedence over or be routinely performed when a defibrillator is available and defibrillation is indicated.

Infection Control

Implement Standard Precautions, including mouth-to-barrier devices.

Observe all infection control guidelines posted for patient.

Disinfect all equipment to be reused on other patients.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of evidence supporting the recommendations is not specifically stated.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Increased incidence of appropriate and successful use of resuscitation techniques
- Timely, high-quality resuscitation improves patient outcomes in terms of survival and level of function.
- Pulse oximeters if used in the pre-and post-arrest situation may provide useful information regarding oxygenation and cardiovascular performance.
- Invasive hemodynamic monitoring devices - continuous monitoring of intravascular waveforms and pressures provides useful information for diagnosis and treatment of cardiovascular compromise.

POTENTIAL HARMS

The following represent possible hazards or complications related to the major facets of resuscitation:

Airway Management

- Failure to establish a patent airway
- Failure to intubate the trachea
- Failure to recognize intubation of the esophagus
- Upper airway trauma, laryngeal and esophageal damage
- Aspiration
- Cervical spine trauma
- Unrecognized bronchial intubation
- Eye injury
- Facial trauma
- Problems with endotracheal tube cuff
- Bronchospasm
- Laryngospasm
- Dental accidents
- Dysrhythmias
- Hypotension and bradycardia due to vagal stimulation
- Hypertension and tachycardia
- Inappropriate tube size
- Bleeding
- Pneumonia

Ventilation

- Inadequate oxygen delivery (F_{DO2})

- Hypo- and/or hyperventilation
- Gastric insufflation and/or rupture
- Barotrauma
- Hypotension due to reduced venous return secondary to high mean intra-thoracic pressure
- Vomiting and aspiration
- Prolonged interruption of ventilation for intubation

Circulation/Compressions

- Ineffective chest compression
- Fractured ribs and/or sternum
- Laceration of spleen or liver
- Failure to restore circulation despite functional rhythm
    - Severe hypovolemia
    - Cardiac tamponade
    - Hemo- or pneumothorax
    - Hypoxia
    - Acidosis
    - Hyperkalemia
    - Massive acute myocardial infarction
    - Aortic dissection
    - Cardiac rupture
    - Air embolus, pulmonary embolism
- Central nervous system impairment

Electrical Therapy:

- Automatic external defibrillators (AEDs) may be hazardous in patients weighing < 25 kg.
- Failure of defibrillator
- Shock to team members
- Pulse checking between sequential shocks of AEDs delays rapid identification of persistent ventricular fibrillation, interferes with assessment capabilities of the devices, and increases the possibility of operator error.
- The initial 3 shocks should be delivered in sequence, without delay, interruption for cardiopulmonary resuscitation (CPR), medication administration, or pulse checks for ventricular fibrillation and pulseless ventricular tachycardia.
- Induction of malignant dysrhythmias
- Interference with implanted pacemaker function
- Fire hazard
    - AEDs may be hazardous in an oxygen-enriched environment.
    - Alcohol should never be used as conducting material for paddles because serious burns can result.
    - Superficial arcing of the current along the chest wall can occur as a consequence of the presence of conductive paste or gel between the paddles.
    - The aluminized backing on some transdermal systems can cause electric arcing during defibrillation, with explosive noises, smoke, visible arcing, patient burns, and impaired transmission of current; therefore, patches should be removed before defibrillation.

- Muscle burn
- Muscle injury resulting in acute renal failure
- If transthoracic impedance is high, a low energy show (<100 J) may fail to generate enough current to achieve successful defibrillation.
- Attention must be paid to factors influencing total and transthoracic impedance.
    - Paddle electrode pressure
    - The use of an appropriate conductive medium that can with-stand high current flow
    - Electrode/paddle size should be 8.5 to 12 cm for adults
    - Electrode placement
    - Time interval between shocks
    - Distance between electrodes (size of the chest)
    - Energy selected
    - Paddle-skin electrode material
    - Number of previous shocks
    - Phase of ventilation
    - Diaphoretic patients should be dried to prevent contact problems with adhesive defibrillation pads and/or electrodes.

Drug Administration

- Inappropriate drug or dose
- Idiosyncratic or allergic response to drug
- Endotracheal-tube drug-delivery failure-The endotracheal tube dose should be 2 to 2.5 times the normal intravenous dose, diluted in 10 mL of normal saline (or distilled water).

CONTRAINDICATIONS

CONTRAINDICATIONS

Resuscitation is contraindicated when:

- The patient's desire not to be resuscitated has been clearly expressed and documented in the patient's medical record
- Resuscitation has been determined to be futile because of the patient's underlying condition or disease
- Defibrillation is also contraindicated when immediate danger to the rescuers is present due to the environment, patient's location, or patient's condition

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness
Safety
Timeliness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

American Association for Respiratory Care. Resuscitation and defibrillation in the health care setting--2004 revision & update. Respir Care 2004 Sep;49(9):1085-99. [161 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1993 Dec (revised 2004 Sep)

GUIDELINE DEVELOPER(S)

American Association for Respiratory Care - Professional Association

SOURCE(S) OF FUNDING

American Association for Respiratory Care (AARC)

GUIDELINE COMMITTEE

Not stated

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Primary Author: David Vines, MHS, RRT, University of Texas Health Science Center, San Antonio, Texas

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: American Association for Respirator Care (AARC). AARC clinical practice guideline. Resuscitation in acute care hospitals. Respir Care 1993 Dec;38(12):1179-88.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the American Association for Respiratory Care (AARC) Web site.

Print copies: Available from the American Association for Respiratory Care (AARC), CPG Desk, 11030 Ables Ln, Dallas, TX 75229-4593; Web site: www.aarc.org.

AVAILABILITY OF COMPANION DOCUMENTS

None available

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI on November 30, 1998. The information was verified by the guideline developer on December 15, 1998. This NGC summary was updated by ECRI on March 21, 2005.

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