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AARC Clinical Practice Guideline

Defibrillation During Resuscitation

DDR 1.0 PROCEDURE:

Therapeutic use of electrical current for defibrillation.

DDR 2.0 DESCRIPTION:

Electrical therapy for the purposes of this guideline encompasses all care necessary for defibrillation during cardiac arrest on all patients with ventricular fibrillation or pulseless ventricular tachycardia. This includes the use of conventional defibrillators and automated (automatic or semi-automatic) external defibrillators (AEDs).

DDR 3.0 SETTING:

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 interhospital transport.

DDR 4.0 INDICATIONS:

4.1 Cardiac arrest due to or resulting in ventricular fibrillation.(1-3)
4.2 Pulseless ventricular tachycardia.

DDR 5.0 CONTRAINDICATIONS:

Defibrillation is contraindicated when:

5.1 the patient's desire not to be resuscitated has been clearly expressed and documented in the patient's medical record or other legal document;(4-6)
5.2 continued resuscitation is determined to be futile by the treating physician;(7-13)
5.3 immediate danger to the rescuers is present due to the environment, patient's location, or patient's condition.

DDR 6.0 PRECAUTIONS/HAZARDS:

6.1 AEDs may be hazardous in patients weighing 90 lb or less.(14)

6.2 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.(15)
6.3 Malfunction of permanent pacemakers can result from placing defibrillator pads or paddles near the pacemaker.(16,17)
6.4 Defibrillation in the absence of an ECG rhythm (ie, 'blind defibrillation') is rarely necessary today because of the almost universal availability of AEDs equipped with monitoring capabilities and diagnostic algorithms. In rare circumstances when electrocardiographic (ECG) monitoring cannot be implemented in a timely fashion, the experienced practitioner may elect to apply blind defibrillation to a pulseless, comatose patient.(14-15)
6.5 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;(18-20) therefore, patches should be removed before defibrillation.
6.6 A shock can be accidentally delivered to other rescuers.(21)
6.7 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.(14)
6.8 The initial three shocks should be delivered in sequence, without interruption for CPR, medication administration, or pulse checks.(22,23)
6.9 Delays in delivering shocks for ventricular fibrillation and pulseless ventricular tachycardia after defibrillator arrival should be avoided.(1,2,24)
6.10 If transthoracic impedance is high, a low energy shock (< 100 J) may fail to generate enough current to achieve successful defibrillation.(25-27)
6.11 Alcohol should never be used as coonducting material for paddles because serious burns can result.(28)
6.12 Attention must be paid to factors influencing total and transthoracic impedance.(14,25, 27,28)
6.12.1 Paddle electrode pressure
6.12.2 The use of an appropriate conductive medium that can withstand high current flow.(29)
6.12.3 The use of hand-held paddles greater than 8 cm in diameter for adults or children weighing more than 40 kg.(30)
6.12.4 Electrode placement
6.12.5 Time interval between shocks
6.12.6 Distance between electrodes (size of the chest)
6.12.7 Electrode/paddle size(30)
6.12.8 Energy selected

6.12.9 Paddle-skin electrode material
6.12.10 Number of previous shocks
6.12.11 Phase of ventilation
6.12.12 Diaphoretic patients should be dried to prevent contact problems with adhesive defibrillation pads and/or electrodes.(14)
6.13 AEDs may be hazardous in an oxygen-enriched environment.(31)

DDR 7.0 LIMITATIONS OF PROCEDURE:

Despite appropriate and technically adequate use of electrical therapy, outcome may not be successful because of patient's underlying condition and deterioration of the patient's cardiac status.

7.1 Response is poor in subjects with extremely low core temperatures, and shocks should be limited to three until temperature has risen above 86°F.(30) Warming may improve success.(32)
7.2 Subjects whose cardiac arrest occurs as a direct result of trauma may not respond to defibrillation.(32)
7.3 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 if the patient is in a vehicle, it must not be moving).

DDR 8.0 ASSESSMENT OF NEED:

8.1 Before arrival of defibrillator: The patient should be assessed for lack of responsiveness, apnea, and pulselessness, and help should be summoned if needed.(14,33,34)
8.2. 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.(33,35)

DDR 9.0 ASSESSMENT OF PROCESS & OUTCOME:

9.1 Equipment management issues. Use of standard checklists can improve defibrillator dependability.(36)
9.2 Defibrillation process issues
9.2.1 System access(34)
9.2.2 Response time(37)
9.2.3 First-responder actions(37,38)
9.2.4 Adherence to established algorithms(39)
9.2.5 Patient selection and outcome
9.2.6 First responder authorization to defibrillate(14,40)

DDR 10.0 RESOURCES:

10.1 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.(41,42) Within the hospital, all personnel who have direct patient contact should be trained in CPR and early defibrillation as first responders.(43) Early defibrillation as a standard has been expanded to include the use of AEDs by first responders trained in basic life support (BLS), for both prehospital and in-hospital cardiac arrest due to ventricular fibrillation.

10.1.1 Level I:

10.1.1.1 Training--Automated external defibrillation is a basic life support (BLS) skill and should be incorporated into BLS training programs for all hospital personnel who are expected to respond to a cardiac arrest and who have access to AEDs. Because AEDs are sensitive and specific in recognizing shockable rhythms,(44) there is no need to train the operator to recognize ventricular fibrillation or ventricular tachycardia or any dysrhythmia. Less training time is needed to learn how to use an AED than to learn dysrhythmia recognition.(43) There should be continuing education and documentation of competency at least every 90 days in the employee's departmental folder.(33,35,45)

10.1.1.2 Responsibilities-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.(46)

10.1.1.3 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.

10.1.2 Level II:

10.1.2.1 Training-Level II personnel should be trained, evaluated, and retrained as necessary in use of automated and conventional defibrillators, emergency cardiac care, and advanced cardiac life support (ACLS) at frequent intervals. The time between defibrillation practice sessions should be limited to 90 days or less.(14,44,47)

10.1.2.2 Responsibilities-Level II personnel have the skills of Level I personnel plus the following capabilities: (1) advanced ECG monitoring and dysrhythmia recognition, (2) capability to deliver shocks with automated and conventional external defibrillators.

10.1.2.3 Credentials-A Level II health professional should be an RRT, RN, MD, or DO, or hold an equivalent credential and should hold a current AHA ACLS or pediatric advanced life support (PALS) course-completion card or have evidence of having completed a similar

recognized training program.
10.2 Equipment:
10.2.1 Automated or semi-automated external defibrillators must be able to determine whether defibrillation is appropriate and advise either delivery of or deliver appropriate shocks. The defibrillators should be maintained in accordance with manufacturer's specifications.(33,35,45)
10.2.2 Conventional defibrillators should be maintained in accordance with manufacturer's specifications. Batteries should be maintained in a state of full charge and reconditioned appropriate.(32,45)
10.2.3 Defibrillator checklists should be used to reduce defibrillator malfunctions.(15) Users should be competent in the proper use of checklists to reduce defibrillator malfunctions.(15,36)

DDR 11.0 MONITORING:

11.1 Resuscitation process-Properly performed defibrillation has been shown to improve patient outcome. The most important determinant of survival in adult out-of-hospital ventricular fibrillation is defibrillation. Continuous monitoring of the process identifies components needing improvement. Among these components are response time, witnessed versus unwitnessed arrest, CPR performance, time-to-first defibrillation attempt, return of spontaneous circulation, complication rate, equipment function, equipment maintenance, and equipment availability.(1,2,36.48,49)
11.2 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 each shift(46) 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).(33,35)
11.3 Training-Records should be kept of initial training and continuing education of all personnel who perform defibrillation as part of their professional activities.

DDR 12.0 FREQUENCY/AVAILABILITY/ DURATION:

Personnel who respond to cardiac arrests should be trained to operate, equipped with, and permitted to operate a defibrillator.(14) 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.(14)

DDR 13.0 INFECTION CONTROL:

13.1 Implement Universal Precautions and tuberculosis control measures.(49,50)
13.2 Observe all infection control guidelines posted for the patient.
13.3 Disinfect all equipment to be reused on other patients.

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