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Guidelines for Best Practices in the Surgical Technologists Role During a Code Blue in the Operating Room

Introduction

The following Guidelines for Best Practices were researched and authored by the AST Education and Professional Standards Committee, and are AST approved.

AST developed the Guidelines to support healthcare delivery organization's (HDO) reinforce best practices in Code Blue as related to the role and duties of the Certified Surgical Technologist (CST®), the credential conferred by the National Board of Surgical Technology and Surgical Assisting. The purpose of the Guidelines is to provide information OR supervisors, risk management and surgical team members can use in the development and implementation of policies and procedures for Code Blue in the surgery department. The Guidelines are presented with the understanding that it is the responsibility of the HDO to develop, approve and establish policies and procedures for the surgery department regarding Code Blue practices per HDO protocols.

Rationale

Code Blue, or an otherwise locally used term to refer to cardiac arrest, is the sudden, abrupt loss of heart function. The victim may, or may not, have a diagnosed heart disease or condition. Also, referred to as *sudden cardiac arrest* or unexpected cardiac arrest, *sudden cardiac death* occurs within minutes after symptoms appear. Symptoms include:

- Nausea
- Vomiting
- Cold sweat
- Lightheadedness
- Shortness of breath
- Chest discomfort: uncomfortable pressure, squeezing, and/or pain
- Discomfort in other areas of the upper body: pain or discomfort in one or both arms, back, neck, jaw, or stomach¹

Rapid implementation of *cardiopulmonary resuscitation/basic life support* (CPR/BLS) and defibrillation combined with early advanced care can result in improved long-term survival rates for cardiac arrest. A "*chain-of-survival*" concept applies to both in-hospital and out-of-hospital cardiac arrests.² Successful treatment of the patient includes:

- Early recognition of the signs and symptoms of cardiac arrest;
- Early activation of qualified medical personnel;
- Early performance of CPR/BLS;

- Early defibrillation when indicated;
- Early implementation of *advanced cardiac life support* (ACLS).

Evidence-based Research and Key Terms

The research of articles, letters, nonrandomized trials and randomized prospective studies is conducted using the Cochrane Database of Systematic Reviews and MEDLINE®, the U.S. National Library of Medicine® database of indexed citations and abstracts to medical and healthcare journal articles.

The key terms used for the research of the Guidelines include: advanced cardiac life support; basic life support; cardiopulmonary resuscitation; chain-of-survival; Code Blue; defibrillation; emergency response system; sudden cardiac arrest; sudden cardiac death. Key terms used in the Guidelines are italicized and included in the glossary.

Guideline I

CSTs should exhibit a comprehensive level of knowledge of the procedures for providing CPR/BLS and use of the automated external defibrillator (AED) for an individual who presents with the symptoms of out-of-hospital cardiac arrest.

1. Annually in the U.S. there are approximately 326,000 - 359,400 Emergency Medical Services (EMS)-assessed cardiac arrests that occur outside the HDO and on average, less than 10% of victims survive.^{3,4} The chain-of-survival is key to the victim's survival – early access, early CPR, early *defibrillation*, and early advanced care.² Research has shown that the following three links are directly related to a higher percentage of patient survival: early recognition of the emergency and activation of the *emergency response system* (ERS); early bystander CPR; and early delivery of defibrillation.²
 - A. Immediate CPR and early defibrillation with an AED can more than double a victim's chance of survival.⁵ Early defibrillation defined as shock delivery <5 minutes after activating the ERS and contacting EMS, is a high-priority goal; this is referred to as the collapse-to-shock interval.^{3,5} For every minute that CPR and defibrillation is not delivered, the victim's chances for survival decrease 7% - 10%.⁶ The only way to convert the ventricular fibrillation to normal heart rhythm is early use of an AED. Clearly the time to defibrillation is the most important determinant for survival of cardiac arrest; the earlier the better the prognosis.⁴
 - B. The 2017 update of AHA's *Heart Disease & Stroke Statistics* reports that 23% of out-of-hospital cardiac arrests are "shockable" arrhythmias.³ Communities with comprehensive CPR and AED public training programs have achieved survival rates of approximately 40% for cardiac arrest victims.⁵ A survival rate as high as 90% has been reported when defibrillation is implemented within the first minute of collapse.³ However, the survival rate decreases to approximately 50% at five minutes; approximately 30% at seven minutes; approximately 10% at nine to eleven minutes; and approximately 2% - 5% past twelve minutes.
 - 1) Early defibrillation is critical for survival of cardiac arrest for several reasons:

- The most frequent arrhythmia is ventricular fibrillation (VF);
 - The best treatment of VF the field is defibrillation with an AED. CPR can only sustain a victim for a short period of time, but cannot directly restore the normal cardiac rhythm. Restoration can only be achieved with defibrillation;
 - The longer the time to defibrillation the success rate for converting the victim rapidly decreases;
 - VF tends to convert to normal rhythm within a few minutes;
 - Many adults can survive without damage to the nervous system even when defibrillation is performed as late as six to ten minutes after sudden cardiac arrest when combined with CPR.³
2. Healthcare personnel (HCP) have a duty to know in detail how to perform CPR and use of the AED in out-of-hospital situations. The following is a summary of the key factors for HCP giving CPR to victims of out-of-hospital sudden cardiac arrest.
- A. The sequence has changed from A (airway) – B (breathing) – C (chest compressions) to C – A – B.
 - B. Emphasis focuses on reducing the time between the last compression and shock delivery; compressions should resume immediately after shock delivery.
 - C. HCP should simultaneously perform steps such as checking breathing and the pulse to reduce the time to when chest compressions are begun.
 - 1) The healthcare worker (HCW) should briefly check to confirm the individual is not breathing or the breathing is erratic, and immediately activates the ERS as well as retrieves an automated external defibrillator (AED), or sends someone to retrieve an AED. The “look, listen and feel for breathing” has been discontinued due to the amount of time it took to complete the sequence.
 - 2) HCW should simultaneously check the victim for a pulse.
 - D. Emphasis focuses on high-quality CPR with rapid chest compressions of adequate rate and depth, allowing complete chest recoil after each compression, minimizing interruption of compressions.
 - 1) HCW should start chest compressions before giving rescue breaths.
 - 2) Chest compression rate for adolescents and adults should be at least 100 - 120/minute at a depth of at least two inches, but not more than 2.4”. The compression-to-breath rate is 30:2. However, if the HCW struggles with trying to provide ventilation, e.g. pinching the nose while opening the mouth, tilting the head, the HCW should not waste precious seconds and resume chest compressions.

- 3) Use of the AED in children <8 years of age is not recommended.³ However, use of the AED in victims >8 years of age is recommended.³

Guideline II

The primary role of CSTs during a cardiac arrest in the OR is to preserve the sterile field, but be alert for any instances in which his/her assistance is needed by the surgical team in providing care to the patient.

1. The surgical team follows the same C-A-B sequence in the OR as what is followed in out-of-hospital cardiac arrests. However, an open airway is already established in patients receiving general anesthesia, and for those patients not already intubated (patients that received local anesthetic/MAC or regional anesthesia) the anesthesia care provider can quickly intubate the patient. In the OR a fourth step is added to the sequence – “D”, definitive treatment.⁷ Definitive treatment pertains to when the physician begins treating the patient with the administration of IV drugs, controlling dysrhythmias by cardiac defibrillation, administration of cardiac medications and post-resuscitation care.
2. Surgery departments should have policies in place for the treatment of cardiac arrest in the OR that includes definitions of the roles of the surgical team members. However, in most instances, the primary role of the CST during a cardiac arrest in the OR is to remain sterile and preserve the sterile field protecting it from contamination, while the rest of the surgical team is providing direct care to the patient.⁷ Responsibilities of the CST include:
 - Maintain the sterility of the back table, Mayo stand, and surgical site;
 - Pack the surgical wound with moist sponges and cover with a sterile drape or sterile towels;
 - Keep track of all instruments, sponges, and needles on the sterile field and anticipate the needs of the surgeon;
 - In some instances, the CST may be called upon to assist by providing artificial respiration, e.g. “bagging” the patient, or to administer chest compressions;
 - If internal defibrillation and/or open-chest heart massage must be provided to the patient, the CST may be called upon by the surgeon to assist the surgical team in providing whatever care is necessary in the attempt to preserve the life of the patient. In life-threatening situations in the OR, maintaining sterile technique and protecting the sterile field may very well become secondary to lifesaving procedures.⁷

Guideline III**The surgery department should review the policies and procedures (P&P) regarding Code Blue in the OR on an annual basis.**

1. The surgery department should include members of the surgical team and administration when reviewing the P&Ps, including CSTs, surgeons, RNs, risk management, and infection control officer.
 - A. The surgery department should document when the P&Ps were reviewed, revision completed (if necessary), and who participated in the review process.
2. CSTs should be familiar with the P&Ps for Code Blue in the OR. The orientation of new employees should include reviewing the P&Ps.

Guideline IV**CSTs should complete continuing education to remain current in their knowledge of Code Blue in the OR.⁸**

1. The continuing education should be based upon the concepts of adult learning, referred to as andragogy. Adults learn best when the information is relevant to their work experience; the information is practical, rather than academic; and the learner is actively involved in the learning process.⁹
2. It is recommended surgery departments use various methods of instruction to facilitate the learning process of CSTs.
 - A. If the education is primarily lecture, methods to engage learners include presentation of case studies for discussion, and audience discussion providing suggestions for reinforcing Code Blue practices in the OR.
 - B. Other proven educational methods include interactive training videos, and computerized training modules and teleconferences.
 - C. The continuing education should be delivered over short periods of time such as in modules, and not in a one-time lengthy educational session.
3. Continuing education programs should be periodically evaluated for effectiveness including receiving feedback from surgery department personnel.
4. The surgery department should maintain education records for a minimum of three years that include dates of education; names and job titles of employees that completed the continuing education; synopsis of each continuing education session provided; names, credentials, and experience of instructors.

Competency Statements

Competency Statement	Measurable Criteria
<ol style="list-style-type: none"> 1. CSTs are qualified to perform CPR/BLS in a public setting. 2. CSTs are qualified to perform CPR/BLS in the OR. 3. CSTs are qualified to perform intraoperative assistive techniques, e.g. providing artificial respiration. 4. CSTs are qualified to participate on HDO and/or surgery department committees that review the policies and procedures for a Code Blue. 	<ol style="list-style-type: none"> 1. Educational standards as established by the <i>Core Curriculum for Surgical Technology</i>.¹⁰ 2. The didactic subject of CPR/BLS and Code Blue in the OR is included in a CAAHEP accredited surgical technology program. 3. Surgical technology students demonstrate knowledge of CPR/BLS by attaining CPR/BLS certification according to the requirements stated in the <i>Core Curriculum for Surgical Technology</i>.¹⁰ 4. CSTs renew their CPR/BLS certification according to employer requirements. 5. CSTs complete training in and perform assistive techniques, such as providing artificial respiration under the direct supervision of the surgeon. 6. CSTs complete continuing education to remain current in their knowledge of emergency procedures in the operating room.⁸

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Glossary

Advanced cardiac life support: Clinical interventions for the urgent treatment of cardiac arrest, stroke or other non-traumatic life-threatening emergencies that are beyond basic life support that entails airway management, accessing veins, interpretation of EKGs and ECGs, administering emergency medications, and defibrillation.

Basic life support: Fundamental non-invasive clinical interventions that are performed to assist in the immediate survival of a patient including basic first aid, cardiopulmonary resuscitation, control of hemorrhage, spinal immobilization and stabilization of fractures. Defibrillation with an automated external defibrillator may now be considered part of basic life support.

Cardiopulmonary resuscitation: A non-invasive procedure of basic life support that involves the rapid, repeated compression of a patient's chest in the attempt to maintain blood circulation and breathing through the mouth and/or nose of the patient to maintain the circulatory system's oxygen level.

Chain-of-survival: Established by the American Hospital Association; the immediate recognition of cardiac arrest, activating the emergency response system, and beginning CPR with early defibrillation to improve the victim's chances of survival and recovery.

Code Blue: The specific code that is assigned to when a patient experiences a cardiac arrest in a HDO that alerts HCP to rapidly reach the location of the patient to begin administering advanced cardiac life support.

Defibrillation: Stopping the fibrillation of the heart, such as ventricular fibrillation, with the administration of a controlled electrical shock that restores the normal cardiac rhythm.

Emergency response system: System of contacting emergency first-responders, e.g. Emergency Medical Technician, to locate and arrive at the scene of the emergency as quickly as possible to begin providing advanced patient care and transport the patient to the nearest high-level health care facility.

Sudden cardiac arrest: Emergency occurrence in which the heart suddenly and unexpectedly stops beating, and the flow of oxygenated blood discontinues to the brain and other vital organs.

Sudden cardiac death: Unexpected death due to cardiac arrest that occurs in a short time period, usually within one hour of the onset of symptoms, in a person with a known or unknown cardiac disease.

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