

**PURPOSE:** The purpose of this policy is to authorize paramedics to perform transcutaneous cardiac pacing.

**AUTHORITY:** Division 2.5, California Health and Safety Code, Sections 1797.220; California Code of Regulation, Division 9, Section 100144.

**POLICY:**

- I. Transcutaneous cardiac pacing (TCP) is an advanced life support procedure that is indicated for adult patients with hemodynamically unstable bradycardia after hyperkalemia (renal failure/dialysis) has been considered.
- II. TCP is authorized as a standing order for paramedics treating adult patients with unstable bradycardia. Hemodynamically unstable bradycardia means a patient with a BP < 90, related to a bradycardic rhythm (HR <60) with serious signs and symptoms related to heart rate (i.e. chest pain, shortness of breath, ALOC, shock, pulmonary congestion, CHF).
- III. TCP should not be delayed for hemodynamically unstable bradycardia patients while waiting for IV access or for atropine to take effect.
- IV. Transcutaneous Cardiac Pacing (TCP) is not authorized for use on patients less than 15 years of age.
- V. TCP is **contraindicated** in hypothermic patients because the bradycardia is usually a physiologic response to body temperature.
- VI. All paramedics accredited in San Joaquin County must complete a TCP training course in order to maintain paramedic accreditation.
- VII. Paramedics applying for initial accreditation in San Joaquin County must complete a TCP training course to be eligible for San Joaquin County accreditation.
- VIII. Equipment Specifications
  - A. Transcutaneous cardiac pacemaker
  - B. Cardiac monitor/defibrillator

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C. Electrodes

D. Pulse oximetry

IX. Procedures

A. The following procedure shall be followed when initiating TCP:

1. Determine patient is a candidate for TCP and treat in accordance with ALS Treatment Protocol for Adult Bradycardia
2. Assemble equipment
3. Explain procedure to patient, as needed
4. Confirm patient's ECG rhythm with 3 lead ECG and obtain baseline vitals; establish continuous pulse oximetry monitoring
5. Apply pacing electrodes (avoid large muscle masses) and attach the pacing cable and pacing device, per manufacturer's recommendations
6. Re-confirm patient's ECG rhythm
7. Set the pacing rate at 80 BPM
8. Set the current at zero milliamps (mA)
9. Activate the pacing device and increase current, as tolerated, until capture is achieved (capture is the point when the pacemaker produces a pulse with each QRS complex)
10. Reassess the patient; if needed for discomfort, administer 2 mg midazolam IV and 5 mg morphine sulfate IV, if not contraindicated. Repeat doses may be administered, as needed; in 1-2 mg increments not to exceed a total of 5 mg midazolam IV and 10 mg morphine sulfate IV.
11. If pacing procedure does not stimulate electrical and mechanical capture, discontinue TCP and resume medication and fluid therapy.

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B. Complications:

1. The conscious patient may experience some pain or discomfort with TCP, which is directly related to the intensity of the muscle contractions and the amount of applied current.
2. Any physical contact with the patient by rescuers while TCP is activated may cause the rescuer to experience an occasional tingling or muscle twitching.
3. The American Heart Association's ACLS guidelines state that the "Two major pitfalls with transcutaneous pacing are failure to recognize the presence of underlying treatable VF and failure to recognize that the pacemaker is not capturing".
4. Prolonged TCP may cause patient skin irritation and burns, especially with higher pacing current levels.
5. The ECG must be properly adjusted in order to detect intrinsic complexes and deliver pacing pulses when appropriate. If the ECG size is set too high or too low, pacing pulses may not be delivered when required.

X. Education Requirements:

- A. Initial paramedic training shall consist of a minimum of four hours of lecture and skills education followed by written and skills testing. The training course shall include the following:
  1. Cardiac physiology including:
    - a. Review of normal conduction system;
    - b. Nodal disturbances and heart blocks;
    - c. Pathology of conduction system damage.
  2. Indications and contraindications for TCP.
  3. ALS Treatment Protocols where TCP is indicated.
  4. Review of case studies involving TCP.

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5. Use and maintenance of TCP equipment.
6. Procedures for initiating TCP.
7. Instructor demonstration of performing TCP.
8. Skills practice in performing TCP.
9. Written and skills examination.

XI. Documentation and Continuous Quality Improvement

- A. Each instance of use or attempted use of TCP shall be thoroughly documented on the patient care record which shall include at a minimum:
  1. A thorough description of the patient's condition that necessitated TCP.
  2. Basic and advanced life support procedures attempted prior to TCP.
  3. Amount of current applied, pacing rate in BPM, and the pacing mode used.
  4. Any complication involving TCP, including patient tolerance to TCP.
  5. Patient condition before and after use of TCP.
  6. Patient condition upon transferring care.
- B. The EMS agency will review each case involving TCP use and collect data regarding case volume, protocol/procedure compliance, complications and patient outcomes.
- C. Data collected will be used for case by case issue resolution, protocol/procedure revisions, and determination of continuing education needs.

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