

## RN-Initiated Emergency Cardiac Care: Decision Support Tool #2 Emergency Cardiac Care in Areas Using Cardiac Monitoring, Defibrillation and Emergency Cardiac Drugs

Decision support tools are evidenced-based documents used to guide the assessment, diagnosis and treatment of client-specific clinical problems. When practice support tools are used to direct practice, they are used in conjunction with clinical judgment, available evidence, and following discussion with colleagues. Nurses also consider client needs and preferences when using decision support tools to make clinical decisions.

### Purpose

To guide registered nurses who may manage clients experiencing sudden or unexpected life-threatening cardiac emergencies where cardiac monitoring and emergency cardiac drugs are available.

### Definitions and Abbreviations

**AED: automated external defibrillator.** Device that, when applied to the chest, automatically detects life-threatening arrhythmias and, if ventricular fibrillation or tachycardia is detected, delivers a shock to restore a normal heart rhythm (defibrillation).

**CPR: cardiopulmonary resuscitation.** Emergency procedure for persons who have circulatory and/or respiratory arrest. The two main components of conventional CPR are chest compressions and rescue breathing/ventilations (preferably mouth-to-mask, e.g., bag/valve/mask, if available, or via adjunctive airway)

**BLS:** basic cardiac life support

**ACLS:** advanced cardiac life support

**PALS:** paediatric advanced life support

**VF:** ventricular fibrillation

**VT:** ventricular tachycardia

**PEA:** pulseless electrical activity

**Joule:** unit of energy delivered by defibrillators

**Monophasic or biphasic waveform:** two different methods by which electrical current is delivered by a defibrillation device. The effective dose of energy (i.e. joules) for defibrillation depends on which type of device is being used.

**Symptomatic or hemodynamically unstable:** (compared to patient's normal, if known): decreased level of consciousness; **OR** clinically significant hypotension (*paediatric patients: decreased perfusion and decreased capillary refill time*), **OR** angina or other symptom of myocardial ischemia; **OR** respiratory distress. One or more may be present.

### **Definitions and Abbreviations (cont'd)**

**High-quality CPR:** A compression rate of at least 100 / min with an adequate compression depth of at least 5 cm (2 inches) in adults and children (4 cm or 1.5 inches in infants). Allow the chest to re-expand after each compression, minimize interruptions in chest compressions to < 10 seconds, give effective breaths that make the chest rise and avoid excessive ventilation.

### **Background**

Patients may experience sudden and life-threatening cardiac arrhythmias, due to either acute coronary syndromes or other causes (e.g. hypovolemia, tension pneumothorax, electrolyte imbalance, shock, congenital heart defects). Once cardiac arrest has occurred, rapid resuscitation is critical to ensure survival. Although approximately 21% of patients experiencing an *unwitnessed* in-hospital cardiac arrest are successfully resuscitated, only 1% survive to hospital discharge; for *witnessed* in-hospital cardiac arrest, the rate of successful resuscitation is approximately 48%, but survival to hospital discharge is only 22%. Ideally, nurses should recognize clinical deterioration prior to cardiac arrest and intervene by providing or accessing appropriate care to prevent the arrest. However, some arrest events are sudden and nurses are very likely to be the first health professional to discover a patient in cardiac arrest or with a life-threatening arrhythmia, and must be able to recognize the condition and intervene immediately.

**Recognition of cardiac arrhythmias and use of specialised equipment (e.g. cardiac monitors, defibrillators, bag-valve masks) and techniques (e.g. intra-osseous administration of medications) requires additional education and regular practice.**

The early use of AEDs and high-quality CPR is associated with the highest rates of survival. Therefore, the use of AEDs or manual defibrillators is strongly encouraged. Nurses who treat cardiac arrest in hospitals and other facilities with on-site AEDs or defibrillators should provide immediate CPR and should use the AED/defibrillator as soon as it is available. Other modes of emergency cardiac care (e.g., cardiac monitoring and administration of medications) can be used in conjunction with AEDs, if they become necessary.

The physician makes the decision to discontinue resuscitation. If a no CPR order is discovered the nurse should bring this to the immediate attention of the physician. It is reasonable to consider discontinuing after 30 minutes of resuscitation. Factors that physicians may consider in making this decision are:

- Lack of any return or spontaneous circulation
- Prolonged period of asystole
- No evidence of circulation with high-quality CPR (no palpable pulses, no waveform with quantitative end-tidal CO<sub>2</sub> capnography)

Resuscitation should never be stopped:

- before 30 minutes (unless “no CPR” order discovered or futility determined)
- if there is *intermittent* return of spontaneous circulation
- if there is a likely cause, until the treatment for that is supplied (e.g., tension pneumothorax, tamponade, hypoxia, hyperkalemia)
- if hypothermia is the cause, until the patient is warmed to at least 35<sup>0</sup>.

Registered nurses may administer medications via IV, endotracheal or intra-osseous routes, provided they possess the necessary competency.

Registered nurses are not authorized to initiate emergency cardioversion and transcutaneous pacing without a physician's order. However, in areas where there may be a long interval before a physician arrives (e.g. rural settings), it is recommended that physicians, employers and nurses collaborate to devise mechanisms to address this need. Options include a client-specific order (including telephone orders) or medical delegation approved\* by the respective colleges

\* Note, no such delegation has been approved to date.

<p><b>Applicable Nurses (Registered) and Nurse Practitioners Regulation</b></p> <p><b>Applicable CRNBC Limit and Condition</b></p>	<p><b>Excerpts from Section 6 of the Health Professions Act: Nurses (Registered) and Nurse Practitioners Regulation (activities that CAN be carried out without a physician’s order):</b></p> <p>Section 6(1):</p> <p>A registrant in the course of practicing nursing may:</p> <ul style="list-style-type: none"> <li>(a) make a nursing diagnosis identifying a condition as the cause of the signs or symptoms of an individual;</li> <li>(e) administer oxygen by inhalation</li> <li>(j) apply electricity for the purpose of defibrillation in the course of emergency cardiac care</li> <li>(l) in respect of a drug specified in Schedule 1 of the Drug Schedules Regulation, compound, dispense or administer the drug...for the purpose of treating cardiac dysrhythmia</li> <li>(k) compound, dispense or administer by any method a drug specified in Schedule II of the Drug Schedules Regulation, B.C. Reg. 9/98...such as the following: sublingual nitroglycerin</li> </ul> <p>(1) Registered nurses who, in the course of providing emergency cardiac care, apply electricity using a manual defibrillator, must possess the competencies established by Providence Health Care and follow decision support tools established by Providence Health Care.</p> <p>(2) Registered nurses may compound or administer: ...epinephrine, atropine, amiodarone or lidocaine to treat cardiac dysrhythmia.</p> <p>(3) Registered nurses who administer epinephrine, atropine, amiodarone or lidocaine must possess the competencies established by Providence Health Care and follow decision support tools established by Providence Health Care.</p> <p><a href="http://www.heartcentre.ca/EmergencyCardiacCareInformation.asp">www.heartcentre.ca/EmergencyCardiacCareInformation.asp</a></p> <p><b>NOTE:</b> cardioversion and initiating temporary pacing fall under Section 7 and therefore require a physician’s order: (Section 7.1. (e)...apply electricity for the purposes of destroying tissue or affecting activity of the heart or nervous system)</p>
<p><b>Indications</b>  (“application parameters”)</p>	<p>To be used in situations in which the patient presents with sudden (expected or unexpected) collapse, loss of consciousness or decreased level of consciousness, and there is no physician present. This tool provides guidance for nursing actions to be taken during the first 10 – 15 minutes, or until orders can be received.</p>
<p><b>Related Resources, Policies and Standards</b></p>	<p>BLS Guidelines Current ACLS algorithms endorsed by Heart &amp; Stroke Foundation (Canada) (Appendix I) PALS algorithms endorsed by the American Heart Association Core Competencies for Emergency Cardiac Care College of Registered Nurses of British Columbia: <a href="https://www.crnbc.ca/Standards/Lists/StandardResources/433ScopeforRegisteredNurses.pdf">https://www.crnbc.ca/Standards/Lists/StandardResources/433ScopeforRegisteredNurses.pdf</a> <b>CRNBC Standards for Acting Without an Order:</b> <a href="https://www.crnbc.ca/Standards/Lists/StandardResources/433ScopeforRegisteredNurses.pdf">https://www.crnbc.ca/Standards/Lists/StandardResources/433ScopeforRegisteredNurses.pdf</a></p>

## I. INITIAL ASSESSMENT AND INTERVENTION

### a. If you are alone in the facility or unit:

- 1) Assess patient for a response and look for normal or abnormal breathing. If there is no response and patient is not breathing call for help as per facility's protocol.
- 2) THEN bring emergency cart with defibrillator and/or AED (if available) to patient's side
- 3) Check pulse. If you do not feel a pulse within 10 seconds, begin CPR starting with compressions in a C-A-B sequence (i.e. Compressions, Airway, Breathing) for 2 minutes
- 4) Apply AED/defibrillator pads
- 5) Turn on AED/ defibrillator. If AED, follow prompts (if AED is used, it is not necessary to remove it, even if cardiac monitoring is later established – they are usually compatible with monitor/defibrillators)

### b. If there is other staff in the facility or unit:

- 1) Assess patient for a response and look for normal or abnormal breathing. If there is no response and patient is not breathing call for help i.e., Code Blue
- 2) Ask helper to bring emergency cart with defibrillator and AED (if available)
- 3) Check the victim's pulse. If you do not feel a pulse within 10 seconds, begin CPR immediately starting with compressions in C-A-B sequence until defibrillator or AED arrives.
- 4) Turn on AED and follow prompts (if AED is used, it is not necessary to remove it, even if cardiac monitoring is later established - they are usually compatible with monitor/defibrillators)

### c. Consider use of a supraglottic airway adjunct if need for rescue breathing persists for more than a few minutes, or there are insufficient personnel to maintain airway and breathing, or intubation has failed (see Appendix II)

### d. If AED not available, establish cardiac monitoring (if not already in place) and follow ACLS algorithms as outlined below.

## Nursing Diagnosis

Inadequate cardiac output for tissue/organ perfusion, due to cardiac arrhythmia.

## II. ONGOING ASSESSMENT AND INTERVENTION (see current Heart & Stroke Foundation ACLS Algorithm, Appendix 1)

### 1. Pulseless Rhythms

#### a. If pulseless, and cardiac rhythm is VF or VT:

- i. Follow ACLS or PALS algorithm for automatic or manual defibrillation and administration of medications (epinephrine, amiodarone and lidocaine only)
- ii. In all cases, ensure high-quality CPR is ongoing until AED or defibrillator arrives.
- iii. Assess ABCs and level of consciousness whenever rhythm on monitor changes
- iv. Continue until physician arrives, or organised rhythm and pulse returns
- v. Maintain constant nursing presence and continuous cardiac monitoring; monitor ABCs, VS and level of consciousness as above q 5-15 minutes, for minimum of 30 minutes following return of organised rhythm and pulse

- vi. During resuscitative efforts 100% oxygen may be used, following the return of an organized rhythm and pulse titrate oxygen administration to maintain a saturation of 94% or greater
  
  - b. If pulseless, and cardiac rhythm is either asystole or pulseless electrical activity (PEA):
    - i. Follow ACLS algorithm for assessment, administration of medications (epinephrine only) and other interventions
    - ii. Assess for common reversible conditions (e.g. hypoxia, hypothermia, hyperkalemia, acidosis, hypovolemia) and correct if possible, within the scope of nursing practice (e.g., administer oxygen, administer fluids if agency policies permit)
    - iii. Continue until physician arrives, or pulse and organised rhythm returns
    - iv. Maintain constant observation and continuous cardiac monitoring; monitor ABCs, VS and level of consciousness as above q 5-15 minutes, for minimum of 30 minutes following return of pulse and organised rhythm
    - v. During resuscitative efforts 100% oxygen may be used, following the return of an organized rhythm and pulse titrate oxygen administration to maintain a saturation of 94% or greater
  
  - 2. Rhythms with a Pulse
    - a. If heart rate less than 50 beats/min and patient symptomatic/hemodynamically unstable/has cardiorespiratory compromise:
      - i. Follow ACLS or PALS algorithm or assessment, administration of medications (atropine only), and other interventions **EXCEPT NOTE:** transcutaneous pacing **MAY NOT** be initiated by an RN without a physician's order (unless medical delegation of the task has been approved in the specific health care agency)
    - b. If heart rate greater than 150 beats/min and patient symptomatic/hemodynamically unstable:
      - i. Continue to provide supportive care, e.g. protection of airway, oxygen administration, BLS if necessary
      - ii. Establish vascular access and await physician's input
      - iii. Continue to monitor ABCs, cardiac rhythm and level of consciousness
      - iv. For infants/children, provide supportive care as above
      - v. **NOTE:** emergency cardioversion **MAY NOT** be initiated by an RN without a physician's order (unless medical delegation of the task has been approved\* by the respective colleges).
- \* Note, no such delegation has been approved to date.

### **Special Considerations/Precautions**

Recognition of cardiac arrhythmias requires additional education and regular practice.

Safe operation of a cardiac defibrillator requires additional education and regular, hands-on practice.

For nurses working alone, implementing the full sequence of interventions will take longer.

When possible, efforts should be made to ascertain if the patient has expressed any directives or preferences for care before the current cardiac emergency (e.g., from the family or those

accompanying the patient). This information should be communicated to and discussed with the physician (and family members, as appropriate) at the first opportunity.

**A physician's order is required to discontinue resuscitation.** Factors that physicians may consider in making this decision are:

- Lack of any return of spontaneous circulation
- Prolonged period of asystole
- No evidence of circulation with high-quality CPR (no palpable pulses, no waveform with quantitative end-tidal CO<sub>2</sub> capnography)

In general, resuscitation should never be stopped:

- before 30 minutes (unless “no CPR” order is discovered or futility is determined)
- if there is intermittent return of spontaneous circulation
- if there is a likely, treatable cause, until the treatment for that cause is given (e.g., tension pneumothorax, tamponade, hypoxia, hyperkalemia)
- if hypothermia is the cause, until the patient is warmed to at least 35°

### **Intended Clinical Outcomes**

Cardiac output that is adequate to perfuse all organs will be restored by restoring cardiac rate and rhythm. Indicators:

- return to previous level of consciousness
- return to previous blood pressure/perfusion status
- return to previous respiratory status or status adequate to maintain adequate oxygenation, and normal end-tidal CO<sub>2</sub> (PETCO<sub>2</sub>)
- freedom from symptoms of cardiac ischemia (e.g. angina or equivalent).

### **Possible Unintended Outcomes**

- side effects related to medications (e.g., worsened ventricular arrhythmias, bradycardia, tachycardia, hypotension, seizures)
- electrical burn possibly due to improper defibrillation technique
- electrical shock of staff member(s)
- patient death

### **Patient and Family Education and Support**

When possible, regardless of patient's level of consciousness, explain to them where they are, what has happened, and what you are doing to help them, throughout process. Facilitate communication amongst patient, family and team; encourage and support family to be with patient.

In agencies where a standard of care for family presence during resuscitation has been fully implemented, families should be permitted into the resuscitation room. Otherwise, when patient care priorities permit, inform family of patient's condition and what is being done, and facilitate communication with physician. Allow family to see patient **as soon as possible**.

### **Documentation**

Documentation tools designed specifically for cardiac emergencies can streamline the documentation process and improve completeness. Use of such a tool is recommended.

#### Document initial assessment, including:

- Time of assessment

- Presence of pulse, perfusion status, respirations
- Cardiac rhythm – obtain and mount ECG rhythm strip
- Level of consciousness

List all staff and family members in attendance

Document all subsequent assessments (including vital signs), interventions and patient's response

Obtain and mount ECG rhythm strip for each defibrillation and change in rhythm

Document time and content of each communication with physician or other health professionals

Document any specimens obtained and sent to laboratory

Document time and content of communication with family members.

### References

- Berg, R. A., Hemphill, R., Abella, B. S., Aufderheide, T. P., Cave, D. M., Hazinski, M. F., Lerner, E. B., Rea, T. D., Sayre, M. R. & Swor, R. A. Part 5: Adult Basic Life Support : 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*. 2010;122(suppl 3):S685-S705
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## Appendix II

### Emergency Cardiac Care: Emergency Airway Management Using Supraglottic Devices

**Decision support tools are evidenced-based documents used to guide the assessment, diagnosis and treatment of client-specific clinical problems. When practice support tools are used to direct practice, they are used in conjunction with clinical judgment, available evidence, and following discussion with colleagues. Nurses also consider client needs and preferences when using decision support tools to make clinical decisions.**

#### Purpose

To guide registered nurses who may manage clients experiencing sudden or unexpected life-threatening cardiac emergencies in advanced airway management.

#### Definitions and Abbreviations

**BCLS:** Basic cardiac life support

**ACLS:** Advanced cardiac life support

**PALS:** Paediatric advanced life support

**BVM:** Bag-valve-mask resuscitation devices

**Supraglottic:** above the glottis, sometimes also referred to as extraglottic

**LMA:** Laryngeal Mask Airway – one type of supraglottic airway device (other devices used in British Columbia include the Combi-Tube®, i-gel®, or King®)

**Unresponsive:** decreased level of consciousness such that the patient does not respond to pain and protective reflexes are impaired or absent

**High-quality CPR:** A compression rate of at least 100/min with an adequate compression depth of at least 5 cm (2 inches) in adults and children (4 cm or 1.5 inches in infants). Allow the chest to re-expand after each compression, minimize interruptions in chest compressions to < 10 seconds, give effective breaths that make the chest rise and avoid excessive ventilation

#### Background

Patients who experience sudden and life-threatening cardiac arrhythmias may not be able maintain a patent airway or demonstrate sufficient respiratory effort to support adequate oxygenation and ventilation. Once cardiac and/or respiratory arrest has occurred, rapid resuscitation is critical to ensure survival. Ideally, nurses should recognize clinical deterioration prior to cardiopulmonary arrest and intervene by providing or accessing appropriate care to prevent the arrest. However, some arrest events are sudden and nurses are very likely to be the first health professional to discover a patient in cardiopulmonary arrest, and must be able to recognize the condition and intervene immediately. Recognition of airway and respiratory emergencies is a fundamental nursing skill,

however the use of specialised equipment (e.g. supraglottic airways, bag-valve-masks) requires additional education and regular practice.

Supraglottic airway devices are relatively easy to use in comparison with bag-valve-mask ventilation units. They are sized based on patient weight and/or height, and are blindly inserted. When properly positioned, balloon(s) and /or shaped surfaces integral to the device maintain position and seal above the glottic opening, directing airflow in and out of the lungs. These devices are considered to be reasonable alternatives to endotracheal tubes in emergency situations, including where endotracheal intubation has failed.

**Advanced airway placement, while recommended in certain situations, should not cause significant interruptions in chest compressions and should not delay defibrillation.**

A common supraglottic airway device is the LMA, which is used frequently in operating rooms and is available in sizes ranging from neonate to large adult. Other devices may be encountered in practice. It is important that nurses be familiar with any device they may be required to place or manage.

<p><b>Applicable Nurses (Registered) and Nurse Practitioners Regulation</b></p>	<p><b>Section 6 (activities that can be carried out without a physician’s order):</b></p> <p>1. a registrant, in the course of practicing nursing, may:</p> <p style="padding-left: 40px;">(g) for the purposes of assessment or ameliorating or resolving a condition identified through the making of a nursing diagnosis, put an instrument or a device, hand or finger</p> <p style="padding-left: 80px;">(iii) beyond the pharynx</p>
<p><b>CRNBC Limits &amp; Conditions</b></p>	<p>Registered nurses may not carry out endotracheal intubation</p>
<p><b>Indications</b> (“application parameters”)</p>	<p>To be used in situations in which the patient presents with sudden (expected or unexpected) collapse, loss of consciousness or decreased level of consciousness, and there is no physician present. This tool provides guidance for nursing actions to be taken during the first 10 – 15 minutes, or until a physician arrives.</p>
<p><b>Related Resources, Policies and Standards</b></p>	<p>BLS and ACLS Guidelines Core Competencies for Emergency Cardiac Care</p>

**I. INITIAL ASSESSMENT AND INTERVENTION**

1. ALL PATIENTS
  - i. Assess for a response.
  - ii. If no response, call for help. Check for pulse, and if no pulse, follow Emergency Cardiac Care Decision Support Tools and current ACLS/PALS algorithm.
  - iii. Clear airway as indicated, including by suctioning if any materials visible in mouth/throat
  - iv. Support airway with positioning, manual manoeuvres, and if indicated with nasal- and/or oral-pharyngeal airways
  - v. Provide supplemental oxygen to keep SaO<sub>2</sub> greater than 94%

- vi. Support respirations with resuscitation mask and/or BVM
- vii. If indicated, provide high-quality CPR
- vii. Place an appropriately sized supraglottic airway device if the patient is unresponsive, demonstrates a lack of protective reflexes AND:
  - a. requires manual or mechanical ventilation for more than a few minutes  
OR
  - b. insufficient personnel are present to manually maintain airway and respirations and ventilation  
OR
  - c. intubation has failed
- viii. Confirm successful placement by monitoring the following:
  - end-tidal CO<sub>2</sub> (using detection device – quantitative capnography is recommended)
  - chest rise and fall
  - adequate air entry on auscultation
  - oxygen saturation
  - vital signs
- ix. Secure device using institution-approved method

### **Potential Nursing Diagnoses (determined by assessment)**

Ineffective airway clearance

Ineffective breathing pattern

Impaired spontaneous ventilation (including absent ventilation)

Impaired gas exchange

### **Special Considerations/Precautions**

Safe use of supraglottic airways requires additional education and regular hands-on practice. The nurse must be familiar with specific brands and/or types of devices available in their setting. Current ACLS guidelines emphasize high-quality CPR and use of AED or manual defibrillator over placement of advanced airway devices. Placement of a supraglottic airway should never interfere with those priorities.

### **Intended Clinical Outcomes**

The airway will be patent and protected to the maximum extent possible. Ventilation and oxygenation that is adequate to support all organs will be maintained. Indicators:

- air entry resulting in chest rise and fall without gastric insufflation
- oxygen saturation and carbon dioxide level at baseline or better
- return of spontaneous respirations
- freedom from regurgitation or signs and symptoms of aspiration (e.g. respiratory distress, decreased oxygen saturation)
- oxygenation and ventilation supported until endotracheal intubation by the appropriate provider (ultimate desired outcome)

### **Possible Unintended Clinical Outcomes**

- aspiration secondary to presence of gastric contents, gastric insufflation, regurgitation (supraglottic devices, while an advanced airway, are not a definitive airway providing complete airway protection)

- insufficient seal for ventilation at high inspiratory pressures
- pharyngeal trauma
- esophageal trauma
- hypoxia
- hypercarbia and acidosis
- hypocarbia and alkalosis
- death

### **Documentation**

A documentation tool designed specifically for cardiac emergencies can streamline the documentation process and improve completeness. Use of such a tool is recommended.

#### Document initial assessment, including:

- Time of assessment
- Presence of pulse, respirations
- Level of consciousness

List all staff in attendance.

Document all subsequent assessments, interventions and patient's response.

If care is transferred to emergency paramedics or a cardiac arrest team, responsibility for further documentation should rest with them, though may be delegated to first or second responders. Indicate the time of this transfer of care.

Obtain and mount ECG rhythm strip for each discharge of AED, if used.

Document time and content of each communication with physician or other health professionals.

Document any specimens obtained and sent to laboratory.

### **References**

Field, J. M., Hazinski, M. F., Sayre, M. R. et al. (2010). Part 1: Executive summary: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*, 122(suppl 3), S640 –S656.

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