Authorizing Prescriber(s)

LHO - Code Blue, Emergency Department & Critical Care Physicians
LHB - Emergency Department and Critical Care Physicians
LHPP - Emergency Department Physicians
LHAP - Emergency Department and Critical Care Physicians

Authorized to Whom

Intraosseous (IO) Cannulation and Infusion
Emergency/Critical Care Registered Nurses (RN) and Registered Respiratory Therapists (RRT) who have the knowledge, skill, and judgment and have successfully completed the education for IO insertion

Cardiac Arrest/Symptomatic Bradycardia/Tachycardia with a Pulse
RNs and RRTs that have the knowledge, skill, and judgment and hold competency in the Lakeridge Health Advanced Life Support competency validation program. Competency validation on theory and practical simulation testing must be completed every two years and current Advanced Cardiac Life Support (ACLS) provider status must be maintained (new or renewal course every 2 years).

Patient Description / Population

Any person that appears to be 16 years of age or older who meets the criteria for Intraosseous (IO) Cannulation and Infusion and/or Cardiac Arrest and/or Symptomatic Bradycardia and/or Tachycardia with a Pulse as indicated in the Order Table Form.

Order and/or Procedure

These procedures are not presented in sequential order; any one of or combination of the procedures below may be performed by an authorized healthcare professional until either an appropriate emergency response or an authorized prescriber is present. Refer to the Order Table Form.

Delegated Controlled Acts within this medical directive: Applying the application of a form of energy (defibrillation).

Skill Beyond Principle Expectations within this medical directive: Insertion of IO

Indication(s) to the Implementation of the Directive

Any person with indications for IO Cannulation and Infusion and/or Cardiac Arrest and/or Symptomatic Bradycardia and/or Tachycardia with a Pulse as per the Order Table Form.

Physician is not readily available.

Contraindications to the Implementation of the Directive

The directive must not be implemented in any of the following circumstances:

- The person refuses to consent to the procedure
- Person's advance care planning contraindicates these treatments
- Existence of procedure specific contraindications as noted in the Order Table Form.

If a person or substitute decision maker (SDM) refuses treatment, contact the Most Responsible Practitioner (MRP) immediately to determine plan of care.

Consent

The Regulated Health Care Professional (RHCP) implementing the directive must obtain consent, if the person is capable of providing it. In an emergency situation, if the person is not capable of providing consent, the RHCP may administer treatment without consent if, in his or her opinion, all of the following are true:

a. The person is incapable with respect to the treatment;
b. The person is experiencing severe suffering or is at risk, if the treatment is not administered promptly, of suffering serious bodily harm; and
c. It is not reasonably possible to obtain a consent or refusal on the person's behalf, or the delay required to do so will prolong the suffering that the person is experiencing or will put the person at risk of suffering serious bodily harm.

Documentation Requirements

In addition to standard documentation practices, the RHCP implementing this directive must document the following in the order section of the person's health record:

- The procedure performed on the person
- The name of this medical directive
- The name of the implementer
- The date and time
- Legible signature of implementer including credentials

Document on the Resuscitation Record as required.

Review/Evaluation Process

Every 2 years by the Critical Care Program.

References

College of Nurses of Ontario (2017). *Legislation and regulation RHPA: Scope of practice, controlled acts model.* Retrieved from http://www.cno.org/globalassets/docs/policy/41052_rhpascope.pdf

Government of Ontario (2017). *Regulated health professions act, 1991S.O. 1992, chapter 18.* Retrieved from https://www.ontario.ca/laws/statute/91r18

Heart & Stroke Foundation ™ (2016). *Advanced cardiovascular life support provider manual.* 2015 Heart & Stroke Foundation ™ Canadian Guidelines. © 2016 American Heart Association.

Institute for Safe Medication Practices (ISMP) Canada (2016*). Changes in expression of strength: Elimination of ratios on single-entity injectable products*. Volume 16 Issue 2. Retrieved from https://www.ismp-canada.org/download/safetyBulletins/2016/ISMPCSB2016-02_ChangesInExpressionStrength.pdf

Lexicomp (2017). *Lidocaine systemic*. Retrieved from https://online.lexi.com/lco/action/doc/retrieve/docid/lakerh_f/2164128#foc

Rouge Valley Health System (2016). *Medical directives & delegated controlled acts-administration of life saving drugs in a cardiac emergency*. Rouge Valley Health System Administrative Manual.

Rouge Valley Health System (2016*). Medical directives & delegated controlled acts-application of electrical energy in a cardiac arrest*. Rouge Valley Health System Administrative Manual.

Teleflex (2014). *Clinical education resources arrow® EZ-IO® intraosseous vascular access system*. Retrieved from https://www.teleflex.com/en/usa/ezioeducation/index.html

Order Table Form

This table must **not** be used independently apart from the Medical Directive

Order	Indication	Contraindication	Notes
Intraosseous (IO) Cannulation and Infusion			
1. Insert an IO needle into the bone marrow using a battery-powered handheld drill into the proximal tibia, distal tibia, or the proximal humerus site. Flush with 10 mL of 0.9% Sodium Chloride. **For alert persons**, consider lidocaine administration prior to flush). 2. IO infusion for alert persons, who are in potentially life-threatening situations, is noted to cause severe discomfort and pain prior to a rapid bolus. Therefore: a. Administer 40 mg (2 mL) of preservative-free, EPINEPHrine-free, 2% lidocaine IO over 2 minutes. b. Allow lidocaine to dwell for 60 seconds. c. Flush with 5 - 10 mL of 0.9% Sodium Chloride. d. If alert person continues to have pain from IO slowly administer an additional dose of 20 mg (1 mL) lidocaine IO over 60 seconds. 3. Consider obtaining order for systemic pain control for personss not responding to IO lidocaine. 4. Deliver fluids and medication as ordered	All persons within LH who are in a potentially life-threatening situation and IV access has been unsuccessful after 2 attempts or 90 seconds of searching for a suitable vein (including prehospital).	**IO Insertion Site** 1. Any limb fractures or crush injuries near or at insertion site 2. Conditions in which the bone is fragile, such as osteogenesis imperfecta 3. Excessive tissue or absence of adequate anatomical landmarks 4. Infection at the area of insertion 5. Previous attempt to establish in same bone 6. Previous orthopaedic procedure at the site 7. Prosthetic limb or joint at the site of insertion **Lidocaine Administration** 1. Any documented allergy to lidocaine is a contraindication to the administration of lidocaine **only**. 2. The use of any form of lidocaine other than preservative-free, EPINEPHrine-free, 2% lidocaine is contraindicated for use in this procedure.	Refer to Appendix A Ensure MRP is aware of the treatment initiated. An IO may still be inserted, but without lidocaine administration, if the lidocaine is contradicted. There is a rare but life-threatening risk of methemoglobinaemia in patients following lidocaine administration. If patients exhibit sudden signs of worsening hypoxia and cyanosis, stop lidocaine administration and contact the physician immediately.

Order	Indication	Contraindication	Notes
through IO push, utilizing a pressure bag at 300 mmHg or a syringe pump.			
Adult Cardiac Arrest			
1. Immediate initiation of effective Cardiopulmonary Resuscitation (CPR) as outlined in current ACLS guidelines **2.** Activate a Code Blue **3.** Open airway and provide BVM ventilation assistance with 100% oxygen; place oropharyngeal airway if trained in placement. **4.** Determine whether the rhythm is shockable vs. non-shockable upon arrival of defibrillator and after each CPR cycle of 2 minutes. Do not touch patient during rhythm analysis. **5.** RRT or RN to initiate IO access if any delay in obtaining IV e.g. unsuccessful attempts at IV or 90 seconds (including pre hospital).	Any person in a pulseless cardiac arrest situation. • Unresponsive • Absent or abnormal breathing (no breathing or only gasping) • No obvious detectable pulse (check for 5 - 10 seconds)	**1.** A clearly expressed and documented resuscitation status of DNAR or Personalized Wishes that contradict CPR or AED/Defibrillation as per the Resuscitation Status Patient Care Standard. **2.** Any aspect of the directive that contradicts the personalized preferences in accordance to the person (or SDM). For example, that a defibrillation device not be utilized in the attempted resuscitation.	Follow BLS and/or ACLS guidelines Refer to Appendix B Ensure the MRP is aware of the treatment initiated. High doses of epinephrine do not improve survival or neurologic outcome and may contribute to post-resuscitation myocardial dysfunction.
Non-shockable Rhythm **1.** EPINEPHrine (0.1 mg/mL) 1 mg IV/IO every 3 - 5 minutes as necessary for the duration of the arrest **2.** Give medication early in 2-minute CPR cycle to ensure medication is circulated well	**Non-shockable Rhythm** Asystole, Pulseless Electrical Activity (PEA)		Follow ACLS guidelines

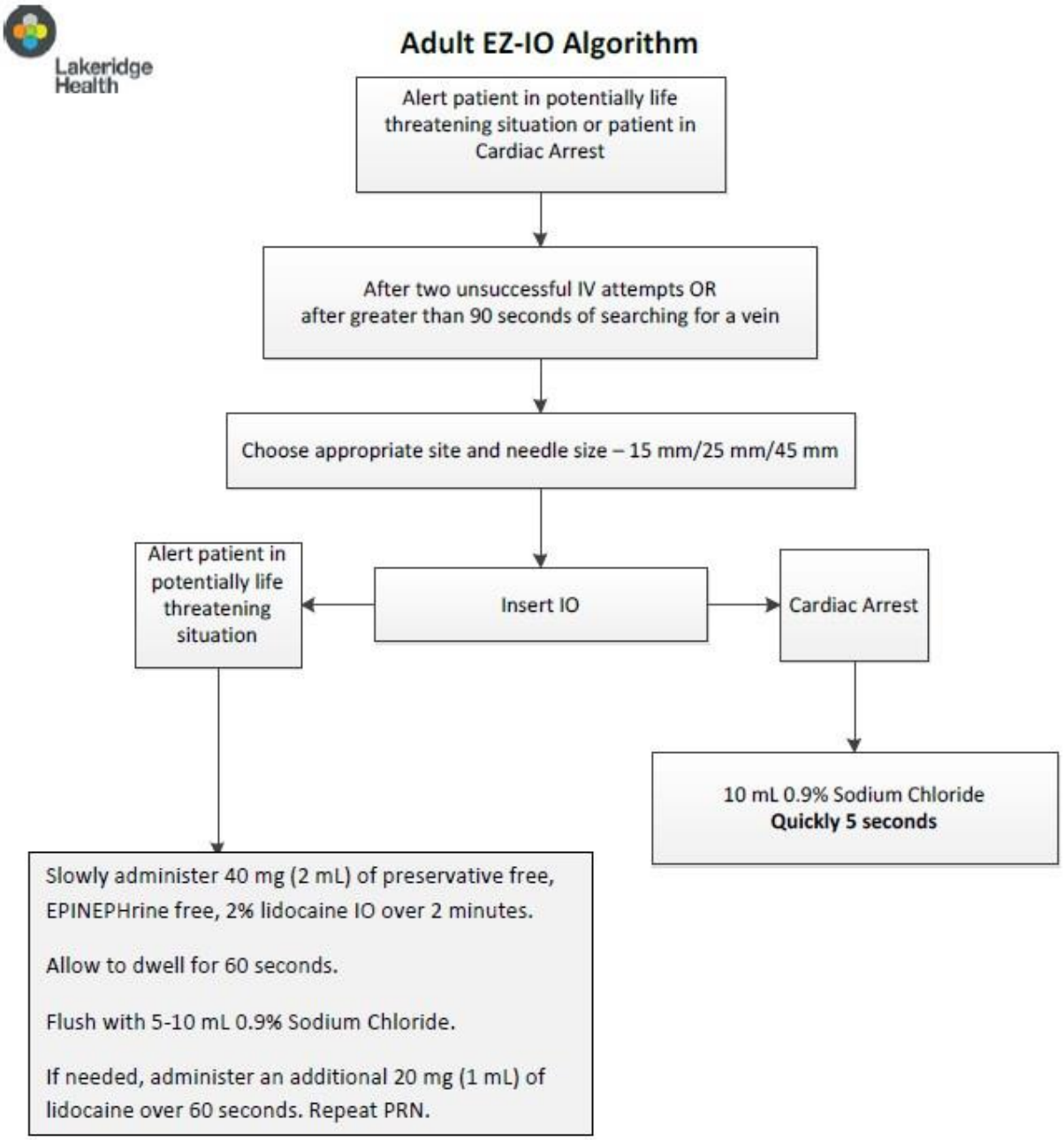
Order	Indication	Contraindication	Notes
Adult Cardiac Arrest Con't			
Shockable Rhythm **1.** Zoll defibrillator/AED • Defibrillate with 200J with Zoll defibrillator as per manufacturer's guideline or as directed by Zoll AED. Non-Zoll defibrillator/AED • Defibrillate with 200J. Subsequent doses should be equivalent or higher joules to a maximum of 360J (as per manufactures' recommendation) **2.** Immediately resume CPR post defibrillation (no pulse check) **3.** Administer EPINEPHrine (0.1 mg/mL) 1 mg IV/IO every 3 - 5 minutes as necessary for the duration of the arrest **4.** Administer amiodarone for sustained or recurrent VF/VT (after EPINEPHrine and defibrillation in the 2-minute CPR cycles). The first dose of Amiodarone is 300 mg IV/IO bolus, with a repeat dose of 150 mg IV/IO bolus in 3 - 5 minutes for sustained or recurrent VF/VT **5.** If amiodarone is not available administer lidocaine 1 - 1.5 mg/kg IV/IO first dose, then 0.5 - 0.75 mg/kg at 5 - 10 minutes intervals to maximum of 3 mg/kg for sustained or recurrent VF/VT	**Shockable Rhythm** Ventricular Fibrillation (VF), Pulseless Ventricular Tachycardia (VT)	Documented allergies to the medication being administered	Follow ACLS guidelines Continue compressions during charging. The RHCP must call out **"ALL CLEAR"**and conduct a visual check to ensure that no one is in physical contact with the person and oxygen has been removed from patient/off the bed/stretcher before the shock is delivered. Epinephrine is the first medication administered in a cardiac arrest situation **Caution: Amiodarone** has multiple complex drug interactions. Do not administer with other drugs that prolong QT interval.

Order	Indication	Contraindication	Notes (Optional)
Symptomatic Bradycardia			
1. Notify physician STAT **2.** Obtain 12-lead ECG if available; do not delay treatment **3.** Apply oxygen if hypoxemic **4.** IV access **5.** Determine whether the rhythm is atropine responsive vs. unresponsive. **If unsure, treat person as atropine responsive.**	Persons with symptomatic bradycardia, defined as a heart rate that is less than 50 beats per minute (bpm) and systolic blood pressure (SBP) less than 90 mmHg plus one or more of the following additional signs and symptoms: acute altered mental status, ongoing chest pain, hypotension, congestive heart failure, or other signs of shock (dizzy, diaphoretic etc.)	**1.** Documented allergies to the medication being administered **2.** Asymptomatic bradycardia **3.** Person capable of consent refuses treatment or SDM refuses on behalf of the person	Ensure MRP is aware of the treatment initiated. Follow ACLS guidelines Refer to Appendix C
Atropine Responsive Cardiac Rhythms **1.** Administer Atropine 0.5mgIV/IO over 30 seconds every 3 - 5 minutes as needed, to a maximum dose of 3 mg to achieve an SBP between 90 and 120 mmHg. **2.** If Atropine is ineffective (no change in person's status, person's condition is deteriorating, or total dose of 3 mg of Atropine given) move to Atropine unresponsive.	**Atropine Responsive Cardiac Rhythms** Sinus Bradycardia, First Degree AV Block, and Second Degree AV Block Type 1	Avoid use in hypothermic bradycardia	Immediate access to Transcutaneous Pacemaker must be ensured: prepare for application. Doses of less than 0.5 mg may result in paradoxical slowing of heart rate Use with caution in presence of myocardial ischemia and hypoxia as it will increase myocardial oxygen demand.

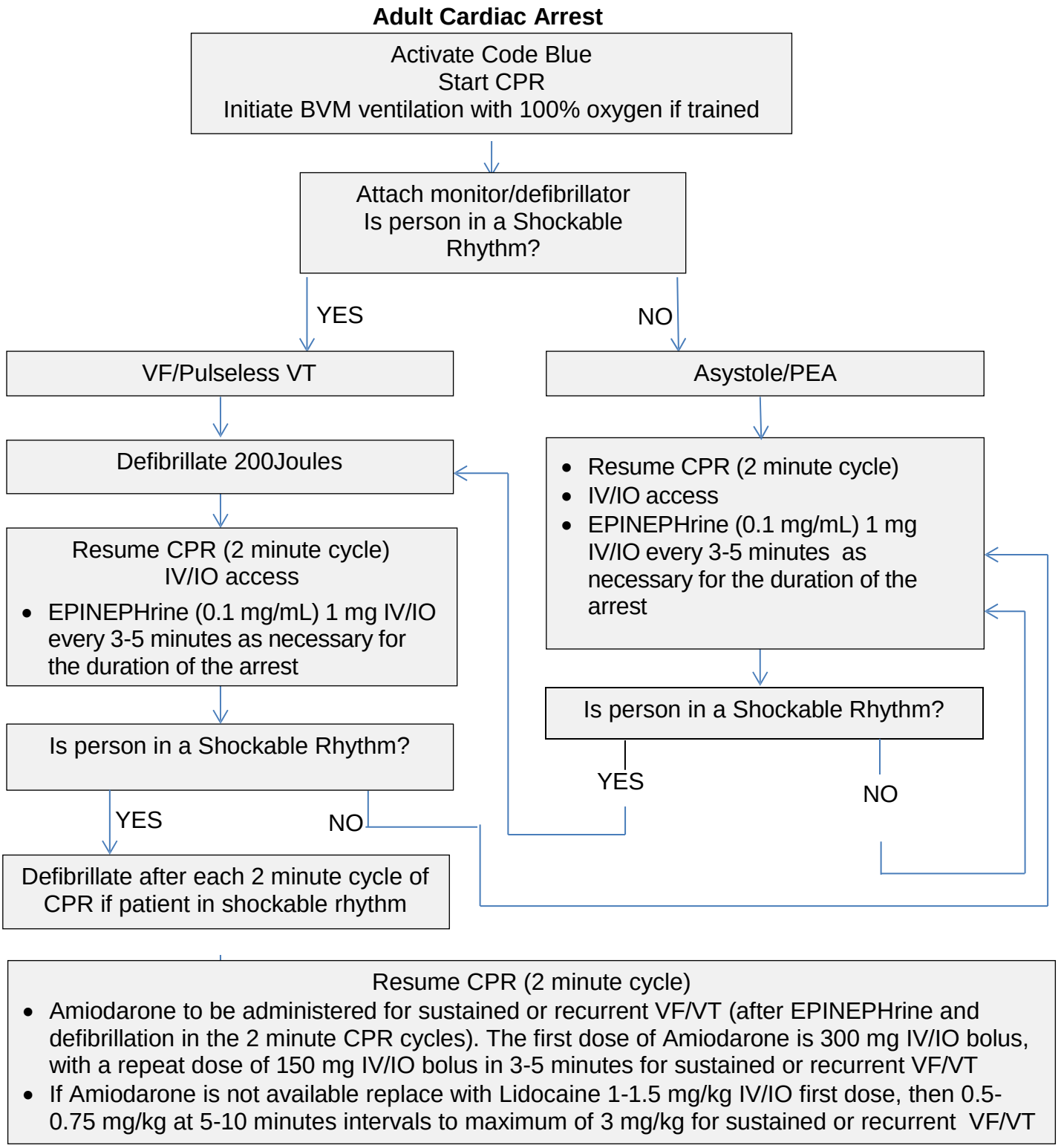
Order	Indication	Contraindication	Notes (Optional)
Symptomatic Bradycardia Con't			
Atropine-unresponsive Cardiac Rhythms **1.** DOPamine 400 mg in 250 mL D5W IV infusion. Start infusion at 2 mcg/kg/min and titrate infusion to achieve an SBP between 90 and 120 mmHg. Maximum infusion dose of DOPamine is not to exceed 20 mcg/kg/min. **2.** If there is adequate perfusion, continue to monitor and observe the person's status. **3.** If there is no change or condition deteriorates, initiate transcutaneous pacing.	**Atropine-unresponsive Cardiac Rhythms** Second Degree Heart Block Type 2, Third Degree (Complete) Heart Block, or failed response to Atropine.	Documented allergies to the medication being administered	Dopamine may cause tachyarrhythmias Do not mix with sodium bicarbonate
Pacing Procedure: **1.** Verify mode is set on demand **2.** Verify rate is set at 70 bpm **3.** Initiate pacing at a starting current of 30 mA **4.** Increase current by 10 mA until pacing captures and cardiac output confirmed **5.** Once cardiac output confirmed increase current by 10 mA and continue pacing			

Order	Indication	Contraindication	Notes (Optional)
Tachycardia with a Pulse			
1. Notify physician STAT **2.** Obtain ECG and 12-lead to confirm rhythm interpretation **3.** Monitor cardiac rhythm, blood pressure and oximetry **4.** Apply oxygen if hypoxemic **5.** Attempt vagal manoeuvres **6.** Administer Amiodarone (IV) 150 mg mixed in 100 mL D5W minibag and infuse over ten minutes. Continuously monitor the patient utilizing cardiac monitor. **May repeat Amiodarone (IV) once as necessary prior to physician arrival.** **7.** Where the person appears unstable, apply pads in case of need for cardioversion by the physician. **Note: Cardioversion is not within RN/RRT scope of practice nor covered by this Directive**	Persons with symptomatic ventricular tachycardia (VT) or supraventricular tachycardia (SVT), defined as a heart rate greater than or equal to 150 bpm and an SBP less than 90 mmHg plus one or more of the following additional signs and symptoms: acute altered mental status, ongoing chest pain, congestive heart failure, or other signs of shock (dizzy, diaphoretic etc.)	**1.** Documented allergies to the medication being administered **2.** Rhythm confirmed to be sinus tachycardia **3.** Person is Vital Signs Absent (VSA) **4.** Person capable of consent refuses treatment or SDM refuses on behalf of the patient.	Ensure MRP is aware of the treatment initiated. Refer to Appendix D Amiodarone is a complex drug that affects sodium, potassium, and calcium channels. It also has a-adrenergic and β-adrenergic blocking properties. May be used for treatment of some atrial and ventricular arrhythmias (expert consultation preferred) Do not administer with other drugs that prolong QT interval

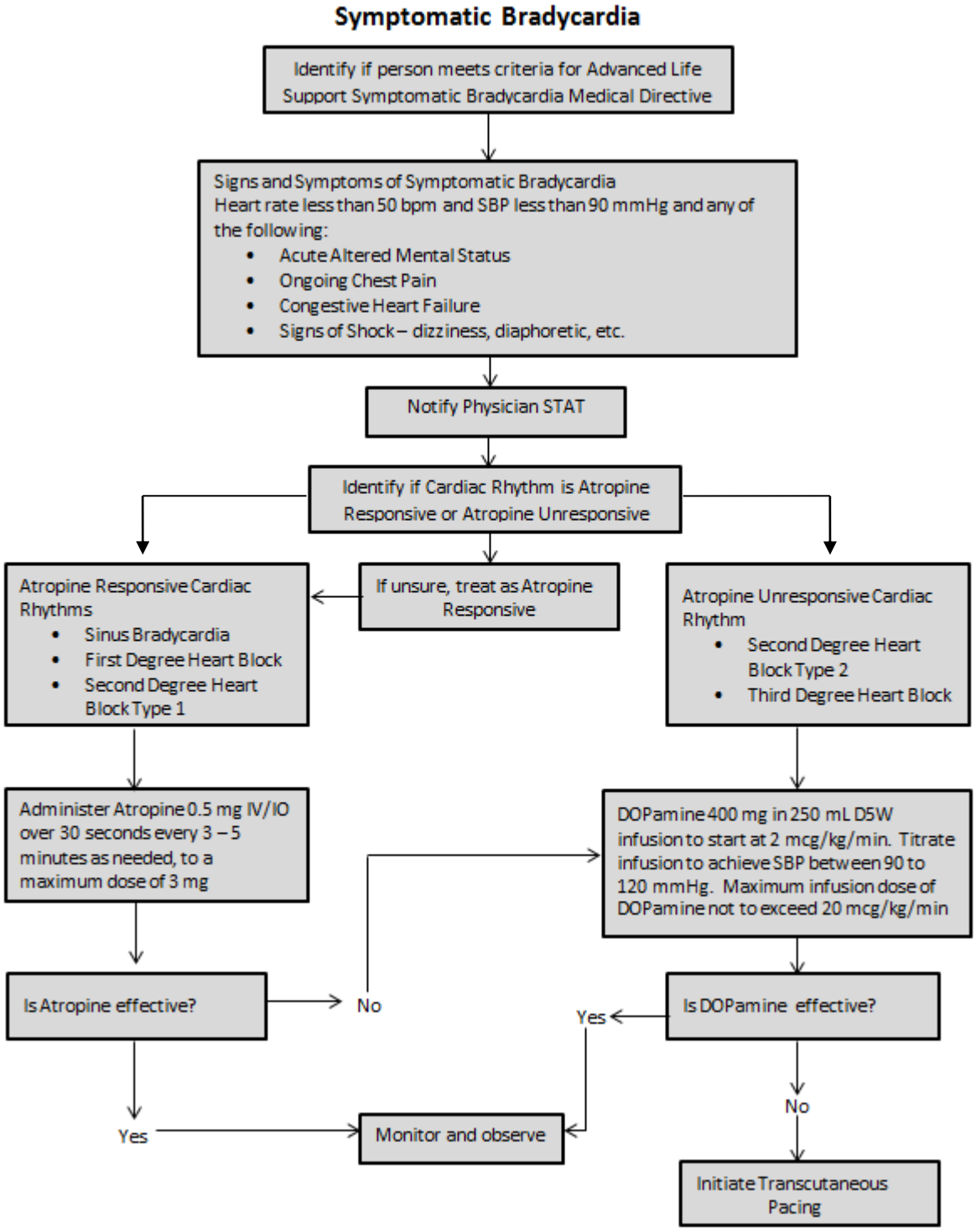
Appendix A:


Lakeridge Health
Adult EZ-IO Algorithm
Alert patient in potentially life threatening situation or patient in Cardiac Arrest
After two unsuccessful IV attempts OR after greater than 90 seconds of searching for a vein
Choose appropriate site and needle size – 15 mm/25 mm/45 mm
Alert patient in potentially life threatening situation
Insert IO
Cardiac Arrest
10 mL 0.9% Sodium Chloride
Quickly 5 seconds
Slowly administer 40 mg (2 mL) of preservative free, EPINEPHrine free, 2% lidocaine IO over 2 minutes.
Allow to dwell for 60 seconds.
Flush with 5-10 mL 0.9% Sodium Chloride.
If needed, administer an additional 20 mg (1 mL) of lidocaine over 60 seconds. Repeat PRN.

Appendix B:


Adult Cardiac Arrest
Activate Code Blue
Start CPR
Initiate BVM ventilation with 100% oxygen if trained
Attach monitor/defibrillator
Is person in a Shockable Rhythm?
YES
NO
VF/Pulseless VT
Asystole/PEA
Defibrillate 200Joules
Resume CPR (2 minute cycle)
IV/IO access
EPINEPHrine (0.1 mg/mL) 1 mg IV/IO every 3-5 minutes as necessary for the duration of the arrest
Is person in a Shockable Rhythm?
YES
NO
Resume CPR (2 minute cycle)
IV/IO access
EPINEPHrine (0.1 mg/mL) 1 mg IV/IO every 3-5 minutes as necessary for the duration of the arrest
Is person in a Shockable Rhythm?
YES
NO
Defibrillate after each 2 minute cycle of CPR if patient in shockable rhythm
Resume CPR (2 minute cycle)
Amiodarone to be administered for sustained or recurrent VF/VT (after EPINEPHrine and defibrillation in the 2 minute CPR cycles). The first dose of Amiodarone is 300 mg IV/IO bolus, with a repeat dose of 150 mg IV/IO bolus in 3-5 minutes for sustained or recurrent VF/VT
If Amiodarone is not available replace with Lidocaine 1-1.5 mg/kg IV/IO first dose, then 0.5-0.75 mg/kg at 5-10 minutes intervals to maximum of 3 mg/kg for sustained or recurrent VF/VT

Appendix C:


Symptomatic Bradycardia
Identify if person meets criteria for Advanced Life Support Symptomatic Bradycardia Medical Directive
Signs and Symptoms of Symptomatic Bradycardia
Heart rate less than 50 bpm and SBP less than 90 mmHg and any of the following:
Acute Altered Mental Status
Ongoing Chest Pain
Congestive Heart Failure
Signs of Shock – dizziness, diaphoretic, etc.
Notify Physician STAT
Identify if Cardiac Rhythm is Atropine Responsive or Atropine Unresponsive
Atropine Responsive Cardiac Rhythms
Sinus Bradycardia
First Degree Heart Block
Second Degree Heart Block Type 1
If unsure, treat as Atropine Responsive
Atropine Unresponsive Cardiac Rhythm
Second Degree Heart Block Type 2
Third Degree Heart Block
Administer Atropine 0.5 mg IV/IO over 30 seconds every 3 – 5 minutes as needed, to a maximum dose of 3 mg
DOPamine 400 mg in 250 mL D5W infusion to start at 2 mcg/kg/min. Titrate infusion to achieve SBP between 90 to 120 mmHg. Maximum infusion dose of DOPamine not to exceed 20 mcg/kg/min
Is Atropine effective?
No
Is DOPamine effective?
Yes
Yes
Monitor and observe
No
Initiate Transcutaneous Pacing

Appendix D:

Tachycardia with a Pulse