***2015 Guidelines Update for CPR and Emergency Cardiovascular Care* Comparison Chart of Key Changes**

2015 Recommendation	2010 Recommendation	Explanation
Systems of Care and Continuous Quality Improvement		
Universal elements of a system of care have been identified to provide stakeholders with a common framework with which to assemble an integrated resuscitation system	New for 2015	Healthcare delivery requires structure (e.g., people, equipment, education) and process (e.g., policies, protocols, procedures) that, when integrated, produce a system (e.g., programs, organizations, cultures) that leads to optimal outcomes (e.g., patient survival and safety, quality, satisfaction). An effective system of care comprises all of these elements — structure, process, system, and patient outcomes — in a framework of continuous quality improvement.
Separate Chains of Survival have been recommended that identify the different pathways of care for patients who experience cardiac arrest in the hospital as distinct from out-of-hospital settings.	New for 2015	The care for all post–cardiac arrest patients, regardless of where their arrests occur, converges in the hospital, generally in an intensive care unit where post–cardiac arrest care is provided. The elements of structure and process that are required before that convergence are very different for the 2 settings. Patients who have an out-of-hospital cardiac arrest (OHCA depend on their community for support. Lay rescuers must recognize the arrest, call for help, and initiate CPR and provide defibrillation (i.e., public-access defibrillation [PAD]) until a team of professionally trained emergency medical service (EMS) providers assumes responsibility and then transports the patient to an emergency department and/or cardiac catheterization lab. The patient is ultimately transferred to a critical care unit for continued care. In contrast, patients who have an in-hospital cardiac arrest (IHCA) depend on a system of appropriate surveillance (e.g., rapid response or early warning system) to prevent cardiac arrest. If cardiac arrest occurs, patients depend on the smooth interaction of the institution’s various departments and services and on a multidisciplinary team of professional providers, including physicians, nurses, respiratory therapists, and others.

It may be reasonable for communities to incorporate mobile technologies that summon rescuers who are in close proximity to a victim of suspected OHCA and are willing and able to perform CPR.	New for 2015	There is limited evidence to support the use of mobile technologies by dispatchers to notify potential rescuers of a possible cardiac arrest nearby, and activation of mobile technologies has not been shown to improve survival from OHCA. However, in a recent study in Sweden, there was a significant increase in the rate of bystander-initiated CPR when a mobile-phone dispatch system was used. Given the low harm and the potential benefit, as well as the presence of digital devices, municipalities could consider incorporating these technologies into their OHCA systems of care.
Basic Life Support and CPR Quality		
In adult victims of cardiac arrest, it is reasonable for rescuers to perform chest compressions at a rate of 100 to 120/min. Also applies to BLS for Healthcare Providers.	It is reasonable for lay rescuers and HCPs to perform chest compressions at a rate of at least 100/min.	New to the 2015 Guidelines Update are upper limits of recommended heart rate and compression depth, based on preliminary data suggesting that excessive compression rate and depth adversely affect outcomes.
During manual CPR, rescuers should perform chest compressions to a depth of at least 5 cm for an average adult, while avoiding excessive chest compression depths (greater than 6 cm).	The adult sternum should be depressed at least 5 cm.	While a compression depth of at least 5 cm is recommended, the 2015 Guidelines Update incorporates new evidence about the potential for an upper threshold of compression depth (greater than 6 cm). Compression depth maybe difficult to judge without use of feedback devices, and identification of upper limits of compression depth may be challenging. Most monitoring via CPR feedback devices suggests that compressions are more often too shallow than they are too deep For lay/untrained rescuers, 'push hard, push fast' should still be advised.

Untrained lay rescuers should provide compression-only (Hands-Only™) CPR, with or without dispatcher assistance, for adult victims of cardiac arrest. The rescuer should continue compression-only CPR until the arrival of an AED or rescuers with additional training. All lay rescuers should, at a minimum, provide chest compressions for victims of cardiac arrest. In addition, if the trained lay rescuer is able to perform rescue breaths, he or she should add rescue breaths in a ratio of 30 compressions to 2 breaths. The rescuer should continue CPR until an AED arrives and is ready for use, EMS providers take over care of the victim, or the victim starts to move.	If a bystander is not trained in CPR, the bystander should provide compression-only CPR for the adult victim who suddenly collapses, with an emphasis to "push hard and fast" on the center of the chest, or follow the directions of the EMS dispatcher. The rescuer should continue compression-only CPR until an AED arrives and is ready for use or EMS providers take over care of the victim. All trained lay rescuers should, at a minimum, provide chest compressions for victims of cardiac arrest. In addition, if the trained lay rescuer is able to perform rescue breaths, compressions and breaths should be provided in a ratio of 30 compressions to 2 breaths. The rescuer should continue CPR until an AED arrives and is ready for use or EMS providers take over care of the victim.	Compression-only CPR is easy for an untrained rescuer to perform and can be more effectively guided by dispatchers over the telephone. Moreover, survival rates from adult cardiac arrests of cardiac etiology are similar with either compression-only CPR or CPR with both compressions and rescue breaths when provided before EMS arrival. However, for the trained lay rescuer who is able, the recommendation remains for the rescuer to perform both compressions and breaths.

To help bystanders recognize cardiac arrest, dispatchers should inquire about a victim's absence of responsiveness and quality of breathing (normal versus not normal). If the victim is unresponsive with absent or abnormal breathing, the rescuer and the dispatcher should assume that the victim is in cardiac arrest. Dispatchers should be educated to identify unresponsiveness with abnormal and agonal gasps across a range of clinical presentations and descriptions.	To help bystanders recognize cardiac arrest, dispatchers should ask about an adult victim's responsiveness, if the victim is breathing, and if the breathing is normal, in an attempt to distinguish victims with agonal gasps (i.e., in those who need CPR) from victims who are breathing normally and do not need CPR.	This change from the 2010 Guidelines emphasizes the role that emergency dispatchers can play in helping the lay rescuer recognize absent or abnormal breathing. Dispatchers should be specifically educated to help bystanders recognize that agonal gasps are a sign of cardiac arrest. Dispatchers should also be aware that brief generalized seizures may be the first manifestation of cardiac arrest. In summary, in addition to activating professional emergency responders, the dispatcher should ask straightforward questions about whether the patient is unresponsive and if breathing is normal or abnormal in order to identify patients with possible cardiac arrest and enable dispatcher-guided CPR.
For patients with known or suspected opioid addiction who are unresponsive with no normal breathing but a pulse, it is reasonable for appropriately trained lay rescuers and BLS providers, in addition to providing standard BLS care, to administer intramuscular (IM) or intranasal (IN) naloxone. Opioid overdose response education with or without naloxone distribution to persons at risk for opioid overdose in any setting may be considered.	New for 2015	There is substantial epidemiologic data demonstrating the large burden of disease from lethal opioid overdoses, as well as some documented success in targeted national strategies for bystander-administered naloxone for people at risk. ** At time of print: In Canada, Naloxone is a Prescription Only Medicine (POM) listed on Health Canada's Prescription Drug List.
2015 Recommendation	**2010 Recommendation**	**Explanation**
Healthcare Provider BLS		
HCPs must call for nearby help upon finding the victim unresponsive, but it would be practical for an HCP to continue to assess the breathing and pulse simultaneously before fully activating the emergency response system (or calling for backup).	The HCP should check for response while looking at the patient to determine if breathing is absent or not normal.	The intent of the recommendation change is to minimize delay and to encourage fast, efficient simultaneous assessment and response, rather than a slow, methodical, step-by-step approach.

It is reasonable for HCPs to provide chest compressions and ventilation for all adult patients in cardiac arrest, whether from a cardiac or noncardiac cause. Moreover, it is realistic for HCPs to tailor the sequence of rescue actions to the most likely cause of arrest.	It is reasonable for both EMS and in-hospital professional rescuers to provide chest compressions and rescue breaths for cardiac arrest victims.	Compression-only CPR is recommended for untrained rescuers because it is relatively easy for dispatchers to guide with telephone instructions. It is expected that HCPs are trained in CPR and can effectively perform both compressions and ventilation. However, the priority for the provider, especially if acting alone, should still be to activate the emergency response system and to provide chest compressions. There may be circumstances that warrant a change of sequence, such as the availability of an AED that the provider can quickly retrieve and use.
It may be reasonable for the provider to deliver 1 breath every 6 seconds (10 breaths per minute) while continuous chest compressions are being performed (i.e., during CPR with an advanced airway).	When an advanced airway (i.e., endotracheal tube, Combitube, or laryngeal mask airway) is in place during 2-person CPR, give 1 breath every 6 to 8 seconds without attempting to synchronize breaths between compressions (this will result in delivery of 8 to 10 breaths per minute).	This simple single rate for adults, children, and infants—rather than a range of breaths per minute—should be easier to learn, remember, and perform.
2015 Recommendation	**2010 Recommendation**	**Explanation**
Advanced Cardiovascular Life Support (ACLS)		
The combined use of vasopressin and epinephrine offers no advantage to using standard-dose epinephrine in cardiac arrest. Also, vasopressin does not offer an advantage over the use of epinephrine alone. Therefore, to simplify the algorithm, vasopressin has been removed from the Adult Cardiac Arrest Algorithm–2015 Update.	One dose of vasopressin 40 units IV/ intraosseously may replace either the first or second dose of epinephrine in the treatment of cardiac arrest.	Both epinephrine and vasopressin administration during cardiac arrest have been shown to improve ROSC. Review of the available evidence shows that efficacy of the 2 drugs is similar and that there is no demonstrable benefit from administering both epinephrine and vasopressin as compared with epinephrine alone. In the interest of simplicity, vasopressin has been removed from the Adult Cardiac Arrest Algorithm.
There is inadequate evidence to support the routine use of lidocaine after cardiac arrest. However, the initiation or continuation of lidocaine may be considered immediately after ROSC from cardiac arrest due to VF/pVT.	New for 2015	While earlier studies showed an association between giving lidocaine after myocardial infarction and increased mortality, a recent study of lidocaine in cardiac arrest survivors showed a decrease in the incidence of recurrent VF/pVT but did not show either long-term benefit or harm.

There is inadequate evidence to support the routine use of a ß-blocker after cardiac arrest. However, the initiation or continuation of an oral or IV ß-blocker may be considered early after hospitalization from cardiac arrest due to VF/pVT.	New for 2015	In an observational study of patients who had ROSC after VF/pVT cardiac arrest, ß-blocker administration was associated with higher survival rates. However, this finding is only an associative relationship, and the routine use of ß-blockers after cardiac arrest is potentially hazardous because ß-blockers can cause or worsen hemodynamic instability, exacerbate heart failure, and cause bradyarrhythmias. Therefore, providers should evaluate patients individually for their suitability for ß-blockers.
TTM recommendations have been updated with new evidence suggesting that a range of temperatures may be acceptable to target in the post–cardiac arrest period. After TTM is complete, fever may develop. While there are conflicting observational data about the harm of fever after TTM, the prevention of fever is considered benign and therefore is reasonable to pursue.	Comatose (i.e., lacking of meaningful response to verbal commands) adult patients with ROSC after out of-hospital VF cardiac arrest should be cooled to 32°C to 34°C for 12 to 24 hours. Induced hypothermia also may be considered for comatose adult patients with ROSC after IHCA of any initial rhythm or after OHCA with an initial rhythm of pulseless electrical activity or asystole. Preventing fever recommendation is new for 2015.	A recent high-quality study compared temperature management at 36°C and at 33°C and found outcomes to be similar for both. Given that 33°C is no better than 36°C, clinicians can select from a wider range of target temperatures. In some studies, fever after rewarming from TTM is associated with worsened neurologic injury. Therefore preventing fever is suggested.

2015 Recommendation	**2010 Recommendation**	**Explanation**
Pediatric Basic Life Support and CPR Quality		
The C-A-B sequence has been reaffirmed in 2015.	Initiate CPR for infants and children with chest compressions rather than rescue breaths (C-A-B rather than A-B-C). CPR should begin with 30 compressions (by a single rescuer) or 15 compressions (for resuscitation of infants and children by 2 HCPs) rather than with 2 ventilations.	In the absence of new data, the 2010 sequence has not been changed. Consistency in the order of compressions, airway, and breathing for CPR in victims of all ages may be easiest for rescuers who treat people of all ages to remember and perform. Maintaining the same sequence for adults and children offers consistency in teaching.
It is reasonable to use the recommended adult chest compression rate of 100 to 120/min for infants and children.	"Push fast": Push at a rate of at least 100 compressions per minute.	One adult registry study demonstrated inadequate chest compression depth with extremely rapid compression rates. To maximize educational consistency and retention, in the absence of pediatric data, pediatric experts adopted the same recommendation for compression rate as is made for adult BLS.
2015 Recommendation	**2010 Recommendation**	**Explanation**
Pediatric Advanced Life Support		
Early, rapid IV administration of isotonic fluids is widely accepted as a cornerstone of therapy for septic shock. For children in shock, an initial fluid bolus of 20 mL/kg is reasonable. However, for children with febrile illness in settings with limited access to critical care resources (i.e., mechanical ventilation and inotropic support), administration of bolus IV fluids should be undertaken with extreme caution, as it may be harmful.	New for 2015	This recommendation continues to emphasize the administration of IV fluid for children with septic shock. Additionally, it emphasizes individualized treatment plans for each patient, based on frequent clinical assessment before, during, and after fluid therapy is given, and it presumes the availability of other critical care therapies. In certain resource limited settings, excessive fluid boluses given to febrile children may lead to complications where the appropriate equipment and expertise might not be present to effectively address them.

There is no evidence to support the *routine* use of atropine as a premedication to prevent bradycardia in emergency pediatric intubations. It may be considered in situations where there is an increased risk of bradycardia. There is no evidence to support a minimum dose of atropine when used as a premedication for emergency intubation.	A minimum atropine dose of 0.1 mg IV was recommended because of reports of paradoxical bradycardia occurring in very small infants who received low doses of atropine.	Recent evidence is conflicting as to whether atropine prevents bradycardia and other arrhythmias during emergency intubation in children. However, these recent studies did use atropine doses less than 0.1 mg without an increase in the likelihood of arrhythmias.
Fever should be avoided when caring for comatose children with ROSC after OHCA. A large randomized trial of therapeutic hypothermia for children with OHCA showed no difference in outcomes whether a period of moderate therapeutic hypothermia (with temperature maintained at 32°C to 34°C) or the strict maintenance of normothermia (with temperature maintained 36°C to 37.5°C) was provided.	Therapeutic hypothermia (32°C to 34°C) may be considered for children who remain comatose after resuscitation from cardiac arrest. It is reasonable for adolescents resuscitated from witnessed out-of-hospital VF arrest.	A prospective, multicenter study of pediatric OHCA victims randomized to receive either therapeutic hypothermia (32°C to 34°C) or normothermia (36°C to 37.5°C) showed no difference in functional outcome at 1 year between the 2 groups. This and other observational studies demonstrated no additional complications in the group treated with therapeutic hypothermia. Results are currently pending from a large, multicenter, randomized controlled trial of therapeutic hypothermia for patients who are comatose after ROSC following pediatric IHCA (see Therapeutic Hypothermia After Pediatric Cardiac Arrest website: www.THAPCA.org.)
After ROSC, fluids and inotropes/vasopressors should be used to maintain a systolic blood pressure above the fifth percentile for age. Intra-arterial pressure monitoring should be used to continuously monitor blood pressure and identify and treat hypotension.	New for 2015	No studies were identified that evaluated specific vasoactive agents in post-ROSC pediatric patients. Recent observational studies found that children who had post-ROSC hypotension had worse survival to hospital discharge and worse neurologic outcome.
Delayed cord clamping after 30 seconds is suggested for both term and preterm infants who do not require resuscitation at birth. There is insufficient evidence to recommend an approach to cord clamping for infants who require resuscitation at birth.	There is increasing evidence of benefit of delaying cord clamping for at least 1 minute in term and preterm infants not requiring resuscitation. There is insufficient evidence to support or refute a recommendation to delay cord clamping in infants requiring resuscitation.	In infants who do not require resuscitation, delayed cord clamping is associated with less intraventricular hemorrhage, higher blood pressure and blood volume, less need for transfusion after birth, and less necrotizing enterocolitis. The only adverse consequence found was a slightly increased level of bilirubin, associated with more need for phototherapy.

If an infant born through meconium stained amniotic fluid presents with poor muscle tone and inadequate breathing efforts, the initial steps of resuscitation should be completed under the radiant warmer. PPV should be initiated if the infant is not breathing or the heart rate is less than 100/min after the initial steps are completed. Routine intubation for tracheal suction in this setting is not suggested, because there is insufficient evidence to continue recommending this practice. However, a team that includes someone skilled in intubation of the newborn should still be present in the delivery room.	There was insufficient evidence to recommend a change in the current practice of performing endotracheal suctioning of nonvigorous infants with meconium-stained amniotic fluid.	Review of the evidence suggests that resuscitation should follow the same principles for infants with meconium-stained fluid as for those with clear fluid; that is, if poor muscle tone and inadequate breathing effort are present, the initial steps of resuscitation (warming and maintaining temperature, positioning the infant, clearing the airway of secretions if needed, drying, and stimulating the infant) should be completed under an overbed warmer. PPV should be initiated if the infant is not breathing or the heart rate is less than 100/min after the initial steps are completed. Experts placed greater value on harm avoidance (i.e., delays in providing bag-mask ventilation, potential harm of the procedure) over the unknown benefit of the intervention of routine tracheal intubation and suctioning. Appropriate intervention to support ventilation and oxygenation should be initiated as indicated for each individual infant. This may include intubation and suction if the airway is obstructed.