



# Cardiac Arrest in Canada

## What needs to be done

A cardiac arrest – defined as a condition where the heart suddenly stops beating – will lead to death if not treated immediately. It can happen to anyone, at any age, any place or time, without warning. Some communities, especially rural, remote, and isolated Indigenous communities, have greater difficulties accessing emergency and other medical services for cardiac arrest treatment.<sup>1-3 4,5</sup> However, a more comprehensive and coordinated response system is needed to ensure that people who have a cardiac arrest in Canada make it to the hospital alive and have the best chance for survival with the best possible neurologic outcome.<sup>6,7</sup>

An effective response system depends on the quick action of bystanders, to save the life of someone in cardiac arrest. Barriers exist that prevent bystanders from performing Hands-Only CPR or accessing and using an AED. There is a reluctance for bystanders to engage in CPR due to lack of confidence, fear of doing the wrong thing or harming the person, and unclear civil liability protection for those who act.<sup>8-10</sup> AEDs are often unavailable or inaccessible for public use, they are not always properly maintained, or are unregistered, meaning 9-1-1 services cannot direct bystanders to the nearest AED. Lives cannot be saved if CPR is not performed or if an AED does not work, cannot be found or people are afraid to use one.

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## What are we proposing?

Provincial governments, in partnership with the federal government, health system planners, emergency medical services, educators and people in Canada should consider the following policy options to improve health outcomes and increase survival rates for children and adults who experience cardiac arrest:

1. Support education and awareness:
  - Mandate Hands-Only CPR and AED education for elementary, middle and high school students and ensure adequate funding is available.
  - Fund education and awareness campaigns to ensure people in Canada can recognize the signs of cardiac arrest know what to do and act by calling 9-1-1 or EMS, doing Hands-Only CPR and using an AED if one is available.
2. Improve AED availability:
  - Require placement of AEDs in high-traffic public places, high-density residential settings, areas where higher risk activity is occurring, and rural and remote communities with longer EMS response times.
  - Adopt or amend legislation to require AEDs as a component of first aid kits at workplaces where there is an occupational first aid attendant, and ensure guidelines clearly state that all employees are encouraged to use these AEDs in an emergency.
3. Improve AED accessibility and readiness:
  - Implement a sustainably resourced provincial AED registry that is accessible to 9-1-1 dispatchers so that they may direct bystanders to the nearest AED during an emergency.
  - Require mandatory AED registration and standardize AED accessibility and maintenance to ensure they can be easily located and work to their fullest life-saving capacity.
4. Encourage quality improvement in emergency response systems:
  - Include cardiac arrest response times as a reportable EMS performance indicator in the province/territory.
  - For all calls where cardiac arrest is suspected, direct provincial/territorial EMS to offer and continue to improve dispatch-assisted Hands-Only CPR and AED use.
  - Ensure and fund access to data of cardiac arrest events and patient outcomes for inclusion in registries across the country, such as the Canadian Resuscitation Outcomes Consortium (CanROC) Cardiac Arrest Registry.

## Why now?

An estimated 35,445 out-of-hospital cardiac arrests happen each year in Canada.<sup>11</sup> Survival drops with every minute without CPR and an AED,<sup>4,12</sup> and unfortunately, the survival in most communities is less than 10%.<sup>13-16</sup> Bystander CPR rates in Canada are between 36% to 49%<sup>7,17</sup> and bystander AED use rates in public spaces are only 7% to 17%.<sup>7</sup> As well, only 4% of Canadian respondents of a recent Heart & Stroke survey name cardiac arrest as a possible cause of unexpected collapse and unresponsiveness.<sup>18</sup>

The Chain of Survival™ is a six-step process which, when properly executed, gives a person in cardiac arrest the best chance of survival and recovery. It begins with (1) recognizing a cardiac arrest and calling 9-1-1, (2) immediate CPR, (3) rapid use of an AED, (4) advanced emergency medical services, (5) advanced life support and post-arrest care at a hospital, and (6) recovery. The success of each link in the Chain of Survival is dependent on decisive action taken in previous links, therefore bystander action in the first three links is fundamental until EMS or first responders can take over care.

Education and awareness can help people in Canada recognize the signs of a cardiac arrest and empower them to call 9-1-1, perform Hands-Only CPR and use an AED. This education can start in schools with children 12 years or younger, as recommended in a statement endorsed by the World Health Organization, titled “Kids Save Lives” and can build on work by the ACT Foundation, who have trained 4.6 million students across Canada.<sup>19,20</sup> Children can perform CPR, call 9-1-1, apply an AED and share their resuscitation skills with family and friends.<sup>19,21</sup> In Quebec, CPR education / training is mandatory for high school students, resulting in about 68,000 trained students each year.<sup>22</sup> One tool that could help with resuscitation education in schools is CardiacCrash™, an interactive hands-on teaching module that builds skills and knowledge in CPR and AED use through combined in-person and digital learning. Students receive positive reinforcement from peers to succeed in a real-life cardiac arrest scenario, and as a result, retention of learning is higher than through traditional teaching methods.<sup>23</sup>

In addition to education and awareness, strategic placement of AEDs in high traffic public and residential settings (e.g., shopping centers, condominiums), areas where higher risk activity is occurring (e.g., sports complexes), and rural and remote communities with longer EMS response times is the best way to ensure that people in Canada are protected and that investments are cost-effective.<sup>24-26</sup> The targeted placement of AEDs in public spaces in Los Angeles and King County, Seattle resulted in improved survival rate for patients with cardiac arrest.<sup>24,27</sup> Community responder programs which train volunteers to deploy lifesaving CPR and AEDs can help reduce cardiac arrest response times.<sup>28</sup> A Canadian community responders program, titled Neighbours Saving Neighbours, will be piloted in 2022 across 75 communities in Ontario.<sup>29</sup>

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In addition to strategic AED placement, capturing the location of accessible public and private AEDs (e.g., those in multi-dwelling residences and private businesses) through a mandatory registry will enable 9-1-1 dispatchers to direct bystanders to the nearest AED in the event of a cardiac arrest. Most Canadian provinces (excluding Newfoundland and Labrador) have AED registries, although not all of them are linked to dispatch, monitor regular maintenance, or capture publicly accessible AEDs that have been privately installed. Ensuring a comprehensive and robust provincial AED registry can maximize effectiveness when the emergency response system is activated. An analysis of out-of-hospital cardiac arrest data in Denmark found that bystander AED rates were nearly triple and 30-day survival nearly double when the nearest AED was accessible, compared to inaccessible, at the time of the cardiac arrest.<sup>30</sup>

Many organizations, including the American Heart Association, the European Resuscitation Council and Heart & Stroke, endorse specialized training for 9-1-1 dispatchers to identify agonal breathing (gaspings or not breathing normally) and to coach bystanders to perform CPR.<sup>31,32</sup> Dispatch-assisted CPR is recognized by the Global Resuscitation Alliance (GRA) as an important quality improvement strategy for an advanced Chain of Survival model.<sup>33</sup> However, poor recognition of agonal breathing continues to pose a challenge for dispatchers and accounts for as much as 50% of unrecognized cardiac arrests over the phone.<sup>34</sup> With the right educational tools, dispatchers can better identify cardiac arrests, leading to improvements in bystander CPR rates.<sup>34,35</sup> In Ottawa, dispatch-assisted CPR coaching increased bystander CPR rates by 58% in one study.<sup>34</sup> In Korea, dispatch-assisted CPR more than tripled bystander CPR rates and doubled improvements in neurological outcomes.<sup>36</sup>

The capture of EMS response times can also be used as a quality improvement measure. Currently there is no consistency in the measurement of response times across provinces and territories, making it difficult to assess how various response systems compare, and how they can be improved. In Canada, efforts are underway to include data from 9-1-1 communication centres, dispatchers' performance and other indicators within the growing Canadian Resuscitation Outcomes Consortium (CanROC). Where possible, encourage paramedic engagement and involvement in resuscitation research and paramedicine improvements. Allowing provincial data capture of cardiac arrest events (including AED use) and patient outcomes in the CanROC Cardiac Arrest Registry would strengthen research in this area and lead to improved survival from cardiac arrest.

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## **Heart & Stroke polling found strong public support in Canada for the following:<sup>37</sup>**

93% support making Hands-Only CPR and AED education mandatory for elementary, middle and high school students.

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95% support government funding for education and public awareness campaigns on recognizing and responding to a cardiac arrest.

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97% support the provincial government requiring placement of AEDs in high traffic public places, high density residential settings, areas where higher risk activity is occurring, and rural and remote communities.

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97% support legislation requiring AEDs to be a component of workplace first aid equipment or kits where there is an occupational first aid attendant.

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96% support implementation of a sustainably resourced and funded provincial AED registry linked to 9-1-1 dispatch.

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96% support mandatory AED registration and standardization of AED accessibility and maintenance to ensure AEDs can be easily located and are properly maintained.

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96% support government directing emergency health services to offer and encourage dispatcher-assisted Hands-Only CPR and AED use.

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# What's the opportunity?

- Bystander AED use is cost-effective.<sup>38</sup> In one economic analysis, a modelled increase in the rate of bystander AED use from 7.5% to 18.8% was the most important contributor to enhanced patient outcomes and cost-effectiveness.<sup>38</sup>
- Physical and neurological issues are common following cardiac arrest,<sup>39</sup> resulting in substantial loss in employment and earnings that persist for at least three years after the event.<sup>40</sup> However, quickly executing the Chain of Survival gives an individual the best chance of surviving and recovering from a cardiac arrest, in particular improved neurological outcomes<sup>7</sup>
- Individuals are more likely to recover to pre-cardiac arrest ability levels and are able to return to their daily activities sooner<sup>4,5</sup>
- Women are less likely than men to be resuscitated<sup>41</sup> and older women suffering from an out-of-hospital cardiac arrest are less likely to survive to hospital discharge than older men.<sup>42</sup> Hands-Only CPR and AED education and awareness can help narrow this gap.
- Government partnership with local communities (especially rural, remote, and isolated Indigenous communities) through investments in Hands-Only CPR and AED education/awareness, and AED availability and accessibility can improve resuscitation outcomes in these communities.
- Heart & Stroke has partnered with governments across Canada to install over 15,000 AEDs in communities across the country since 2010.<sup>43</sup> There is still more work to be done and Heart & Stroke is committed to improving the following:
  - Increasing the survival rate following cardiac arrest by 50%
  - Doubling the bystander CPR rate, and
  - Doubling the bystander AED use rate.

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This statement is current as of December 2021.