A Survey of the Public's Ability to Recognize and Willingness to Intervene in Out-of-hospital Cardiac Arrest and Opioid Overdose

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Out-of-hospital cardiac arrest (OHCA) and opioid overdose (OD) are two emergencies where prompt recognition and response—typically by untrained bystanders—are critical to ensure positive outcomes. The median incidence of emergency medical services–treated OHCA across 10 urban centers in North America is 52 per 100,000,[1] while the U.S. incidence of fatal OD is around 14 per 100,000.[2]

In both emergencies, bystanders are the first link in the chain of survival. In OHCA, bystander-initiated cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) application increases survival and functional neurologic outcomes in OHCA, and for every 1-minute delay, there is a 12% decrease in favorable neurologic outcomes.[3] In OD, bystander-administered naloxone decreases mortality.[4] Although public agencies have allocated significant resources providing educational courses for laypersons to conduct CPR, not all members of the public can even recognize OHCA,[5–10] and it is likewise uncertain whether they could recognize or treat OD.

We conducted a multimodal in-person survey to describe the general public's ability to recognize OHCA or OD, as well as investigate the knowledge of and willingness to administer appropriate treatments. We hypothesized that the majority of respondents would be able to recognize a person experiencing OHCA or OD. The Providence Health Care Research Ethics Board provided approval.

We selected 17 urban British Columbia locations in greater Vancouver (population 2.4 million), Victoria (390,000), Prince George (74,000), and Kelowna (132,000). We screened participants from outside public transportation stations, shopping malls, sports venues, community centers, and university campuses. Trained research assistants conducted 3-hour recruitment shifts at times of anticipated high pedestrian

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traffic at these locations. Participants were required to be at least 18 years or older, proficient in English, and provide informed verbal consent. Assistants then administered a 36-item survey (Appendix S1, available as supporting information in the online version of this paper, which is available at http://onlinelibrary.wiley.com/doi/10.1111/acem.13916/full) with two embedded videos (Videos S1 and S2).

We based our instrument on prior similar surveys regarding OHCA[5–10] and extrapolated OD-based questions from these. We covered several domains, including respondent demographics, prior witness of an OHCA/OD, prior bystander training, knowledge of appropriate actions (including chest compressions, use of AED, and administration of naloxone), and willingness to provide these. Since laypersons are typically trained in resuscitation via multihour classroom instruction, we inquired whether participants would be willing to view short videos while waiting in line at kiosks at banks, airports, or community centers or when renewing their driver's license, as a low-barrier alternative. The survey was expected to take approximately 20 minutes and participants were compensated $5 (Canadian) for their time.

To ascertain whether laypersons could recognize OHCA or OD, we used publicly available videos created by public service agencies. We showed footage demonstrating a person experiencing OHCA (Heart and Stroke Foundation of Canada [Video S1]) and a person experiencing OD (British Columbia Centre for Disease Control "Toward the Heart" [Video S2]). We screened videos among five emergency physicians to ensure appropriate and recognizable content. Respondents were asked to choose the condition from a list of medical emergencies. We piloted the survey for content, clarity, and length among five volunteer emergency physicians across three iterations.

Coprimary outcomes were the correct identification of the video depiction of OHCA and OD. Other outcomes included knowledge of what treatments to apply in case of the videos, as well willingness to administer evidence-based treatments in response to hypothetical OHCA and OD scenarios and desire to undergo additional training. A priori, we felt that 196 respondents would provide a margin of error ±7% (95% CI) around a hypothetical 50% recognition rate. We used descriptive statistics including frequencies with counts and proportions and describe continuous variables as means with standard deviations if normally distributed or medians with interquartile ranges if otherwise (STATA 11).

Between March 1, 2018, and December 22, 2018, we approached 980 people, of whom 582 (59.4%) endorsed a lack of time or desire to participate and 164 (16.7%) did not speak sufficient English, leaving 234 for enrollment (23.9%). Respondents were 48% female, the median (IQR) age was 38 (28–49) years, and 62% reported at least some university education (Table 1). Almost one-quarter reported having witnessed an OHCA (23%) or OD (24%), and one-third (34%) reported using opioids or knowing someone who did.

For OHCA, 26 respondents (11%, 95% CI = 7% to 15%) correctly identified this from the video clip, and 54 (23.1%) would perform chest compressions (selected from a list of options). If presented with a hypothetical scenario where a patient had OHCA, 62% were willing to perform CPR, 76% were willing to perform dispatch assisted CPR, and 47% were comfortable using an AED.

For OD, 89 respondents (38%, 95% CI = 32% to 43%) correctly identified this from the video, while 93 would administer naloxone and 33 would provide assisted ventilations. Over half (53%) were aware of naloxone kits; if provided with a hypothetical OD scenario, 16% would be willing to administer naloxone.

For further training, almost all respondents (89%) were willing to watch a 1-minute video on how to perform CPR while waiting at a kiosk. For the 197 respondents who had not received naloxone training, 54% were receptive to receiving a full naloxone training course (Table 1).

This in-person survey of British Columbia residents in a variety of urban locations found that few could correctly identify a patient having a cardiac arrest or OD from a short video clip, and few could provide the appropriate lifesaving therapy. However, when presented with hypothetical scenarios, two-thirds were willing to provide CPR, and one-sixth were willing to administer naloxone in OD. Importantly, this mismatch between recognition and willingness to assist demonstrates an urgent need for focused educational interventions to assist with recognition.

Our findings are similar to those of prior work. Breckwoldt et al.[5] interviewed German bystanders who attended an OHCA, and nearly half did not appear to appreciate that a cardiac arrest had taken place. Likewise, a survey of Lebanese youth demonstrated that

Table 1
Demographics and Outcomes

Variable	Respondents (n = 234)
Demographics	
Age (years), median (IQR)	38 (29–48)
Female	112 (47.9)
Highest level of education	
Did not finish high school	20 (8.5)
Completed at least high school	53 (22.6)
Completed at least technical diploma	60 (25.6)
Completed at least bachelor's degree	60 (25.6)
Completed masters/PhD or equivalent	34 (14.5)
Declined to answer/missing data	7 (3.0)
Self-reported income (CAD)	
<25,000	65 (27.7)
25,000–49,999	38 (16.2)
50,000–99,999	62 (26.5)
100,000–149,999	32 (13.7)
>150,000	30 (12.8)
Declined to answer/missing data	7 (3.0)
Cardiac arrest: experience and recognition	
Current training in chest compressions	59 (25.2)
Expired training in chest compressions	51 (21.8)
Personally witnessed cardiac arrest	54 (23.1)
Recognized video of cardiac arrest from list of options	26 (11.1)
Correctly described "cardiac arrest" as "heart stopped beating" from list of options	50 (21.4)
Cardiac arrest: treatment	
Would perform chest compressions if presented with the scenario in the video	54 (23.0)
If presented with a hypothetical OHCA, would be willing to perform chest compressions	145 (62.0)
If presented with a hypothetical OHCA, would be willing to perform dispatch-assisted compressions	179 (76.5)
Aware of the existence of AEDs	186 (79.5)
Correctly identified appropriate level of training required to operate an AED	73 (31.2)
Aware of location of nearest AED	35 (15.0)
Unaware of location of nearest AED but able to quickly determine	70 (29.9)
Aware of apps such as PulsePoint	24 (10.3)
Comfortable using AED	110 (47.0)
OD: experience and recognition	
Current training in naloxone use	38 (16.2)
Taking opioids or knows someone taking opioids	79 (33.8)
Personally witnessed OD	57 (24.4)
Recognize video of OD from list of options	89 (38.0)
OD: treatment	
Would administered naloxone if presented with the scenario in the video	93 (39.7)
Would administer assisted ventilations if presented with the scenario in the video	33 (13.6)
Aware of naloxone and its role	124 (53.0)
Correctly identified appropriate level of training required to administer bystander naloxone	121 (51.7)
Prior training in bystander naloxone	49 (17.1)
In possession of a bystander naloxone kit	30 (12.8)
If presented with a hypothetical opioid OD, would be willing to administer bystander naloxone	37 (15.9)
Undergo naloxone training if no prior training (n = 196)	106 (54.1)
Willingness for additional training	
View short videos in public location	209 (89.3)

Data are reported as n (%) unless otherwise specified.
AED = automated external defibrillator; OD = opioid overdose; OHCA = out-of-hospital cardiac arrest.

most could not identify signs of cardiac arrest.[6] However, bystanders are willing to provide medical assistance in OHCA, and questionnaires in the United States[7] and Japan[8] have confirmed this. Gonzalez et al.[9] surveyed laypersons at two Philadelphia train stations and found that 66% could identify an AED while 58% were willing to use one in an emergency, results similar to those in a Viennese telephone survey.[10]

There has been little investigation of community ability to recognize and willingness to assist in OD. Given that 47,000 Americans died from OD in 2017,[2] this information is critical to public health and emergency educators. Our data indicate that less than half of respondents can even recognize OD, but some would be willing to administer naloxone, and most would be willing to undergo training. There is significant potential for improvement in both these statistics, and training laypersons in recognition and management of OD is likely a worthwhile investment.

Training is critical to bystander interventions, and numerous agencies have invested substantial resources in first aid and medical response public education courses over the past few decades. Unfortunately, our results demonstrate that most laypersons cannot even

recognize OHCA or OD: if the emergency cannot be recognized, even the most rigorous training will be of little assistance. Therefore, we advocate that current first aid training programs provide ample and diverse opportunities for recognition of OHCA and OD in addition to teaching appropriate bystander treatments. Since the cost and time of many first aid courses may be a barrier to laypersons, it is worth assessing whether current educational opportunities are maximized. Planners may consider from our results that people seem willing to engage in low-barrier training in public spaces, such as video kiosks while people wait in line, or at sporting or community events. Such relatively low-cost methods have the potential to reach large numbers of people quickly and at multiple times. These may be a viable avenue to address public knowledge and recognition deficits in order to align the skills and desire of the public to help those with medical emergencies.

We note some limitations. We surveyed the public in numerous urban locations in a single province with the majority of respondents declining. A shorter survey, or one conducted via telephone or online or better-compensated, might have achieved a higher response rate. Our participants were younger with higher levels of postsecondary education and income, and some subgroups may be more able to recognize OHCA or provide assistance;[10] social desirability bias may have influenced respondents. Our recognition rate was lower than anticipated, potentially affecting power of the survey. Our choice of videos —although they were developed and are used by public agencies—may have influenced the recognition rate; other videos may have led to different results. Naloxone can also be administered intranasally and public acceptance rates may be higher using this route. This is a snapshot taken over a few months during an opioid epidemic that has been heavily featured in the media and cannot measure changes over time.

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Supporting Information

The following supporting information is available in the online version of this paper available at http://onlinelibrary.wiley.com/doi/10.1111/acem.13916/full

Appendix S1. Questionnaire.

Video S1. Heart stroke

Video S2. Toward the heart.