CJC Open 3 (2021) 504–509

Original Article

Assessment of Canadian Public Automated External Defibrillator Registries

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ABSTRACT

Background: Public automated external defibrillator (AED) registries aim to increase layperson defibrillation for victims of out-of-hospital cardiac arrest. This study aims to characterize Canadian AED registries and the process by which these databases are updated and used.

Methods: A survey was administered to representatives from each eligible AED registry. Collected data included information on registry management, AED validation process, linkage to emergency medical dispatch (EMD), and number of AEDs per registry. Three unregistered AEDs in each region were then located and registered into their

RÉSUMÉ

Introduction : Les registres publics de défibrillateurs externes automatiques (DEA) ont pour objectif d'accroître la défibrillation par des non-professionnels aux victimes d'arrêt cardiaque extra-hospitalier. La présente étude a pour objectif de décrire les registres canadiens de DEA et le processus par lequel ces bases de données sont actualisées et utilisées.

Méthodes : Les représentants de chaque registre admissible de DEA ont répondu à une enquête. Les données recueillies étaient les suivantes : les renseignements sur la prise en charge du registre, le

Out-of-hospital cardiac arrest (OHCA) is common in Canada and is widely considered a major public health concern.[1,2] Bystanders can terminate underlying common malignant tachyarrhythmias using an automated external defibrillator (AED). The recognition and treatment of these fatal arrhythmias is highly time dependent, as every minute without successful treatment reduces survival by 7%-10%.[3] Timely layperson use of an AED and cardiopulmonary resuscitation has been shown to increase survival to discharge in OHCA.[4] Unfortunately, bystanders use an AED in a minority of OHCA.[5,6] Inability to locate nearby AEDs may be a significant barrier to optimal public AED use.[7,8] Among the strategies proposed to address this issue, Public Access Defibrillation (PAD) aims to enhance AED accessibility and use by laypersons and emergency personnel, notably through public AED registries and crowdsourced mobile applications.[7,9,10] Knowledge of the precise location of an AED coupled by assistance from emergency medical dispatcher (EMD) is a useful component that may improve AED utilization.[11]

In Canada, 9 of the 10 provinces currently have public AED registries. In Ontario and Saskatchewan, a provincial registry does not exist, but separate registries for Toronto, Regina, and Saskatoon have been created. Newfoundland and Labrador does not currently have an AED registry, but governmental discussions are ongoing.[12] To date, none of the 3 Canadian territories (Northwestern Territories, Nunavut, and Yukon) have public AED registries. Manitoba was the first province to pass legislation regarding AEDs: the Defibrillator Public Access Act was proclaimed into force in 2013 obligating AED owners to register their devices with the Heart and Stroke AED Registry.[13] A similar bill was passed in Ontario in 2020.[14] As many of these registries were developed independently, they are likely to differ in a multitude of ways. This study therefore aims to characterize Canadian AED registries and the process by which these databases are updated

Received for publication November 16, 2020. Accepted December 17, 2020.

Ethics Statement: This research obtained ethics approval from the McGill University Faculty of Medicine Institutional Review Board (A02-E16-19A) and adheres to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans – TCPS 2 (2018).

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See page 509 for disclosure information.

https://doi.org/10.1016/j.cjco.2020.12.013

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respective registry. The primary endpoint was the proportion of AEDs that became visible in the registry within 1 month.
Results: Of the 9 Canadian provinces that have registries, 7 are provincial, whereas 2 contain smaller independent registries. The survey was completed by 90% of contacted registries. The number of AEDs per registry ranged from 21 to 443 per 100,000 persons. Six registries are managed by a provincial government, 6 use a standardized validation process, and 8 are linked to EMD. Of the 21 AEDs registered by our study personnel in 7/10 registries, 9 (43%) were made available to the public within 1 month of registration. Only 1 registry employed an AED validation process that included direct contact with AED managers.
Conclusions: Canadian public AED registries demonstrate significant differences in their governance and administrative processes. A majority of registries are integrated with EMD for out-of-hospital cardiac arrest, but not all registries use a standardized validation process to ensure accuracy of AED information submitted by the public.

processus de validation des DEA, la liaison avec la répartition médicale d'urgence (RMU) et le nombre de DEA par registre. Trois DEA non enregistrés dans chaque région ont ensuite été localisés et inscrits dans leur registre respectif. L'issue principale était la proportion de DEA qui étaient visibles au registre en un mois.
Résultats : Dans les neuf provinces canadiennes qui ont des registres, sept ont des registres provinciaux, alors que deux comptaient des registres indépendants plus petits. Quatre-vingt-dix pour cent des représentants des registres ont rempli l'enquête. Le nombre de DEA par registre allait de 21 à 443 par 100 000 personnes. Six registres sont gérés par les autorités provinciales, six utilisent un processus de validation standardisé et huit sont liés à la RMU. Parmi les 21 DEA enregistrés par notre personnel d'étude dans 7/10 registres, neuf (43 %) ont été mis à la disposition du public un mois après leur enregistrement. Seul un registre utilisait un processus de validation des DEA qui consistait en un contact direct avec les gestionnaires de DEA.
Conclusions : Les registres publics canadiens de DEA démontrent des différences significatives dans leurs processus administratifs et de gestion. La majorité des registres sont intégrés à la RMU pour la gestion des arrêts cardiaques extra-hospitaliers, mais ce ne sont pas tous les registres qui utilisent un processus de validation standardisé pour garantir l'exactitude des renseignements sur les DEA soumis par le public.

and used. It should be noted that the AED registries explored in this study may be separate from other databases, such as those maintained by organizations such as PulsePoint.

Material and Methods

This study combined descriptive cross-sectional and prospective observational methodology. Public AED registries were included if they were the sole or a major PAD program in their respective province, as per the Heart and Stroke Foundation of Canada. These registries were confirmed via manual search engine inquiries and local provincial contacts. There were no exclusion criteria. Ethics approval was obtained from the McGill University Faculty of Medicine Institutional Review Board in February 2019 (A02-E16-19A).

Descriptive cross-sectional component

The descriptive component consisted of a cross-sectional qualitative and quantitative closed survey. Between February 2019 and June 2020, a research assistant contacted registry representatives by electronic correspondence. AED registry representatives were identified via their respective AED registry websites and the Heart and Stroke Foundation of Canada. Subsequent follow-up was conducted to confirm registry participant identity. Informed written consent was obtained from each public AED registry representative. Before survey administration, AED registry representatives were contacted biweekly for a maximum of 3 and 4 times via e-mail and telephone, respectively. An 8-section online voluntary survey (Google Form) was then sent to representatives via an e-mail link requesting information regarding the AED registry (Supplemental Table S1). The survey included questions on registry management, registry link to a smartphone application, availability of content to EMD, and number of AEDs per registry. The survey questionnaire was developed in a systematic fashion through collaboration between the authors in focus group sessions and externally reviewed by a senior researcher independent of the primary research team.

Prospective component

The prospective component aimed to corroborate and validate the findings collected in the study's cross-sectional part. A research assistant from each eligible province was tasked with locating 3 unregistered AEDs and gathering the data needed to submit the AEDs into their respective registry. The AED localization strategy was up to the discretion of the research assistant. All AEDs were then submitted across Canada between April 15 and May 18, 2019. The validation process employed by each individual AED registry was described. Specifically, information collected included the method and timing of correspondence from the AED registry after registration, the type of AED parameters validated by registry personnel, and the delay between initial registration and final validation. Registries were considered to have a standardized validation process if they contacted the person registering each AED, via phone or e-mail, to verify the exactitude of provided information. One month after AED submission, an author (LD) verified if the AEDs had been made visible in the studied registries. For the registries that had not incorporated the new AEDs at this milestone, a second follow-up was conducted 3 months after submission. The primary endpoint was the proportion of AEDs submitted that became available to the public (ie, visible in the registry) within 1 month of submission. The secondary endpoint was the proportion of AEDs registered across Canada for which the data submitted were validated by registry personnel.

Data analysis

Descriptive statistics were used to analyze and report the survey data. Dichotomous variables are reported as counts and

Table 1. Survey results depicting Canadian AED registry characteristics by province

Province	Management	AED data validation process	Link to smartphone application	Accessible to EMD	OHCA use tracking	Number of AEDs	Number of AEDs per 100,000 persons	Date of survey completion
Alberta	Government	Yes	No	Yes	Yes	3600	82	March 16, 2020
British Columbia	Government and NPO	No	Yes	Yes	Yes	2342	46	April 15, 2020
Manitoba	Government	Yes	No	Yes	No	4467	324	March 24, 2020
New Brunswick	NPO	Yes	No	Yes	Yes	700	90	February 17, 2019
Nova Scotia	Government	No	No	No	No	1012	104	February 17, 2019
Ontario (Toronto)	Government	Yes	No	Yes	No	1294	21	June 7, 2020
Prince Edward Island	EMS	Yes	No	Yes	No	215	136	April 17, 2020
Quebec	NPO	Yes	Yes	Yes	No	2312	27	August 5, 2019
Saskatchewan (Regina)	Government	No	No	Yes	Yes	1050	443	March 12, 2020

AED, automated external defibrillator; EMD, emergency medical dispatcher; EMS, emergency medical service; NPO, nonprofit organization; OHCA, out-of-hospital cardiac arrest.

proportions. Research assistants were not involved in data analysis or manuscript writing.

Results

The survey was completed by representatives of 9 of the 10 eligible AED registries, yielding a response rate of 90%. Survey results revealed that 6 registries (67%) are managed by the provincial government or provincial health service authority (Table 1). Six registries (67%) declared utilization of a standardized AED data validation process, and 8 registries (89%) reported using some form of quality surveillance (Table 2). Five registries (56%) reported conducting quality surveillance regarding electrode and battery replacement, and 5 registries (56%) reported requesting updates regarding changes in AED availability. Registry affiliation with EMD was reported in 7 registries (78%), whereas 2 registries (22%) were linked with smartphone applications. Four registries (44%) tracked AED use in OHCA. The number of AEDs per registry ranged from 21 to 443 per 100,000 persons (Fig. 1). Complete anonymized survey responses for each individual registry are provided in Supplemental Table S2.

Research assistants succeeded in registering 3 AEDs in 7/10 Canadian AED registries. Of the 21 AEDs registered, 9 (43%) were made available to the public within 1 month of registration and 12 (57%) were made available within 3 months. The Quebec registry was the only registry to employ a standardized validation process. The New Brunswick, Nova Scotia, Manitoba, Alberta, and British Columbia registries contacted AED owners via e-mail for different reasons (submission confirmation, welcome letter, or maintenance checklist), but did not employ a standardized validation process. However, Alberta and British Columbia had data verification mechanisms built into their AED submission forms (eg, British Columbia did not allow owners to submit AEDs with invalid serial numbers).

Discussion

The current study represents a first attempt at depicting the landscape of AED registries in Canada. Survey results demonstrated significant variability in registry management and the processes by which AED data are validated, integrated, and updated. The number of AEDs per capita also varied significantly between the registries. Importantly, 6 registries (67%) reported that AED information provided to them underwent a validation process; however, only 1 (11%) registry was ultimately confirmed to have a standardized AED validation process.

Patients who suffer from OHCA in the vicinity of an AED are more likely to benefit from public defibrillation and survive, highlighting the importance of defibrillator accessibility and linkage to EMD.[15] AED registries provide a framework to achieve these goals and may therefore contribute to improved survival after OHCA. Our study demonstrated that a majority of Canadian AED registries are linked to EMD. It subsequently becomes crucial to ensure that the data contained within AED registries remain accurate and easily accessible to EMD during calls for OHCA. In our study, a standardized AED validation process was unfortunately not used by all registries. In their study illustrating experiences with the national Swedish AED registry, Fredman et al.[9] suggested that an AED validation process may be beneficial, but that a stringent validation process may lead to unwarranted exclusion of AEDs. The authors suggested that a more personalized communication between AED managers and registry representatives may improve the quality of the data. Our work identified that only the Quebec provincial registry used a standardized validation process involving verbal contact with AED owners. This form of validation process is likely time and resource consuming, perhaps delaying AED integration into registries. However, this must be balanced against the importance of ensuring accuracy of AED information in OHCA.

The Heart and Stroke Foundation of Canada position statement on PAD recommends that quality assurance of AEDs be conducted by multiple means, including AED maintenance, data collection, and evaluation.[16] The importance of quality assurance was highlighted by a study exploring manufacturer and AED owner experiences in the United States. This study demonstrated that AED electrodes and batteries represent the most common cause of device failure.[17] In our study, only 5 registries (56%) reported conducting quality surveillance regarding electrode and battery replacement. Moreover, only 5 registries (56%) reported requesting updates regarding any change in AED availability. Quality surveillance and assurance by AED registries is not uniform in Canada, but may play an important role in

Table 2. Responses to most relevant survey questions with summary statistics

Question	No.	%
General registry information		
What entity governs the registry?		
1. HSF	1/9	11
2. NPO	2/9	22
3. PHSA/Government	5/9	56
4. Other	1/9	11
Is the registry public?		
1. Public	5/9	56
2. Private	4/9	44
General AED information		
Type of AEDs accepted in registry:		
1. Permanent	9/9	100
2. Mobile	4/9	44
3. Other	1/9	11
Who can register an AED?		
1. Owner	9/9	100
2. Manufacturer or distributor	4/9	44
3. EMS	7/9	78
4. Government	6/9	67
5. Anyone	4/9	44
AED validation		
Is a validation process used?		
1. Yes	6/9	67
2. No	3/9	33
Validation process method:		
1. Automated	1/6	17
2. Human	4/6	67
3. Both	1/6	17
AED inclusion when registered:		
1. Immediately	3/6	50
2. Only after validation	3/6	50
Quality surveillance		
Are updates requested regarding the following elements?		
1. Expiration: battery	5/9	56
2. Expiration: electrodes	5/9	56
3. AED removal	8/9	89
4. Change in location	7/9	78
5. Change in availability	5/9	56
Registry affiliations		
Is there computerized EMD access to the AED registry during cardiac arrest calls?		
1. Yes	7/9	78
2. No	2/9	22
Are the data accessed by EMD updated in real time?		
1. Yes	5/7	71
2. No	2/7	29
Is the registry linked to a smartphone application?		
1. Yes	2/9	22
2. No	7/9	78
AED use in cardiac arrest		
Does the registry track the use of registered AEDs in OHCA?		
1. Yes	4/9	44
2. No	5/9	56

AED, automated external defibrillator; EMD, emergency medical dispatch; EMS, emergency medical service; HSF, Heart and Stroke Foundation; NPO, nonprofit organization; OHCA, out-of-hospital cardiac arrest; PHSA, provincial health service authority.

ensuring device functionality and availability for OHCA victims.

At the time our study was conducted, only 1 province in Canada had passed a law regarding PAD. Bill 20, also known as the Defibrillator Public Access Act, was passed in Manitoba in 2013. This bill requires owners of designated public premises to install and register AEDs, and to ensure maintenance, testing, and access to AEDs in emergencies. In our study, the Manitoba registry was found to have the highest absolute number of registered AEDs and the second highest number of AEDs per capita. However, we identified significant delays in AED registration whereby none of the 3 registered AEDs in Manitoba were made available to the public within 3 months. Other Canadian provinces recently followed the path of legislation, with Ontario passing a similar law in 2020 (Bill 141) and British Columbia currently exploring a bill regarding AED accessibility (Bill 216).[14,18] As things currently stand, it is likely that a number of AEDs are unregistered, resulting in AED registry incompleteness across Canada, as reported in other countries.[19]

Limitations

The survey methodology of our study inherently comes with limitations including possible information bias resulting from the self-reported nature of the data. We attempted to mitigate this limitation by incorporating a prospective methodology. Furthermore, despite systematic development of the survey within focus group sessions amongst the authors, no external pretesting of the survey was conducted. Moreover, our results represent a static representation of AED registries in Canada. AED registry development is clearly dynamic, and thus our findings are likely to eventually become outdated. There may be new or evolving registries that are in the process of development since data collection was performed; this study aims to serve as a baseline assessment from which registries can evolve. In addition, the differences inherent to respective AED registries may also contribute to difficulty in accurately interpreting some of the data in our study. For instance, because urban areas have a higher number of AEDs, urban registries (eg, Regina) may appear as though they have a higher number of AEDs per capita when compared with provincial registries. The data collection in both the survey and prospective components of the study occurred over several months in part due to difficulties in establishing contact with registry representatives and AED owners, which may limit the internal validity of our findings. Finally, despite our attempts via manual searches and local provincial contacts, some existing registries might not have been accounted for and this may have limited our findings.

Future directions

Our study highlights the important heterogeneity in AED registry governance and functioning across Canada. It is of utmost importance to maintain AED registry continuity and data accuracy to ensure the highest level of care for patients and to improve survival in OHCA. Continued collaboration between key stakeholders including governments, EMS, nonprofit organizations, AED distributors, and AED owners is warranted. We would encourage standardization and collaboration between AED registries for harmonization of registry management and quality surveillance techniques. Furthermore, widespread governmental involvement may result in continued legislation surrounding AED registration and the development of registries in places where they are

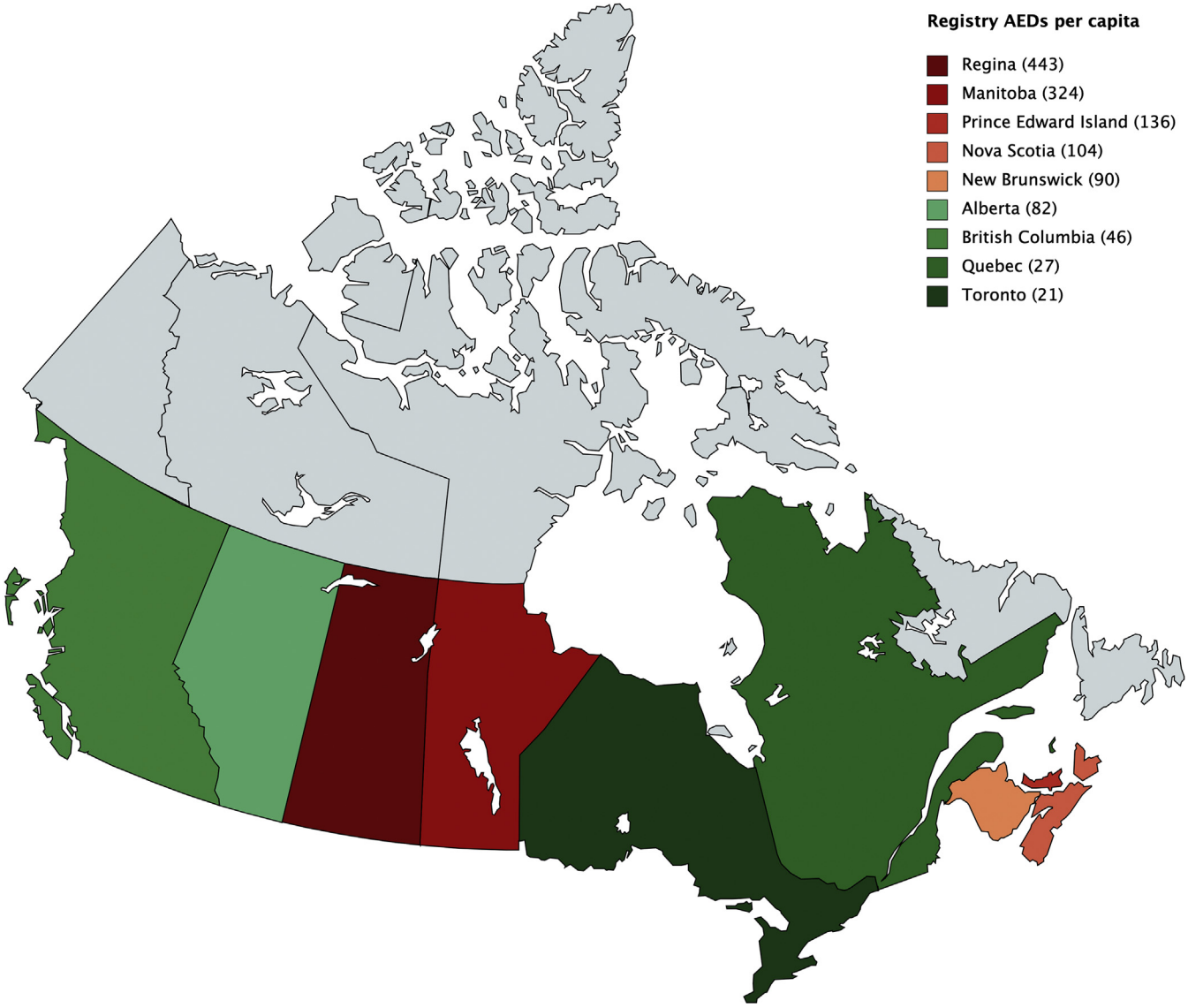

Figure 1. Number of AEDs in Canadian registries per 100,000 persons. Provincial AED densities are represented by a colour gradient going from **dark red** (highest density) to **dark green** (lowest density). AED, automated external defibrillator.

currently lacking. Finally, future work elaborating on where priorities should lie regarding Canadian AED registry development is needed.

Maintaining an accurate and up-to-date registry is important, but more research is required to demonstrate increased bystander AED utilization with this strategy. However, a recently published review of bystander alert technologies demonstrated improved response times, increased rates of bystander cardiopulmonary resuscitation, and improved survival outcomes with the implementation of this technology.[20] AED registries provide an important framework that can be integrated with AED mobile applications to ensure that effective and accurate bystander alert modalities are integrated within the chain of survival. Other technological advances resulting in optimal AED surveillance and rapid retrieval when needed have also been explored. One study described a protocol for a dynamic AED registry, whereby AEDs are tagged with a 2-dimensional matrix code (QR code).[21] This code is scanned with a smartphone that allows for automatic identification of AED parameters. Information regarding AED status and location is obtained and then transmitted in real time to the dynamic registry.

Conclusion

Canadian public AED registries demonstrate significant differences in their governance and administrative processes. A majority of registries are integrated with EMD for OHCA, but few registries use a standardized validation process to ensure accuracy of AED information submitted by the public. This study may serve as a framework for the assessment and uniformization of AED registries across all jurisdictions. Future studies exploring the usefulness of AED registries in PAD programs in Canada are warranted.

Acknowledgements

The authors thank the study research assistants Laura May Miles, David Iannuzzi, Jean-Sébastien Grenier, Devin O'Brien, Nicole Roda, Sophie Ramsden, Cole Kubay, Shaina Templeton, Cody Weiler, Emily Lostchuck, Ibrahim Banun, and Benn Edwards.

LD and DN conceived and designed the study, contributed data or analysis tools, performed the analysis, and wrote the manuscript. JNB, FDC, and VH conceived and designed the study, contributed data or analysis tools, and revised the manuscript.

Funding Sources

This project was funded by the 2020 Cardiovascular Resuscitation grant awarded by the Quebec Association of Emergency Physicians and the Jacques-de Champlain Foundation. The sponsors had no involvement in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication.

Disclosures

LD is the former coordinator of the Jacques de Champlain Foundation's AED Project (2017-2018), a nonprofit organization that manages the provincial registry in Quebec; and oversaw the daily management of the registry including AED validation and registry maintenance. DN is the former assistant coordinator of the AED Project (2017-2018); and oversaw strategies regarding quality improvement of the registry. JNB is the former coordinator of the AED Project (2016-2017); and is currently the website editor at the Jacques de Champlain Foundation. He was not involved in the process of data collection or analysis. FDC is President of the Jacques de Champlain Foundation, a nonprofit organization that manages the provincial registry in Quebec. He was not involved in the process of data collection or analysis. VH is the former AED Registry Project Lead for the Jacques de Champlain Foundation (until 2018). She had no involvement in the process of data collection or analysis.

References

1. Hasselqvist-Ax I, Herlitz J, Svensson L. Early CPR in out-of-hospital cardiac arrest. N Engl J Med 2015;373:1573-4.
2. Virani SS, Alonso A, Benjamin EJ, et al. Heart disease and stroke statistics-2020 update: a report from the American Heart Association. Circulation 2020;141:e139-596.
3. Drennan I, Lin S, Thorpe K, Morrison L. The effect of time to defibrillation and targeted temperature management on functional survival after out-of-hospital cardiac arrest. Resuscitation 2014;85:1623-8.
4. Hallstrom A, Ornato J, Weisfeldt M, et al. Public-Access Defibrillation and survival after out-of-hospital cardiac arrest. ACC Curr J Rev 2004;13.
5. Pollack RA, Brown SP, Rea T, et al. Impact of bystander automated external defibrillator use on survival and functional outcomes in shockable observed public cardiac arrests. Circulation 2018;137:2104-13.
6. Neves Briard J, de Montigny L, Ross D, de Champlain F, Segal E. Is distance to the nearest registered public automated defibrillator associated with the probability of bystander shock for victims of out-of-hospital cardiac arrest? Prehosp Disaster Med 2018;33:153-9.
7. Bobrow BJ. The case for AED registries. JEMS 2014;Suppl:14-7.
8. Agerskov M, Nielsen AM, Hansen CM, et al. Public Access Defibrillation: great benefit and potential but infrequently used. Resuscitation 2015;96:53-8.
9. Fredman D, Ringh M, Svensson L, et al. Experiences and outcome from the implementation of a national Swedish automated external defibrillator registry. Resuscitation 2018;130:73-80.
10. Berglund E, Claesson A, Nordberg P, et al. A smartphone application for dispatch of lay responders to out-of-hospital cardiac arrests. Resuscitation 2018;126:160-5.
11. Neves Briard J, Grou-Boileau F, El Bashtaly A, et al. Automated external defibrillator geolocalization with a mobile application, verbal assistance or no assistance: a pilot randomized simulation (AED G-MAP). Prehosp Emerg Care 2019;23:420-9.
12. Delaney C. Letter: an AED registry will save lives 2017. Available at: https://www.thetelegram.com/opinion/local-perspectives/letter-an-aed-registry-will-save-lives-158921/. Accessed July 17, 2020.
13. The Defibrillator Public Access Act. The Legislative Assembly of Manitoba, Thirty-Ninth Legislature, 5 Sess.; 2010-2011.
14. Bill 141: Defibrillator Registration and Public Access Act. Legislative Assembly of Ontario, 2020.
15. Karlsson L, Malta Hansen C, Wissenberg M, et al. Automated external defibrillator accessibility is crucial for bystander defibrillation and survival: a registry-based study. Resuscitation 2019;136:30-7.
16. Public access to automated external defibrillators (AEDs)—position statement. Heart and Stroke Foundation, 2012.
17. DeLuca LA Jr, Simpson A, Beskind D, et al. Analysis of automated external defibrillator device failures reported to the Food and Drug Administration. Ann Emerg Med 2012;59:103-11.
18. Bill M 216. Defibrillator Public Access Act. Legislative Assembly of British Columbia, 2019.
19. Ringh M, Jonsson M, Nordberg P, et al. Survival after Public Access Defibrillation in Stockholm, Sweden—a striking success. Resuscitation 2015;91:1-7.
20. Valeriano A, Van Heer S, de Champlain F, Brooks S. Crowdsourcing to save lives: a scoping review of bystander alert technologies for out-of-hospital cardiac arrest. Resuscitation 2021;158:94-121.
21. Elrod JB, Merchant R, Daya M, et al. Public health surveillance of automated external defibrillators in the USA: protocol for the dynamic automated external defibrillator registry study. BMJ Open 2017;7:e014902.

Supplementary Material

To access the supplementary material accompanying this article, visit *CJC Open* at https://www.cjcopen.ca/ and at https://doi.org/10.1016/j.cjco.2020.12.013.