Cardiac Arrest Annual Report

2016-2017

BCEHS | BC Emergency Health Services

Report Definitions

Treated Cardiac Arrest (CA): Non-cancelled, non-traumatic treated cardiac arrest where the paramedics attempted resuscitation on the patient.

Bystander CPR: Bystander CPR indicators exclude events where the cardiac arrest occurred after EMS arrival.

Bystander CPR is often recorded in the free text section where data cannot be extracted. Adjustment to results of future reports is to be expected once electronic patient care report is fully implemented.

Utstein: Internationally recognized criteria for outcomes. The patients in this group: witnessed CA by a bystander, shockable rhythm, and have a presumed cardiac etiology.

Return of Spontaneous Circulation (ROSC) to Emergency Department (ED): 'ROSC sustained to ED' selected on PCR.

Survival: A patient is deemed 'survived' unless he or she meets one of following criteria:

- Scene disposition: 'Patient Dead at Scene' or 'Other Agency Dealing'
- ED disposition: 'Death after arrival' or 'Death on arrival'
- Hospital discharge disposition: 'Died' within 30 days of admission

Exclusion Criterion

- Patients transported to ED but the ED disposition is missing.
- Patient's ED disposition is either 'Admitted into…' or 'transferred to….', but the hospital discharge disposition is missing.

Region: Operations area. It is set by BCEHS and is different from the current Health Authority boundaries

Disclaimer

The information provided in this report is designed to provide helpful information on the subjects discussed. This report is not meant to be used for academic research as the data presented in the report is different from those produced by Canadian Resuscitation Outcomes Consortium (CanROC) due to data collection coverage. As CanROC works towards housing provincial cardiac arrest cases in collaboration with BCEHS, the two organizations are working towards an alignment and process to promote cardiac arrest data integrity.

Contents

1. Executive Summary

The purpose of the annual report is to illustrate the rationale behind measuring out-of-hospital cardiac arrest indicators and evaluating BCEHS clinical performance. This is the first BCEHS annual report on clinical performance to identify gaps and opportunities for improvement in cardiac arrest patient care and to show the areas BCEHS excels at. The annual report also allows BCEHS to embark on benchmarking with other EMS systems nationally and internationally. BCEHS paramedics attend to over 500,000 emergency 911 events in a year and approximately one percent of the events are cardiac arrests.

With only one in nine British Columbians surviving (all-comers) with favourable neurological outcome, death from OHCA has a tremendous impact on all of our lives. The identification of critical areas of improvement for BCEHS could help improve the odds of surviving OHCA in British Columbia. OHCA is the most critical, and time-dependent condition to which our service responds. With this cardiac arrest report we are able to benchmark ourselves internationally against all EMS systems responding to OHCA, who follow similar cardiac arrest guidelines (North America, Europe and Australia), as it tests all aspects of cardiac arrest care from the community involvement through to the effect of Advanced Life Support.

Early bystander CPR, which is one of the contributing factors to patient survival, is an area where BCEHS can influence. A quality improvement mechanism is in place to increase telephone-instructed CPR for bystanders. While EMS response time and scene time are key metrics in the chain of survival, currently the report only captures paramedics response times. BCEHS will be working with BC Fire Departments to capture a true EMS response time for cardiac arrest events in order to accurately depict access to EMS from a patient's perspective. Overall in fiscal year 2016/17, BCEHS treated approximately 3,000 cardiac arrest patients and 16.3% of them survived. The survival rate in BC is considered the highest amongst all provinces in Canada.

2. Introduction

Cardiac arrest is the abrupt loss of heart function in a person who may or may not have been diagnosed with heart disease. It can come on suddenly or in the wake of other symptoms.

Cardiac arrest is often fatal, if appropriate steps aren't taken immediately. Each year in British Columbia more than 6,000 cardiac arrests occur outside of a hospital setting and require BC Emergency Health Services (BCEHS) response. Of these calls in 2016/2017, 3,022 received treatment by BCEHS Paramedics.

In Canada, survival to hospital discharge for out-of-hospital cardiac arrest (OHCA) is between 3.9% and 7.1%[1]. In BC, survival to hospital discharge for out-of-hospital cardiac arrest (OHCA) ranges between 8.6% and 16.0%[2]. Benchmarking survival from OHCA is a key component to identifying areas for improvement and clinical leadership.

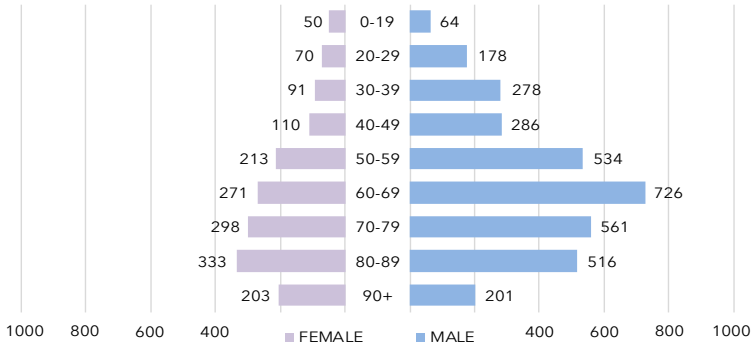
1 Wong GC, Diepen S, Ainsworth C. Canadian Cardiovascular Society/Canadian Cardiovascular Critical Care Society/Canadian Association of International Cardiology Position Statement on the Optimal Care of the Postarrest Patient. Canadian Journal of Cardiology. 2017;33:1-16.
2 Grunau B, Kawano T, Dick W. Trends in Care Processes and Survival Following Prehospital Resuscitation Improvement Initiatives for Out-of-Hospital Cardiac Arrest in British Columbia, 2006–2016. 2018;125:118-125

PATIENT STORY

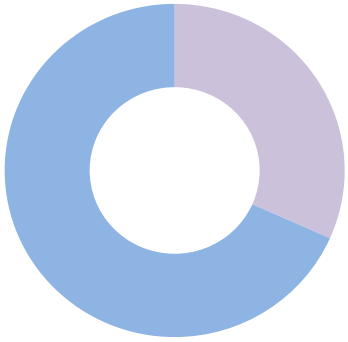
On Sept 16, 2018 - 44 year old Ben was relaxing on the couch, watching TV, when he suddenly felt strange. Ben called out to his girlfriend Darlene and tried to walk from the couch to the dining room table, he couldn't continue – he was dizzy, sweaty, and weak, and had a strange feeling in his chest. Darlene helped him to the ground just as he lost consciousness. Darlene felt panicked as she tried to find her phone and call 911. Abandoning the search for her phone, she decided to run into the shared hallway of her apartment building and start banging on doors in search of help – and a phone. Finally, on the fourth door, Darrel answered. He and Darlene ran back to Ben – who had turned a "dusky" colour and was not breathing. They quickly dialed 911 and received immediate dispatch assisted CPR directions. Once the paramedics arrived, Ben's airway was managed with an i-gel (breathing tube), he continued to receive high quality CPR and was shocked three times. Ben achieved return of spontaneous circulation (ROSC) with no medications and required sedation post arrest to manage arm movements and agitation. Ben returned home a week later with an implantable cardiac defibrillator (ICD) and Darrel received a vital link award, which is given to bystanders who help paramedics and dispatchers save a cardiac arrest patient's life. This story demonstrates the perfect chain of survival: early recognition/911 activation, dispatch assisted telephone CPR, immediate high quality CPR, rapid defibrillation, EMS, advanced life support and post-arrest care.

3. Demographics: All Cardiac Arrest

GENDER / AGE BREAKDOWN



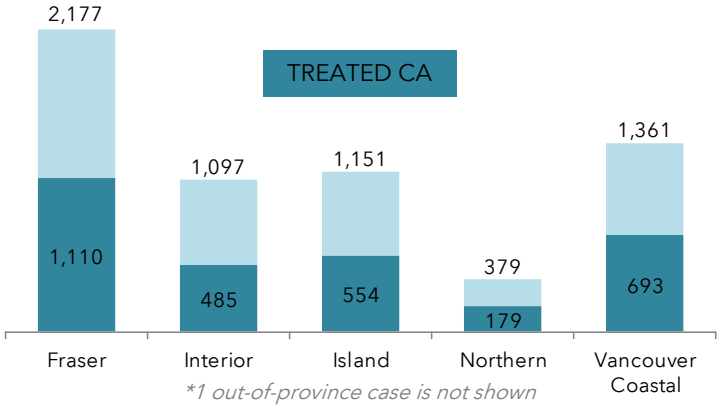
GENDER %



66%
MALE CA

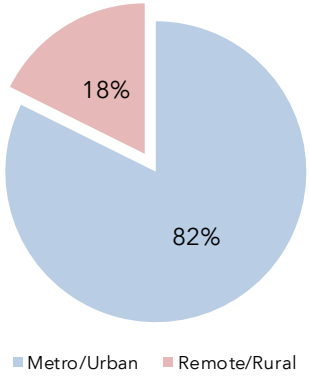
31%
FEMALE CA

ALL CA BY REGION*

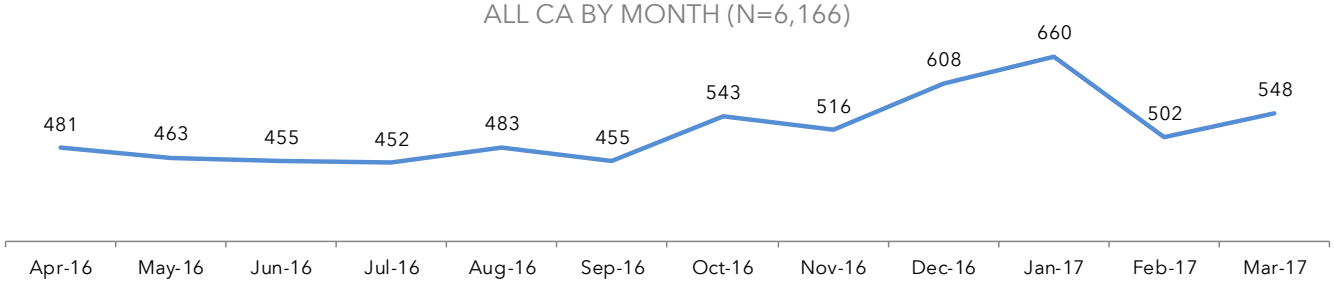


*1 out-of-province case is not shown

LOCATION



ALL CA BY MONTH (N=6,166)



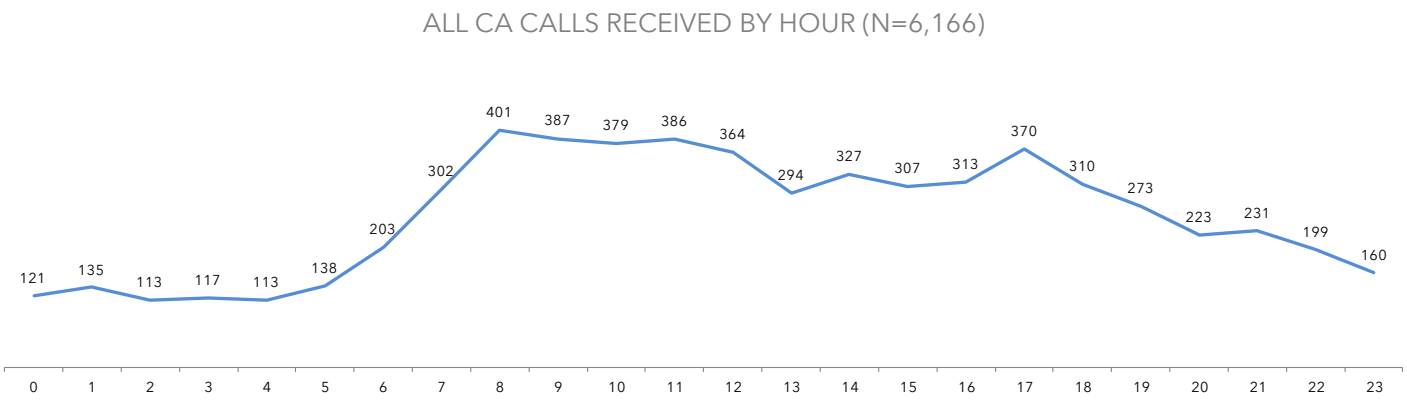
- In 2016/2017, there were **6,166** CA events and of those, **3,022** were treated by paramedics.
- About 2/3 (**66%**) of all CA patients were men.
- Median ages of all CA patients were **64** (male) and **70** (female)
- **82%** of all CA events occurred in metro/urban areas.
- **Fraser** region had highest number of CA events, followed by Vancouver Coastal.
- **January** had the highest number of CA events

4. Dispatch

Dispatch plays a critical role in supporting early bystander CPR, which is one of the contributing factors to patient survival. CPR maintains the flow of oxygenated blood to the vital organs of the body – e.g. brain and heart without which these organs quickly become damaged due to a lack of oxygen. As soon as a BCEHS emergency medical call-taker (EMCT) suspects a patient is in cardiac arrest, they give immediate instruction to the caller on how to perform bystander CPR.

Call-takers are also the key to giving direction for access to the location of automated external defibrillators (AED) as early access to AED is one of the key contributing factors to patient survival.

Telephone-CPR (T-CPR) is the delivery of compressions and/or ventilation instructions to callers of suspected OHCA cases. T-CPR has been recognized as an integral component of an emergency medical system response to OHCA and holds enormous potential to increase bystander response and thus survival from cardiac arrest. Guidelines call for all call-takers to be appropriately trained to provide T-CPR instructions and have an ongoing quality improvement mechanism to ensure that all unresponsive adults who are not breathing normally receive appropriate T-CPR instructions as early as possible.



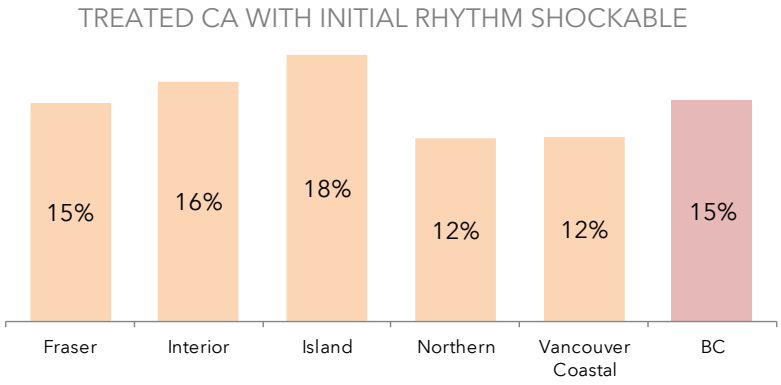
- Majority of CA calls were received during the day between **8am to 5pm.**

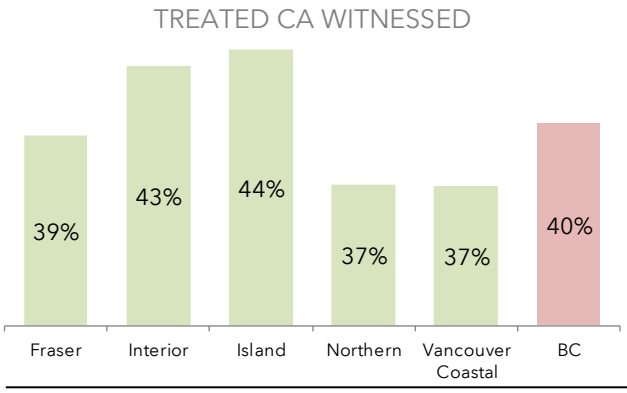
5. Patient

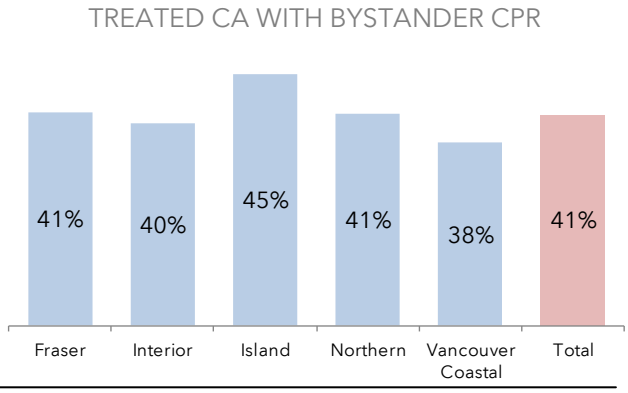
Patients who present in a shockable rhythm (Ventricular fibrillation (VF)/Ventricular tachycardia (VT)) have a better chance of survival than those presenting in a non-shockable rhythm (Pulseless electrical activity (PEA) & Asystole).

Bystanders have a crucial role in the chain of survival. Survival from cardiac arrest is more likely when the arrest is witnessed, high quality bystander CPR is initiated immediately, and the first rhythm is shockable.

The cause of cardiac arrest affects the outcome and is an important factor in determining the recognition of reversible causes. OHCA are presumed to be of cardiac cause unless it is known or likely to have been caused by trauma, drowning, drug overdose, asphyxia, electrocution or some other non-cardiac cause.







- In 2016/2017, **40%** of treated CA were witnessed.
- Bystander CPR rate is approximately **41%** across the province.
- **15%** of treated CA events had an initial shockable rhythm. Northern and Vancouver Coastal had the lowest shockable rhythm percentage at **12%**

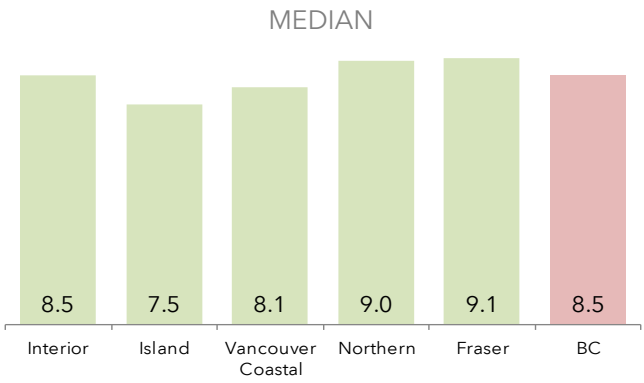
6. Process

Response time and scene time are key metrics in the chain of survival for OHCA. The chain of survival – early access, early CPR, early defibrillation, early Advanced Cardiovascular Life Support, and early post-resuscitative care – is an operational framework that is used to assess and evaluate EMS response to OHCA.

In some areas of the province BC Fire Departments also respond if available to calls of the highest acuity e.g. OHCA. This means that they may be on scene before BCEHS Paramedics to provide basic life support e.g. CPR and AED application/use.

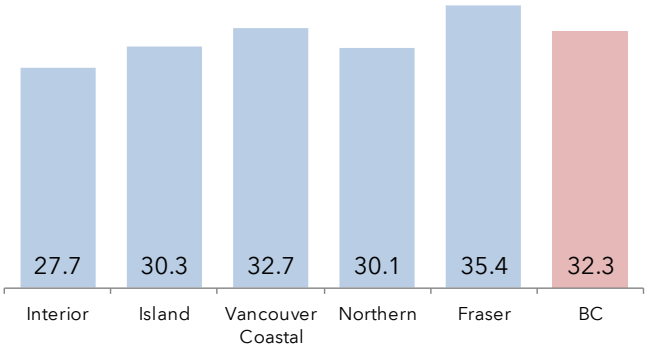
BCEHS Response time is defined as the time it takes an ambulance and paramedics to arrive on -scene from the time the 911 call is received. Scene time includes time from arrival at the scene to the time the transporting unit leaves for the hospital.

BCEHS TREATED CA RESPONSE TIME IN MINUTES*



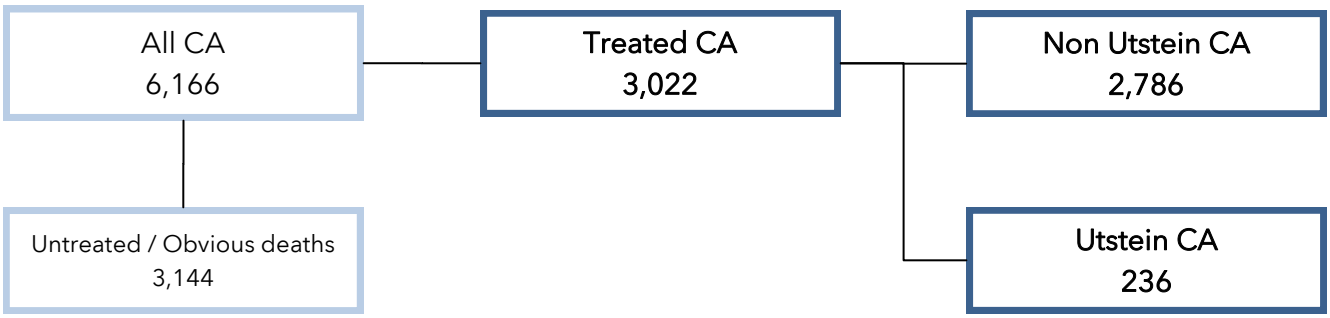
**BCEHS does not have access to First Responder response times and therefore we can only report on paramedic response times.*

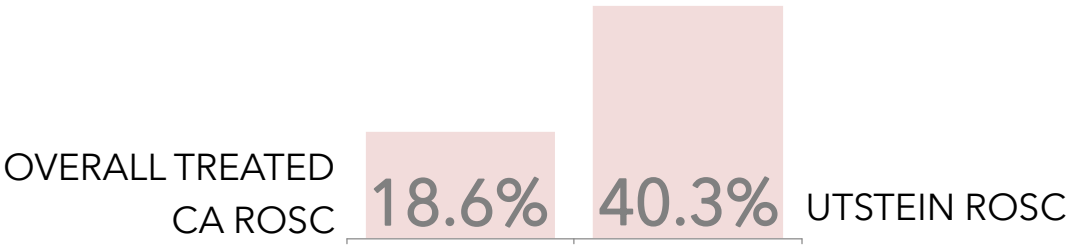
BCEHS TREATED CA SCENE TIME IN MINUTES

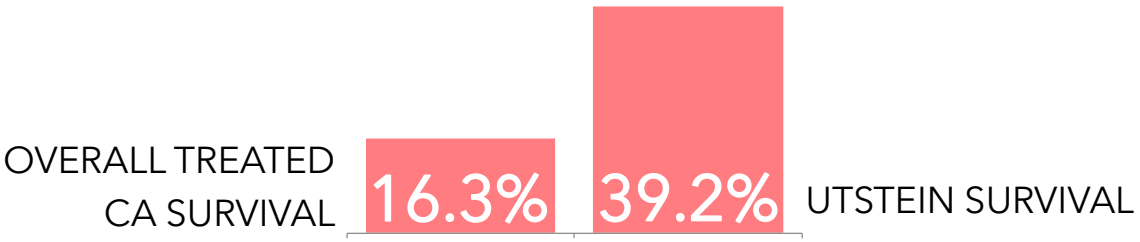


- BCEHS median response time in the province is **8.5** minutes. Cardiac arrests witnessed by paramedics record a 0 minute response time
- BCEHS median scene time in the province is **32.3** minutes.

7. Outcome



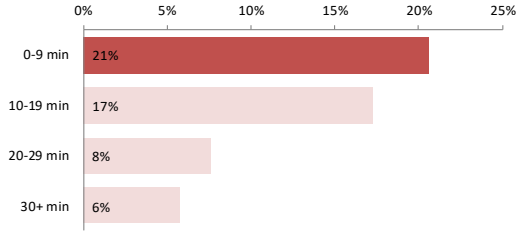




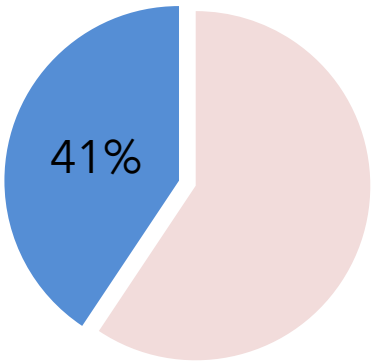
ROSC TO ED BY WITNESSED ARREST

	ROSC to ED
Witnessed by Healthcare Provider	29%
Witnessed by Lay Person	31%
Unwitnessed	14%
Missing	5%

% ROSC TO ED BY RESPONSE TIME



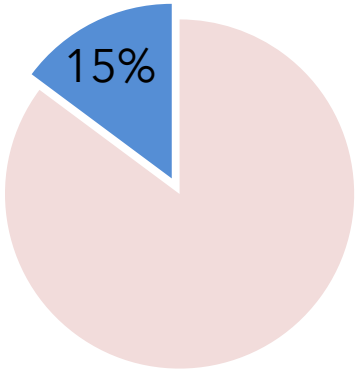
% BYSTANDER CPR



23%
ROSC TO ED WITH BYSTANDER CPR

14%
ROSC TO ED WITHOUT BYSTANDER CPR

% SHOCKABLE RHYTHM



41%
ROSC TO ED WITH SHOCKABLE RHYTHM

15%
ROSC TO ED WITHOUT SHOCKABLE RHYTHM

8. Conclusion

For every treated cardiac arrest case, BCEHS provides feedback to paramedics about their CPR quality using the data collected. BCEHS is committed to continually improve service to the patients we serve by being transparent and this is the first of many reports on various clinical outcomes to be published. While the report highlights key areas to improve cardiac arrest survival and sets a baseline for our progress, BCEHS still has challenges with patient care data collection to accurately reflect practice. Detailed documentation is essential to good patient care, and is required by all health care providers. Paramedics are a vital link to both providing critical care to cardiac arrest patients and also ensuring rigorous documentation. Using meaningful data effectively is key to improving our healthcare service delivery.