

# External Review of a Death during Prehospital Care November, 2018

Date

Aug 8, 2019

Investigators

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Submitted to:

The Honourable Adrian Dix, Minister of Health, Government of British Columbia

Stephen Brown, Deputy Minister of Health, Government of British Columbia

## Purpose of the Report

This report is intended to provide an external and impartial assessment of the conditions surrounding the death of a patient. It is meant to explore the situation and circumstances that could have potentially prevented her death. Although all relevant information will be considered, this review is not intended to ascribe blame to individuals or organizations. However, the conclusions and recommendations of the review are intended to provide insights and potential actions to improve care of future patients.

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## Executive Summary

On November 8, 2018, at 08:15 hours, BCEHS dispatch received a call from the patient, a [REDACTED]. She was distressed and complained of bleeding [REDACTED]. The dispatch call-taker confirmed the address and access procedures for the apartment building and dispatched the closest ambulance. The call taker then obtained more details from the patient. The patient described severe bleeding and was speaking normally and coherently but obviously very anxious. [REDACTED].

The ambulance arrived at the address 5 minutes after the initial dispatch call. The paramedics had difficulty unlocking the front door of the building. Approximately 4 minutes later the ambulance crew gained access through the front door of the building. During that time, there had been intermittent contact with the patient via the intercom. After accessing the elevators, the paramedics found themselves in a secondary lobby with a second bank of elevators to the resident floors. They were unable to access the elevators to get to the 6<sup>th</sup> floor since a specific security fob was required. The patient was talking on the intercom to the paramedics but was unable to unlock the elevator. After 12 minutes elapsed since arrival at scene, paramedics advised dispatch to call the fire department to assist with access to the building. Firefighters arrived and were able to access the 6<sup>th</sup> floor. Crew arrived at patient side 35 minutes after the initial call. The patient was pulseless. Resuscitation attempts were unsuccessful.

[REDACTED]  
[REDACTED] There was no formal autopsy to comment on the potential extent of and source of blood loss.

The investigators reviewed the available documentation regarding the incident, audio recordings, dispatcher logs, defibrillator logs, statements and incident reports filed by paramedics and firefighters, and interviewed all emergency responders in order to develop an understanding of factors that might have contributed to delays in reaching the patient. The BCEHS official responsible for the deployment plan was also interviewed, and applicable policies and medical literature were reviewed. The investigators found several areas in which assumptions and lack of communication could have contributed to delays in reaching the patient and made recommendations to decrease the likelihood of similar events in the future.

## Abbreviations

ACLS – advanced cardiac life support  
 AED – automated external defibrillator  
 ALS – advanced life support  
 BCEHS – British Columbia Emergency Health Services  
 CAD – computer aided dispatch  
 CPR – cardiopulmonary resuscitation  
 CRM – Clinical Response Model  
 ECG - electrocardiogram  
 EHS – Emergency Health Services  
 EMD – emergency medical dispatcher  
 EMS – emergency medical services  
 EO – expert opinion  
 EPCR – electronic patient care report  
 EPOS – Emergency Physician Online Support  
 IV – intravenous  
 LOE – level of evidence  
 MPDS – Medical Priority Dispatch System  
 MVA – motor vehicle accident  
 PHSA – Provincial Health Services Authority  
 PS – paramedic service  
 PSAP – Public Safety Answering Point  
 PSLS – Patient Safety Learning System  
 VFRS – Vancouver Fire and Rescue Service

## Process of Investigation

Drs. Christenson and Feldman (the investigators) were contracted as external experts to review the details of the case, to comment on issues related to the response and to make recommendations to prevent future similar occurrences.

The investigators:

- Reviewed all relevant documents
- Listened to dispatch recordings with the patient and the responding crews
- Evaluated literature specifically related to first response by allied agencies
- Interviewed paramedics and first responders involved at the scene
- Interviewed the dispatcher and call-taker involved in the call
- Interviewed the Senior Provincial Executive Director, Patient Care Communication and Planning

From the above information: the investigators established the timeline; the nuances of the interactions; details about the response and the care provided; the potential issues related to outcome; the process of critical incident call review; and suggestions for improvements in policy and process.

The investigators then summarized their understanding and recommendations in this report and present it to the Minister of Health and the Deputy Minister of Health.

## Documents Reviewed

- Literature available on first responding firefighter dispatching models
- Coroner's report
- External Defibrillator ECG download
- Paramedic patient care records
- Paramedic incident report
- Recent medical records from St. Paul's Hospital
- Audio tapes of dispatch conversations
- Transcript of the audio recordings
- BCEHS Dispatch event register
- BCEHS Dispatch event log
- Statements written on the day after the event by three of the responding firefighters
- Fire Dispatch record
- BCEHS Dispatch policies
- BCEHS DSP 150 Use of the Clinical Response Model (May 30 2018)
- Letter to BC Housing after the BCEHS internal review
- Building access and security policy

## Documents Not Collected

- Specific toxicology reports from the laboratory (summary available in coroner's report)
- Correspondence with BCEHS, PHSA or the MOH and the family (to maintain objectivity)
- Correspondence between BCEHS and VFRS after this call (to establish objective facts)
- Internal BCEHS critical case review report (to provide unbiased recommendations)

## Persons Interviewed

- Dispatcher involved in the case
- Call taker involved in the case
- Paramedics involved in the case
- Fire First Responders involved in the case
- BCEHS Operational leader

## Persons Not Interviewed For This Report

- BCEHS executive leaders
- PHSA executive leaders
- VFRS Leadership
- Patient's family
- St. Paul's Hospital treating physicians
- Coroner

## Timeline of the Event

Actual Time	Elapsed Time	Dispatch	Paramedics	Patient
08.15.02	0	Takes call Asks MPDS questions Confirms address and call code to access building  Dispatcher provides advice on direct pressure to area of bleeding Tells patient that ambulance has arrived Call ends		Describes that she is bleeding [REDACTED], [REDACTED] Bleeding is profuse Unlocks apartment door Initially clear and not short of breath. Later describes being dizzy
08.16.42	1.40	[REDACTED] dispatched to scene		
08.16.47	1.45	Calls another crew Describes as Orange and that [REDACTED] is already responding MPDS code 21-Delta-4		
08.20	4.58		Crew arrives at scene	
08.23.40	8.38	Calls patient		No answer
08.24.21	9.19	Calls patient		Voice mail
08.25.47	10.45	Call [REDACTED] Informs patient not answering		
08.26.05	11.03	Calls [REDACTED] Tells them patient initially answered and hung up and now goes to voice mail		
08.27.44	22.42		[REDACTED] advises they are having trouble getting inside	
08.29.05	14.03		[REDACTED] states no success reaching patient	
08.30.01	14.59	Calls patient		Voice mail
08.31.00	15.58	Calls patient Leaves message		Voice mail
08.32.11	17.09	Call [REDACTED] Informs crew that patient cannot be contacted and asks if fire is needed for access		
08.32.25	17.23		Crew agrees that fire should be called	
08.32.33	17.31	Calls fire and explains situation		

8.33.55	18.53	Fire Engine [REDACTED] is dispatched		
8.36.05	21.03	Fire Engine [REDACTED] is enroute		
08.36.46	21.44		Informs EMD that they have made entry to building Confirms to keep fire coming	
08.41.45	26.43		Informs EMD that there are two elevators and they are in a second lobby and cannot access the elevator to get to the 6 <sup>th</sup> floor	Answers the intercom and yelling for help Pressing the buzzer but elevators won't go to 6 <sup>th</sup> floor
08.41.57	26.55	Fire arrives at scene		
08.43.49	28.47	Calls fire and explains what is happening		
08.49.54	34.52		Reports gained access with fire Requests ALS unit Begins CPR	Pulseless
08.50.02	35.00	[REDACTED] called and dispatched to scene	[REDACTED] responds that they are only a few blocks away	
08.50.03	35.01			Carried to hallway to perform CPR
08.50.41	35.39	CPR started	Compressions with bag valve mask Oxygen given	
08.54.57	39.55	AED on No shock advised		
08.55.38	40.36		[REDACTED] at patient side	
08.55.43	40.41	Lifepak 15 defibrillator on		Asystole with periods of pulseless electrical activity Later slow pulseless electrical activity One episode of ventricular fibrillation
08.55.44	40.42		Shock delivered	
08.58.49	43.47		First Epinephrine 1 mg IV	
09.00.36	45.34		IV fluid bolus of normal Saline 1500 mls total	
09.05.40	50.38		Endotracheal intubation Tube placement confirmed	

9.13.21	58.19			
09.21.00	64.58		Amiodarone 300 mg give IV for ventricular fibrillation	
09.32.42	76.40		Calls EPOS to get orders to cease resuscitation	
09.33.01	76.59		Resuscitation attempts ceased	

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## Discussion of the Response, Care Provided and the Review Process

### BCEHS Dispatch Process

MPDS is a commercial dispatch product used in over 3,000 EMS agencies around the world, and is widely regarded as the standard of care for caller interrogation protocols, accuracy of triage, and pre-arrival first aid instructions. The function of MPDS in determining appropriate urgency and resources needed to respond to 911 calls is well-stated in the following excerpt from the 2015 Ontario Association of Paramedic Chief's submission to the Ontario Minister of Health [Ontario Association of Paramedic Chiefs: Recommendations from the Provincial Municipal Land Ambulance Dispatch Working Group, Submission to the Ontario Minister of Health and Long-Term Care, May 28, 2015 <https://www.oapc.ca/wp-content/uploads/2016/11/Land-Ambulance-Working-Group.pdf>, accessed July 20, 2019]:

MPDS has six different priority levels: Echo, Delta, Charlie, Bravo, Alpha and Omega, with Alpha representing a minor problem and Echo an immediate threat to life. The sixth code, Omega, is used in some jurisdictions to transfer or divert callers to an alternate source of care such as a nurse, (e.g. Telehealth [nurse telephone consultation]). The algorithm operates as a multi-dimensional model as the six levels indicate: how many responders will be dispatched; which levels of paramedic expertise are needed; and how rapidly they are needed. The highest priority calls are sent as "hot calls" or using lights and sirens and may necessitate assistance from allied agencies such as fire and police. The creators of MPDS do not recommend a response level for each situation. Instead the multiple dimensions are mapped by each ambulance communication service, in partnership with its PS [paramedic service] and medical experts to the most appropriate response priority given the PS's available resources and geography. Users of the MPDS have found the multi-dimensional nature of the algorithm provides a greater level of precision, accuracy and efficiency in medical triaging.

Callers to 911 are usually in a heightened state of emotion when as they are often seeking help for a family member, or may have just witnessed a traumatic event. Call takers use the questions contained within medical algorithms to obtain information from the caller concerning the nature of their emergency in a systematic and consistent manner. The answers determine the urgency level or prioritization and the type of medical care required. The initial questions are intended to assess if there is an obvious immediate threat to a person's life at which point an ambulance is assigned at the

highest priority (authorizing lights and sirens). As more information is gathered, the priority of the call may be reassessed. Assigning a lower prioritization to a call than what the patient needs is referred to as under-triaging; and a higher prioritization, over-triaging. Incorrect triaging has a negative impact on both system utilization and patient care.

It can be difficult for a call taker to assess the true nature of patient's condition based on the information provided by an excited or potentially distraught caller.

After a call-taker completes the caller interrogation, each of the calls is coded with a specific determinant that describes the nature and urgency of the call as reported by the 911 caller. Each determinant is then mapped to a specified response. Responding resources may include advanced care paramedics, primary care paramedics, and firefighter first responders. Each type of resource may be responded either routine or urgent (lights and sirens).

In B.C., the mapping of MPDS determinants to specific responding resources is called the Clinical Response Model (CRM). Each EMS agency using MPDS adopts an analogous model. According to BCEHS Senior Provincial Executive Director, Patient Care Communication and Planning, significant consideration went into the design of the CRM: "CRM was guided by what was used in other jurisdictions – we reached out to London Ambulance for their response model. An environmental scan was performed as to best practices. New Zealand shared a year of EPCR data and the colour coding system that they used. This was sent to Clinical Medical Programs [a BCEHS committee composed of regional medical directors, research, quality, and paramedic practice] to compare current and proposed plans. No calls were downgraded even though the UK and New Zealand system would have downgraded some of the call types."

In terms of responding allied agencies for first responses, firefighters are always sent for certain non-medical indications, such as motor vehicle collisions, hazardous material incidents, entrapments, and patient access problems. The medical indications for responding firefighter first responders include responses to emergencies coded as Purple and Red (highest urgency calls) and for Orange (urgent) calls when ambulance response time is greater than eight minutes. However, he indicated there is some difficulty in assessing the utility of these responses: "We have limited data from fire services; they don't share with us and we don't know what they do."

The investigators independently reviewed the medical evidence for firefighter first responses and found limited evidence to support the need for firefighter first responders. (See Appendix B)

There are three distinct processes for activation of fire services. For calls coded by the CRM as Purple or Red, fire services are notified automatically by an interface between the BCEHS CAD and the respective fire department CAD. This is also indicated in BCEHS policies:

7.1.1 Subject to local agreements, dispatchers and call takers must request First Responder (FR) agencies, approved by the BCEHS, to respond to emergency situations in a manner consistent with the Clinical Response Model (CRM).

7.1.2 Notification to FR agencies is normally managed electronically through the CAD system as an automated process.

Certain call types, such as motor vehicle collisions also require fire department notification, which is also done automatically by the BCEHS CAD, and is indicated in this policy:

9.1.3 Notification to some fire agencies on commonly requested call types (e.g. MVAs) is normally managed electronically through the CAD system as an automated process.

For calls coded as Orange, when the vehicle recommendation at BCEHS dispatch is an ambulance more than eight minutes away, the dispatcher uses the SENDFR command on their CAD to notify the fire department CAD. In other instances when a BCEHS dispatcher believes a fire response is warranted, or when a paramedic on scene requests a fire response, the BCEHS dispatcher can call the fire dispatch centre and verbally request a fire department response.

One typical reason that BCEHS would call fire services when not indicated by the MPDS determinant or CRM is for patient access. The BCEHS policies in this area are somewhat unclear. The police notification policy indicates that police services should be notified for forcible entry, as indicated here:

5.2.1 BC Emergency Health Services requires that police agencies must be notified of any or all of the following incidents or circumstances, as they relate to scene responses and pre-hospital events:

h. access issues to scenes that may require forced entry;

Notwithstanding this policy, it was the dispatcher's understanding that a fire department response for building access was appropriate, and she did in fact notify E-Comm verbally of the need for their assistance for access to the patient.

In this case, no access problem was anticipated by dispatch. The investigators note that the fire crew was aware of the issue in the building and that there were two sets of locked doors. This information was local crew knowledge but not shared with Fire or BCEHS dispatch information systems.

*Recommendation #1: BCEHS dispatchers should always have easy and obvious access to important information related to the scene. Policy and procedures should be developed to routinely and effectively share and access information in real time known to police, fire and ambulance dispatch centers or paramedic and first responder crews.*

*Recommendation #2: All responding emergency services should have clear and robust processes to gain rapid access to a multi-unit building. Building codes should be reviewed and revised to enable such rapid access when necessary.*

The investigators also are aware that BCEHS dispatch did not know that fire dispatch would be sending a crew from another fire hall other than the one that was 95 meters away. The instructions were that a routine response would be reasonable given the close proximity.

*Recommendation #3: The status of allied emergency services responding to medical calls should be relayed to the BCEHS dispatcher who requested the response to ensure that it is appropriate for the patient condition.*

*Recommendation #4: When allied emergency services are dispatched prior to paramedics making contact with a patient and confirming their condition, they should always be dispatched with the same urgency of response as the initial call.*

## BCEHS Crew Access to the Patient

██████ indicated at 08:23 hrs that they were having difficulty contacting the patient. This was the first moment when there was any problem encountered. The EMD indicated that an access problem for this type of call was unexpected. The dispatcher reported that in her experience, “generally if someone’s conscious and gives a buzzer number, we don’t [think] there are any access issues.” For the next nine minutes, both ██████ and the EMD were able to establish intermittent contact with the patient. At 08:23 hrs, the patient was able to answer her phone, but no voice contact was established. At 08:27 hrs, the patient was able to admit ██████ into the building.

*Recommendation #5: Fire department should be dispatched where there is any suspicion of access delay to the particular building or at the first sign that access might be a problem.*

Interviews with paramedics revealed that they commonly encounter calls where patients have left the scene before their arrival. In addition, they revealed that initial access problems are common in apartment buildings but are typically easily remedied by asking a building manager or other residents to let them in. A confirmation bias may have led them to consider whether this call represented a similar situation to either of those two common experiences – either the patient had left the scene, or they would figure out another way of getting access to the scene. Their intermittent contact with the patient may also have led to their expectation of being imminently admitted to her apartment, and may have delayed the decision to request fire response for access. However, it was also the intermittent contact with the patient that prompted BCEHS dispatch to tell ██████ to stay on scene and not consider this a case where the patient had left the scene.

*Recommendation #6: When communications are interrupted with a patient or caller, the assumption should be made that the patient has deteriorated and urgently requires help. This implies potential upgrading of the call, assistance with access, appropriate staging of all resuscitation equipment and dispatching additional personnel.*

## Care of the Patient during Cardiac Arrest

International guidelines for resuscitation of patients in cardiac arrest are developed through evaluation of evidence by the International Liaison Committee on Resuscitation. Each country then develops specific algorithms and training materials, in Canada by the Heart and Stroke Foundation in conjunction with the American Heart Association. Individual agencies then use these as the foundation and may add local modifications if thought to be of benefit. Key to an excellent resuscitation is excellent leadership of the team with individuals doing specific tasks and an open inquiring leadership with continual exploration of what the cause might be and how to address potential reasons for failure to resuscitate.

In this case, the investigators find that the management of the patient once contact was made was according to the BCEHS guidelines.

The investigators did note however, that although the Automated External Defibrillator (AED) and airway management were applied early and appropriately, that the AED and airway gear used was brought to the scene by the fire department and not by the BCEHS crew. It is critical that appropriate equipment is always immediately available when needed.

*Recommendation #7: Resuscitation equipment should always be carried to the patient side or staged nearby initially unless it is absolutely clear that the patient will not require resuscitation.*

### **Communications**

Interagency response to life threatening emergencies requires excellent communications in preparation for the event, during the event and after the event.

There is a mechanism in which the BCEHS CAD can alert dispatchers of problems with access to specific addresses. If paramedics have previously encountered a problem at a specific address, the dispatcher notes, "the crew can flag an address and type in an incident, and say what one needs to be made aware of... bedbugs, access, gate codes." When dispatchers see a notification on the CAD, "they [the call taker] get a red box, and put it into the call comments... The call taker is trained to look at that as soon as it pops up." No such notification appeared for the call to the patient's address. Interviews with the paramedics suggested that the process for flagging addresses is not streamlined and they may not have sufficient time between calls to fill out the appropriate forms. Finally, at 08:32 hrs, both BCEHS dispatch and [REDACTED] agreed that firefighters should be sent for access.

During the event, dispatch personnel should always be aware of the actions of the other agency dispatch. Although there was no clear indication of the pending arrest, the BCEHS dispatcher believed that the fire crew that could assist with access was only a minute or two away. It appears that once the SENDFR command was electronically triggered, the BCEHS dispatch personnel do not know which engine has been dispatched or if and when they are expected to arrive.

*Recommendation #8: Each responding agency should be aware of the location and expected arrival of the other agency's units. Real time sharing of dispatch information should be facilitated either through CAD to CAD interface, verbally or by other appropriate means.*

Interviews with the firefighters on Engine [REDACTED] indicated that other delays were encountered. When they arrived at the scene, they found the ambulance parked with no indication of where the paramedics were. The Captain reported trying to contact the paramedics on the Combined Events interagency talkgroup on their portable radios. He was unable to raise them, noting that, "we are continually trying to communicate with EHS [on the Combined Events talkgroup]. It would absolutely help if that communication were used more often." At least two more minutes are estimated to have elapsed between the time the fire apparatus arrived and contact was established with the paramedics.

*Recommendation #9: BCEHS and fire crews should routinely communicate during a combined response to ensure optimal support and teamwork.*

Discussion of the communications issues after the event (review) are addressed in a section below.

### **Process for Development and Monitoring of the Clinical Resource Management Policy**

The development of the Clinical Resource Management (CRM) plan has evolved over more than 10 years. Each MPDS determinant is associated with guidance on what crews should be dispatched (primary care paramedics, advanced care paramedics, first responders) and whether they should go routine or with lights and siren. The Investigators understand that considerable input and thought went



into development of the plan and that it is reviewed and potentially modified every 6 months. The current version was implemented in May 2018.

These plans are standard across EMS systems. There is no perfect model, primarily since the dispatch process of categorization depends on the caller who is often non-medical and may have communication issues due to language barriers, cognitive or emotional overlay. The interrogation guidance is intended to be rapid and to categorize calls according to the most dangerous possibility. Resources sent are then determined based on analyses and understanding of the profile of those calls.

It is a societal decision about the level of risk that is appropriate from a patient perspective. It would not be appropriate to send all resources to everything to be certain that no real emergency is missed. Doing so would result in negative outcomes: reduced availability for real emergencies since limited resources are used when not required; a real risk of increased accidents and injury or death to innocent bystanders or crews; burnout of crews responding urgently many times when not needed; and increased cost of vehicle maintenance and fuel. Therefore, in any health system, a balance must be found that provides the overall best outcome for the most patients.

The standard method to monitor a CRM plan is to review and analyze how many times each MPDS code a patient required a higher level of service than described in the plan. Perhaps a more patient focused method to monitor the CRM would be to look at all critical patients requiring care at the scene and determine how often specific patient groups were not initially sent the appropriate resources. By determining the characteristics of the MPDS coding of these “missed” patients, modifications could be made to ensure the capture of as many cases as possible and reduce the number of cases with initial insufficient resources.

It is important to include all agencies involved in the system response in the planning and review of the resources plan and to ensure that information from all agencies is available.

*Recommendation #10: A linked data system should be developed that allows reliable and valid analysis of patient cohorts that includes the MPDS determinant code, CRM recommendation, and patient outcome.*

*Recommendation #11: The current 6 monthly reviews should include all agencies and representatives from front line staff and members of the public. The results of the reviews should be shared with all agencies, front line staff and members of the public.*

### **Process of Call Review and Quality Improvement**

It is of vital importance that events that involve medical or system error should be thoroughly investigated to understand what happened and to make recommendations for improvement of the quality of care in the future. These reviews should include all those involved and leadership who are ultimately responsible for the care delivered. Over the past 10 years, the culture at BCEHS has changed significantly to one that accepts disclosure of error and frank evaluation of the causes and solutions, most of which are caused by system issues. In this case, an internal review was held that did not include the first responding fire crews. In the process of this investigation, the investigators realized that a good deal of useful information was contributed by VFRS first responders during interviews.

The BCEHS incorporates the province wide Patient Safety Learning System and makes it available to all staff. This allows reporting of patient safety events and documentation into reports for the Board of Directors. This is an excellent system and its use should be encouraged regularly by all staff.

The investigators found during the interviews that many staff had not heard of the review or any recommendations arising.

*Recommendation #12: All serious events identified by staff in PSLS have a formal review that includes all involved staff from all responding emergency services agencies and their management representatives who are responsible for the quality of care. Such reviews should enjoy liability protection to enable frank discussion, whether under Section 51 of the Healthcare Act or other mechanisms. If the Act requires revision to provide liability protection for paramedics and firefighters outside the hospital environment, then the Government of B.C. should explore modification of the Act so that its protection from litigation covers all prehospital care personnel. Furthermore, the findings and recommendations from such reviews should be disseminated to all staff so that a culture of continuous improvement is fostered.*

The investigators reviewed the coroner's report [REDACTED]. In British Columbia, the coroner's service is governed by the Solicitor General and has a sharp focus on whether the death was caused by a criminal act. It is relatively rare that an autopsy is recommended by the coroner's service to detail the cause of death if no criminal activity is suspected [REDACTED]. A [REDACTED] system that is trying to optimize care and improve outcomes for patients who are critically ill and suffer a cardiac arrest, would benefit enormously by understanding the epidemiology of the causes for cardiac arrest in various age groups, socio-economic groups, cultural groups and groups identified by gender.

*Recommendation #13: Autopsies in sudden unexpected death are an essential component of a Learning Health System. They are important to understand how care can be improved in the future, through system changes or education. The Minister of Health should consult with the Solicitor General on how to ensure that the mandate for autopsies includes this important health system learning function.*

Interviews with the firefighters indicated that there seemed to be little formal interaction between BCEHS and fire departments during policy changes or over specific issues (whether patient related or not). The investigators noted that there seemed to be differing views held by paramedics and firefighters regarding political agendas on both sides, but it is important to develop a culture where discussions around issues that directly relate to patient care be aired and where strong relationships can be developed with respectful conversations and further understanding of perspectives. Caring for critically ill patients in the sometimes inhospitable environment of prehospital care, requires all emergency responders to work together as a team in the best interests of the patient.

*Recommendation #14: Develop regular interagency meetings of front line providers and management to share information on issues to improve team dynamics and agency relationships. These meetings should be case based and focus on opportunities to improve policy, process and culture.*

## Summary and Conclusions

This external investigation was conducted in an effort to fully understand the circumstances around the death of the patient and to provide recommendations that may prevent future avoidable deaths. The investigators are not certain that this death was avoidable although it may have been if paramedics had been able to access the patient more promptly.

It is not our intention in this report to ascribe blame to individuals or agencies. It is clear that all of the individuals who were part of this case, do their job to help patients. All are affected to some degree and some are deeply affected emotionally by the outcome of this particular case. It is also true that both BCEHS and VFRS are agencies with a primary mandate to provide prehospital patient care. They each work hard to develop policy, infrastructure, training and culture that optimizes outcomes. They do so at times limited by resources but also in an effort to balance the risk with the benefits of various policy choices.

The investigators have endeavored to provide recommendations that will be seriously considered by government, BCEHS and VFRS. These recommendations are based on the assumption that the structure for prehospital response is an interagency tiered response model. It also assumes that the architecture of the dispatch 911 MPDS interrogation and clinical resource management structure is appropriate, which is supported by practice in other jurisdictions and the medical literature.

The investigators believe that the recommendations, if followed, will improve the efficiency of the dispatch process and patient management, interagency communications, and most importantly will substantially improve patient outcomes. The recommendations were developed from the perspective of the patient and what a patient needs from the combined resources funded by taxpayers to provide an emergency medical response.

The investigators were asked to assess whether BCEHS involvement had no, possible, probable or definite impact on the outcome. The investigators believe that the outcome was possibly influenced by the delays in access. The investigators also believe that policy and actions can be improved and that BCEHS should play a lead role in implementing the recommendations.

## List of Recommendations

*Recommendation #1: BCEHS dispatchers should always have easy and obvious access to important information related to the scene. Policy and procedures should be developed to routinely and effectively share and access information in real time known to police, fire and ambulance dispatch centers or paramedic and first responder crews.*

*Recommendation #2: All responding emergency services should have clear and robust processes to gain rapid access to a multi-unit building. Building codes should be reviewed and revised to enable such rapid access when necessary.*

*Recommendation #3: The status of allied emergency services responding to medical calls should be relayed to the BCEHS dispatcher who requested the response to ensure that it is appropriate for the patient condition.*

*Recommendation #4: When allied emergency services are dispatched prior to paramedics making contact with a patient and confirming their condition, they should always be dispatched with the same urgency of response as the initial call.*

*Recommendation #5: Fire department should be dispatched where there is any suspicion of access delay to the particular building or at the first sign that access might be a problem.*

*Recommendation #6: When communications are interrupted with a patient or caller, the assumption should be made that the patient has deteriorated and urgently requires help. This implies potential upgrading of the call, assistance with access, appropriate staging of all resuscitation equipment and dispatching additional personnel.*

*Recommendation #7: Resuscitation equipment should always be carried to the patient side or staged nearby initially unless it is absolutely clear that the patient will not require resuscitation.*

*Recommendation #8: Each responding agency should be aware of the location and expected arrival of the other agency's units. Real time sharing of dispatch information should be facilitated either through CAD to CAD interface, verbally or by other appropriate means.*

*Recommendation #9: BCEHS and fire crews should routinely communicate during a combined response to ensure optimal support and teamwork.*

*Recommendation #10: A linked data system should be developed that allows reliable and valid analysis of patient cohorts that includes the MPDS determinant code, CRM recommendation, and patient outcome.*

*Recommendation #11: The current 6 monthly reviews should include all agencies and representatives from front line staff and members of the public. The results of the reviews should be shared with all agencies, front line staff and members of the public.*

*Recommendation #12: All serious events identified by staff in PSLs have a formal review that includes all involved staff from all responding emergency services agencies and their management representatives who are responsible for the quality of care. Such reviews should enjoy liability protection to enable frank discussion, whether under Section 51 of the Healthcare Act or other mechanisms. If the Act requires revision to provide liability protection for paramedics and firefighters outside the hospital environment, then the Government of B.C. should explore modification of the Act so that its protection from litigation covers all prehospital care personnel. Furthermore, the findings and recommendations from such reviews should be disseminated to all staff so that a culture of continuous improvement is fostered.*

*Recommendation #13: Autopsies in sudden unexpected death are an essential component of a Learning Health System. They are important to understand how care can be improved in the future, through system changes or education. The Minister of Health should consult with the Solicitor General on how to ensure that the mandate for autopsies includes this important health system learning function.*

*Recommendation #14: Develop regular interagency meetings of front line providers and management to share information on issues to improve team dynamics and agency relationships. These meetings should be case based and focus on opportunities to improve policy, process and culture.*

Investigators signatures

A handwritten signature in cursive script that reads "Jim Christenson".

Jim Christenson MD FRCPC

A handwritten signature in cursive script that reads "Michael Feldman".

Michael Feldman MD PhD FRCPC

## Appendix A: Author Short Biographies

### **Dr. Jim Christenson MD FRCPC**

Dr. Jim Christenson is an emergency physician at St. Paul's Hospital in Vancouver. He is a Professor and Head of the Academic Department of Emergency Medicine in the Faculty of Medicine at the University of British Columbia and has a wide range of experience in emergency care clinical research. He completed a BSc at the University of Toronto and then medical school at the University of Ottawa (1976). He then spent 18 months as a house surgeon at the Waikato Hospital in New Zealand before returning to Canada to finish a family practice residency at the University of Calgary where he spent an extra year training in emergency medicine.

He began practice at Vancouver General Hospital and then practiced at the Foothills Hospital in Calgary and Shaughnessy hospital in Vancouver before moving to St. Paul's Hospital in Vancouver.

Dr. Christenson worked in many roles of medical oversight with the BC Ambulance Service from 1982 to 2010. From 2005 to 2010 he was the Vice President, Medical Programs.

His primary research focus is in the area of cardiovascular emergencies, especially resuscitation science and diagnostic decisions for potential Acute Coronary Syndromes. He currently is a Co-Principal Investigator and Chair of the Steering Committee for the Canadian Resuscitation Outcomes Consortium focusing primarily in prehospital care. He is also the Principal Investigator of a neuro-protective intervention given by paramedics to patients with severe stroke (The FRONTIER Trial). Dr. Christenson leads a team that built and launched the BC Emergency Medicine Network (EMN) to facilitate knowledge sharing and clinical support for all emergency practitioners in British Columbia. It is growing quickly and changing the way physicians across the province communicate about new knowledge and practice change.

### **Dr. Michael Feldman MD PhD FRCPC**

Dr. Michael Feldman is an emergency physician at Sunnybrook Health Sciences Centre in Toronto and the Royal Victoria Regional Health Centre in Barrie, Ontario, and an associate professor in the Department of Medicine at the University of Toronto. He worked for 12 years as a paramedic and ambulance dispatcher prior to completing a BSc and PhD at Queen's University in Kingston. He served as medical director for Toronto Fire Services from 2005 to 2017, as a transport physician for Ontario's provincial air ambulance service from 2007 to 2017, and currently serves as medical director for paramedic services in a large region north of Toronto and as the medical director for dispatch for the Province of Ontario. He continues to work in a variety of non-conventional emergency care settings, including serving as medical director for paramedic CBRN and tactical teams around the greater Toronto area, Canada Heavy Urban Search and Rescue Task Force 3 in Toronto, and as the team leader for Toronto's site medical teams. His current research interests include assessment of dispatch protocols, assessment of adverse events during interfacility transports of STEMI patients, and is a co-investigator in the trial of double-sequential defibrillation in out-of-hospital cardiac arrest.

## Appendix B: Focused Literature Review on the Issues in the Case

### Accuracy of MPDS Regarding Urgency and Need for Firefighter Response

The Medical Priority Dispatch System is the caller interrogation algorithm used at over 3,000 ambulance dispatch centres around the world to interrogate callers, determine needed resources, and provide pre-arrival instructions. It is the best studied tool of its type, and is widely regarded as the standard of care in ambulance dispatch operation. The standard interrogation protocol is believed to be superior to the opinion of experienced dispatchers. In a study performed at the London Ambulance Service Trust Control Centre, overriding the automatically-determined dispatch coding to a higher level response is allowed, based on the dispatchers' impression and experience. A retrospective review of 758,695 incidents revealed no additional cardiac arrest cases identified by dispatchers' subjective impressions [1].

As is the case in BCEHS, the local EMS agency deploying MPDS, with the approval of their medical director, determines the most appropriate type and mode of response for each of the medical determinant codes identified by emergency medical dispatch call-takers. Response assignments for each of the 433 separate determinant codes are developed locally based on local EMS and allied agencies' type and quantity of resources, the likelihood of a critically ill or injured patient, and the potential benefit of rapid response by emergency responders [2]. The BCEHS response plan for 21 Delta 04 (dangerous hemorrhage) calls is consistent with how MPDS should be used and is consistent with the response plan of EMS agencies in some other jurisdictions. The emergency medical call taker who spoke to the patient followed protocol 21 and assigned the correct determinant based on the information provided.

There is limited evidence to guide the need for firefighter first responders. In order to better inform this inquiry, a search of the National Library of Medicine MEDLINE database was conducted on June 13, 2019 from 1966 to present using the Medical Subject Heading 'EMERGENCY MEDICAL SERVICES' and the keyword 'firefighter,' which yielded 148 articles. Titles were reviewed to determine whether they were applicable to tiered response protocols and patient outcomes, and if applicable, abstracts were reviewed. Those articles deemed relevant to this inquiry were reviewed in full. A selected review of some key articles is provided here.

The benefit of first responders is well-established with respect to cardiac arrest care, with multiple studies indicating that firefighter first responder and bystander initiated CPR and defibrillation is associated with improved survival from out-of-hospital cardiac arrest [3-5].

The role of firefighter interventions in other call types is less clear. In a cohort of 10,483 patients in Minneapolis-St. Paul, MN, firefighters arrived on scene first in 88% of emergency calls. The percentage of calls in which firefighters had to perform an intervention known to life-saving and time-critical (chest compressions, defibrillation, airway management, and bleeding control) was only 1.7%. The percentage of calls in which these interventions were delivered increased only when firefighters were on scene for more than four minutes before paramedics [6]. Outside of cardiac arrests, there is no universal standard for when firefighters should be dispatched on emergency medical calls. One study in Toronto indicated that first responders would have been required to provide life-saving or time-critical interventions on only 1.4% of medical calls. In a retrospective analysis of 220,358 911 incidents, the MPDS determinants associated with the need for these interventions were identified, and found only 27 determinants (34%

of emergency calls) could be used to identify the majority of potential incidents requiring firefighter intervention. Interestingly, the list of these determinants did not include any protocol 21 calls. This analysis did not examine non-medical reasons for firefighter responses, such as hazardous materials, extrication, fires, and patient access.

#### **Interventions Provided by First Responders and Paramedics**

Once access was gained to the patient, the paramedics' and firefighters' care met applicable standards for cardiac arrest. The paramedics did not encounter ongoing severe bleeding, and considered both bleeding and drug overdose as potential causes of the cardiac arrest. As outlined in the American Heart Association/Heart and Stroke Foundation Guidelines, "standard resuscitative measures should take priority over naloxone administration (Class I, LOE C-EO), with a focus on high-quality CPR (compressions plus ventilation). It may be reasonable to administer IM or IN naloxone based on the possibility that the patient is not in cardiac arrest (Class IIb, LOE C-EO). Responders should not delay access to more-advanced medical services while awaiting the patient's response to naloxone or other interventions (Class I, LOE C-EO)..."

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## Appendix C: Review Terms of Reference

### PATIENT SAFETY AND QUALITY ASSURANCE REVIEW

#### PURPOSE

The Minister of Health has engaged an Independent Panel (the Panel) to examine the circumstances of BCEHS care involving the death of [REDACTED] and whether these may potentially have affected the outcome. This review will include the following: 1) the medical nature of the case with a determination of what, if anything, could have prevented the death, 2) processes in place to respond to the event involving [REDACTED] and 3) actions taken when the event occurred including communication, accountability and any systemic issues identified. The review will make recommendations arising from this case aimed at preventing similar deaths in the future.

#### OBJECTIVES

The Panel will conduct a review of the implications for quality and safety with respect to the event that occurred on November 8, 2018 that includes but is not limited to the following:

- Interactions with and care provided by Emergency Medical Call takers and Dispatchers
- Challenges with respect to Fire providers
- Challenges with respect to the location of and access to the patient
- Role/obligation of housing societies to provide access
- Whether issues pertaining to BCEHS response model could potentially have caused or contributed to the outcome
- Make recommendations arising from this case to prevent similar deaths in the future
- Provide an opinion whether BCEHS had “No impact, Possible impact; Probable impact or Definite impact” on the outcome

#### REPORTING RELATIONSHIP

The Panel will report to the Minister of Health with a copy of the report to the CEO of PHSA. The Terms of Reference may be modified by the Minister at his sole discretion.

#### PROCEDURES

A case definition and audit tool will be developed with input from the Panel. The aims of the Independent Review will be to:

- 1) Review the care of [REDACTED] including review of the following documentation:
  - a. Patient Care Record
  - b. Audio files and transcripts
  - c. Interviews with the crew involved, fire providers, family of [REDACTED] and any other individuals relevant to this event
  - d. Event Chronology and Event Registers
  - e. Incident reports written by the initial paramedic crew
  - f. Clinical response model policy and related materials
  - g. Patient care record from the most recent hospital visit
- 2) Classify the case, using the categories below, regarding what, if any, impact the issues pertaining to BCEHS may have had on the outcome

#### Category

	Impact of BCEHS Involvement on Outcome
1	No Impact
2	Possible Impact
3	Probable Impact
4	Definite Impact

## APPENDIX D: Building Security and Emergency Access Policies

### **Response from Management**

*The Building is an affordable housing development managed by a Community Services Society through an operating agreement with BC Housing, which leases the residential portion of the building from the Provincial government's Ministry of Citizens' Services. Upon completion of the renovations in 2015, the building has multiple users/tenants within the building. In addition to the residential portion of the building, the stakeholders within the building include other Vancouver municipal services.*

*There are a number of complexities related to this arrangement of having multiple stakeholders and users within one building, notably the shared emergency exit stairwells, which service all tenants and users within the entire building. There are two stairwells designated as emergency exit pathways at the north and south ends of each of the 6 floors of the residential tower – both stairwells lead down and provide egress outside at the ground level but provide no access into the building – they are meant as exits only. Both exits provide egress at the ground level to tenants in the residential portion and users of the court space. A third staircase that runs from the basement level (court user access) up the middle of the residential tower, to the penthouse mechanical space, is not accessible for use to enter or exit the building by residential tenants. Each of the 6 residential floors has a door that leads into this stairwell that is kept locked at all times; in addition there is an access door at the main level elevator lobby within the residential space that is also kept locked. In case of emergency when the two elevators are grounded, or an elevator malfunction that impacts both elevators, tenants of the residential space do not have access from the main level to the residential tower.*

When this incident occurred, The Bloom Group already had measures in place to provide access for emergency services.

1. Lock Box            Located at front of building (has fob & keys for common areas, including doors at elevator) – accessible to Vancouver Fire Dept only.
2. Callout            Dispatch has been informed that all master keys are kept at 222 Main St – Paladin Security Desk – accessible to VPD for emergency building access (front door and elevators to residential tower).

After the incident, the Housing Services Manager – was included in the investigation that EHS conducted. On December 20 site visit took place to walk EHS through building access points. Critical Incident Report was completed; additionally, a BC Housing Critical Incident Report was submitted on November 8, 2019.

The Facilities Manager tried to implement VPD Project Access but building system could not integrate with VPD requirements. Vancouver Fire Department was also contacted to come on site and check the lock box locating in the external wall adjacent to the building entrance with the intention of adding a master suite key. Fire Dept advised against doing so after site visit. Instead we created a fob & key for VPD only at 222 Main St – Paladin Security Desk. WSI and VPD have confirmed in writing receipt of all keys and building access devices are held at that location.

VPD confirmed the following:

*"I have learned that that the Court House Security have an access Key Card to your building and all the floors. If Vancouver Police need to get in during an emergency the Court House Security (24/7) will provide police officers the key. VPD have a 24/7 cell phone number to contact security. I have spoken to the BC Ambulance Supervisor and advised him our procedures; and advised they will need us (the VPD) to obtain the key.*

*BC Ambulance stated that they have updated their system as well and will work closely with Vancouver Fire for any medical calls*