

Professional development of Emergency medical responders from ambulance attendants to paramedics (5): the professional profile of paramedics in Canada

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Almost back. Just a few more blocks. We're just pulling out of a small grocery store 2 blocks from our station. They have amazing salads. Just one more set of lights and we're back...

"Ambulance 3204 call." The radio interrupts my thoughts of lunch and I reluctantly pick up the microphone to answer dispatch.

"3204 go ahead." Great. We're assigned a Code 4 call for chest pain. My partner Anna flicks on the emergency lights and starts us towards an address in the industrial area. She's pretty new and drives with both hands gripped on the wheel. She asks me to communicate on the radio. We are on route to a 48 year old man complaining of chest pain and difficulty breathing.

When we pull up to the warehouse, we are met by one of the firefighters. I rolled down the window. The fireman assures me that the patient was stable. It had simply been an argument with his wife that had brought on some chest tightness and trouble breathing.

Anna and I park and grab our equipment. The airway kit, medication bag, defibrillator and stretcher. We are directed to a large bay door at the back of the warehouse. The patient is pacing back and forth with difficulty and appears extremely distressed. Must have been one heck of an argument with his wife. His skin was pale and sweaty and he looked like he was going to die.

It takes us seconds to have the man on our stretcher with oxygen. Anna takes vital signs and starts an IV, while I acquire a 12 lead ECG and try to elicit as much history as I can. As it turns out, our patient hasn't seen a doctor in over 10 years. As far as he's concerned, he's healthy and never, ever needs medication. His vital signs look good, but his 12 lead ECG does not. The ST segments

in the inferior leads are standing like tilted tombstones. Our patient is positive for an ST-elevation myocardial infarction.

As I'm planning treatment in my head, the firefighters help us gather our equipment. I pass our patient some aspirin and tell him to chew before swallowing. He looks at me and tells me he feels awful.

Our priorities at this point are simple but evidence-based: antiplatelet therapy, and rapid transport to a centre that can rapidly perform a coronary angiogram and stenting if needed. Other interventions, like heparin, beta blockers, and angiotensin-converting enzyme inhibitors, are typically left to the hospital. Our goal is to help minimize the time from first medical contact to percutaneous coronary intervention for the blocked coronary artery.

We load the patient into the ambulance and I take a firefighter student in the back of the ambulance with me. A second 12 lead confirms the myocardial infarction,, and we're rolling to Southlake Hospital. I start to nitrate our patient in hopes of relieving some of his chest discomfort. He seems to be slightly more relaxed, but his skin is grey and doesn't look good. He becomes anxious and wants to know why we are passing a closer hospital to go all the way to Southlake hospital. The County of Simcoe is a mostly rural district in the south-central part of Canada, and is geographically challenging when it comes to servicing emergency calls. Distances are long and bypassing hospitals generally isn't a practice we embrace. For this type of patient however, bypassing nearby hospitals has the potential to decrease the amount of myocardial necrosis and potentially save his life. This patient will bypass the emer-

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gency department. We can deliver him directly to the interventional cardiologist in the catheterization lab for a percutaneous coronary intervention.

As we arrived in the catheterization lab, I give a brief but thorough report to the cardiologist. The protocols for managing this patient and calling in the cardiologist are already in place, so they trust our judgment. The interaction with the physicians is often very collegial and educational so we stayed to watch the procedure. A clot was removed the size of a pea! Amazing. Truly amazing that this man came very close to dying and was given a second lease on life by a modern EMS system that has developed and matured over the last forty years.

Evolution of EMS care in North America

In contrast to ambulance physicians, nurses, and other ambulance workers in many European EMS systems, paramedics provide the vast majority of prehospital care in North America. The paramedic as a distinct health care profession has emerged in the last four decades. Paramedics have the patient assessment and treatment skills that permit them to provide the same care that formerly would have required a physician. The development of the paramedic profession is based on work by pioneering physicians in military medicine, emergency cardiac care, hospital emergency and critical care units, as well as medical research. Currently, many paramedics are assuming responsibility for the future of their profession by expanding their skills and contributing to prehospital medical research.

The foundations of paramedicine as a distinct profession, has roots in military medicine. Military surgeons like Dominique Jean Larrey in Napoleon's army and Jonathan Letterman in the American Civil War recognized the need to provide field treatment and rapid evacuation of injured soldiers¹. The first Geneva Convention specifically recognized the important role of the combat medic and protected them from battlefield aggression. Modern armies continue to use specially trained combat medics to provide medical care in the field.

In many cases, best practices for trauma patients were learned on the battlefield. Advances such as the application of traction splints, trauma resuscitation, rapid evacuation, the concept of the "golden hour" in the multiple trauma patient, and damage control surgery by Forward Surgical Teams (FST) in Afghanistan, have led

EMS systems in developing the prehospital management for victims of trauma.

The success of many of these advances can be seen in decreased mortality from battlefield injuries. With injuries becoming more severe and complicated in the Iraq and Afghanistan theatres of war, mortality has dropped below 10%². Civilian paramedics use knowledge of military trauma care to guide aspects of treatment such as fluid resuscitation, trauma care, and triage direct to trauma centres.

At the same time as military medicine was evolving in the U.S. Korean and Vietnam wars, emergency cardiac care underwent significant advances. Initial advances in cardiac care – such as CPR, cardioversion, defibrillation, and anti-arrhythmic medications were restricted initially to the hospital settings. The pioneering efforts of Dr. Frank Pantridge in 1966 demonstrated the feasibility of bringing emergency cardiac care into streets and homes in Belfast, Ireland³. Once the feasibility of prehospital cardiac care was demonstrated, prehospital ambulance professionals were trained to extend many other advanced medical procedures to the field.

Another significant factor behind the development of modern paramedics and systems of civilian trauma care in North America was the 1966 publication of "Accidental Death and Disability: The Neglected Disease of Modern Society" by the U.S. National Academy of Sciences. The report concluded that both government and health care systems did not take sufficient steps to address morbidity and mortality due to trauma, and specifically cited lack of standards for ambulances, emergency equipment, and personnel training⁴.

Once a few EMS systems started training the first paramedics, there was a public call for more sophisticated EMS providers. In the 1970s, the popular television program "Emergency!" featured a pair of Los Angeles paramedics practicing prehospital ALS care in a manner very similar to the way we practice today. With the launch of the program in 1972, there were three paramedic programs in the USA. With the show ending five years later, there were paramedics in every state, and in most major cities. In Canada, some of the earliest paramedics were trained by emergency physicians. although rare in the 1970s. Modern paramedic programs in Canada began to emerge in large cities such as Toronto in the 1980s.

The development of paramedic programs was not without challenges. Some health care profes-

sionals have perceived paramedics as encroaching on their scope of practice. In many communities, supportive physicians assumed leadership roles by assisting with training to the first groups of new paramedics. Some of these physicians secured opportunities for acquisition of clinical skills at the bedside or in the operating room. Soon, a number of paramedics became well-acquainted with supportive physicians in their community.

As paramedic training became more common and more formalized, community college programs were developed, with much of the training performed by the paramedics themselves. Primary care paramedics receive two years of college training. They are delegated by their EMS base hospital physicians to perform semi-automatic defibrillation, deliver five medications (epinephrine, glucagon, salbutamol, nitroglycerin, and ASA) and place simple advanced airways (such as the King LT). Advanced care paramedics have additional training and the ability to intubate, pace, cardiovert, start IVs or IOs, and administer a variety of advanced cardiac life support medications, loop diuretics, analgesics, and sedation. Critical care paramedics typically staff air ambulances and a few land ambulances to provide intensive care during transports of critically ill patients to intensive care units. These paramedics can use ventilators, medication infusions, and intra-aortic balloon pumps.

Modern paramedics employ training and procedures that are increasingly integrated with hospital care. Changes in prehospital care as well as care provided in hospitals have led to increases in survival from out of hospital cardiac arrest. Toronto, Canada's largest city has seen a tripling of survival from out-of-hospital ventricular fibrillation in the last few years. This is in part due to improved CPR techniques, airway management, and post-arrest therapeutic hypothermia. Other recent and significant advances include standardized, medically-derived dispatch interrogation protocols, rapid defibrillation by public access defibrillators or BLS first responders, advanced life support and post-resuscitation care, prehospital thrombolytics, and ST elevation myocardial infarction (STEMI) percutaneous coronary intervention (PCI) centres. The clinical vignette describing the chest pain call at the start of this article illustrates many of the considerations of the paramedic, who is able to independently start antiplatelet agents, notify an interventional cardiologist, and transport to the most appropriate hospital. Medical evidence continues to find

ways of improving prehospital care. Management of CHF with nitrates and continuous positive airway pressure (CPAP) was rapidly adopted by EMS systems only a few years after the benefit of these interventions were shown in hospital emergency departments⁵.

EMS physicians in Canada

With highly trained paramedics, direct medical care by physicians is not common in Canadian EMS systems. The benefit of providing advanced interventions at scene is limited. The widely reported Ontario Prehospital Advanced Life Support Study shows little additional mortality benefit to incorporating a variety of advanced interventions for certain patients⁶. Physicians attempting to provide advanced interventions in the field can actually lead to delays in transport of trauma patients to trauma centres. Paramedics have an exceptional scope of practice which allows them to deliver all needed evidence-based interventions. This scope of practice and continuous refresher training allows paramedics the autonomy to make most key treatment and transport decisions, as illustrated by the case at the start of the article.

In Canada, EMS physicians rarely provide any direct prehospital patient care. Instead, they are responsible for medical oversight through development of medical directives, and quality assurance for the care provided by paramedics. Quality assurance is a key pillar of medical oversight by EMS physicians. EMS education and oversight of patient care provided allows for reliance on paramedics to provide a quality of care that meets or exceeds that which a physician could provide in the field. Although most paramedic care is provided in accordance with medical directives, paramedics may contact a base hospital physician at any time to ask for further treatment orders, discuss a case, or request a termination of resuscitation if the patient has not responded to efforts. On exceptionally rare occasions, EMS physicians may staff a site medical team to respond to calls for very unstable patients who are trapped. In some cases, physicians fly and work on air ambulances to provide care for certain critically ill patients.

EMS physicians also play a key role in helping EMS services interact with other parts of the health care system. For example, hospitals face significant challenges with emergency depart-

ment waiting times. Long wait times in the emergency departments have had direct impacts on ambulance utilization and response times. EMS services, working with their EMS physicians, have participated in a variety of initiatives to reduce ambulance wait times in the hospital to facilitate the availability of vehicles in the community.

EMS physicians working with neurologists, trauma surgeons, pediatricians, and cardiologists, have helped support centres of excellence for referral of patients with specific clinical problems. For example, paramedics recognizing signs and symptoms of stroke will decide whether to contact the stroke neurologist, thereby reducing the time to administration of tPA for ischemic strokes. Paramedics may now bypass smaller hospitals to obtain the necessary specialized care. Many of these specialists have a new understanding of the prehospital considerations and scope of practice.

In prehospital research, paramedics are responsible for enrolling and treating patients in accordance with research protocols. EMS physicians participating in the Resuscitation Outcome Consortium (ROC) study of cardiac arrest and trauma have been instrumental in accessing hospitals records to provide follow up information on patient outcome and disposition. In the last few years, many paramedics have taken an interest in becoming researchers in their own right, and some have published in peer-reviewed medical journals. Future paramedics will

likely adopt practices discovered not only by physicians but also by other paramedics who have published their findings.

Conclusion

Paramedics are recognized as the key providers of prehospital care in North America. Their training and scope of practice are based on pioneering work in military medical care and emergency cardiac care. Modern EMS systems work in concert with their base hospital physicians to adopt practices and medical directives that allow paramedics to provide the majority of the clinical care. As the profession matures, paramedics participating in research will guide the future of the profession.

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