



A physical demands description of paramedic work in Canada



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ABSTRACT

Paramedics perform physically demanding job tasks related to patient care and transport; however, no data exists describing the physical demands exposure profile for a shift. The purpose of this research was to address this knowledge gap by characterizing the physical demands of paramedic work by gathering data from seven different services across Canada. Further, this investigation was extended to compare physical demand exposure frequencies between High-Populous (HP) and Low-Populous (LP) paramedic services. Using a participatory model, two paramedics from each of the seven services were trained how to conduct a physical demands description (PDD). Each trained paramedic observer then conducted PDDs while completing two ride-outs each, where they observed and recorded the physical demand exposures of their colleagues. Results support the belief that paramedics are routinely exposed to physical demands such as lifting, lowering, carrying, pushing, and pulling. In fact, attending paramedics identified stretcher loading and unloading (25.6% of respondents), carrying equipment (19.5%), and pushing and pulling the stretcher (13.4%) as the most physically demanding tasks. When considering differences in task frequency between services, the empty stretcher was loaded and unloaded more frequently in HP services (10.0 ± 4.1) than in LP services (5.6 ± 3.4). Additionally, medication bags were handled more frequently in HP services (21.4 ± 7.5) than in LP services (5.1 ± 3.6). These data confirm that paramedic work is a mix of prolonged sedentary time (on alert waiting for a call), interspersed with bouts of high physical demand exposures (when attending to a call).

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1. Introduction

Paramedics work in a variety of pre-hospital environments providing emergency patient care. Patient care activities can include, but are not limited to: physical assessment; management of airway obstruction; cardiopulmonary resuscitation; patient repositioning and immobilization; lifting and moving a patient; and, intravenous fluid therapy (Ministry of Health and Long Term Care, 2007). Beyond describing the demands as requiring, “occasional bouts of high physical strain in a predominantly sedentary occupation” (Gamble et al., 1991), there is little evidence available that explicitly describes paramedics’ day-to-day physical demands. This is a concern as paramedics report a high prevalence of stress,

burnout, and fatigue (Aasa et al., 2005; Maguire et al., 2005), with recent data indicating that the injury rate of paramedics is more than seven times higher than that of the average working population (Maguire et al., 2014). A robust description of paramedic physical demands is needed.

The physical demands of other first responders and patient care personnel are well established. Previous research has characterized physical demands information obtained from firefighters (Bos et al., 2004), police officers (McKinnon et al., 2011), and nurses (Janowitz et al., 2006). However, while each paramedic service likely has a standard physical demands description (PDD) on file, no systematic research has been undertaken to characterize paramedics’ physical demands with the same scientific rigor as that which was used to describe demands in the previously noted professions. Further, considering expected variability in population and patient demographics across a country like Canada, little is known about possible differences in physical demand exposures between different services. For example, how might physical demands differ

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for paramedics working in services providing pre-hospital care in a highly populated, metropolitan community relative to a less populated, rural community?

Characterizing the work of a paramedic poses many challenges. At the provider level, patient care activities vary with each call, which in turn can present unique challenges depending on the clinical status and needs of each patient. Due to this variability, it is likely that a small sample of two or three shift observations may not adequately capture the range of physical demands that might be common. At the patient level, privacy, confidentiality and potential exposure to hazards (i.e., psychological or physical) pose considerable concerns. Previous research has established that paramedics, and potential observers, can be exposed to psychological hazards that may increase the risk of development mental stress related troubles (Okada et al., 2005). For an ergonomist, likely untrained or prepared to handle the emotional stress associated with witnessing a graphic scene, such as an infant fatality, these exposures could be severely harmful. When considering tightening rules and regulations around patient privacy and confidentiality, many services have begun to impose tighter regulations and policies regarding who is allowed to ride-along with a paramedic crew. In many cases, these observer positions are often reserved for students enrolled in paramedic training programs, paramedic management staff, or regulators. Due to these factors, it is unlikely that a standard physical demands observation model, where an ergonomist rides along observing and measuring demands, would be effective.

To address these challenges and to account for patient confidentiality, paramedics were trained by the research team to observe and identify physical demands in the workplace. This is synonymous with a participatory ergonomics approach (Loisel et al., 2001; Antle et al., 2011) wherein paramedics were trained through a targeted PDD workshop, providing them with the knowledge and proficiencies required to ride-along with their colleagues to observe and report on physical demands. The current study used a PDD workshop training model that has previously been shown to be effective at training non-ergonomists to accurately identify physically demanding elements in the workplace (Coffey et al., 2015). The novel application of a participatory-based model to develop paramedic observers provided a unique way to overcome the aforementioned barriers that may have preventing research from establishing a detailed description of paramedic work.

The purpose of this study was to describe the physical demands of paramedic work based on observations obtained from seven different paramedic services from across Canada. Additionally, we aimed to identify the most physically demanding job tasks, based on the perceptions of the attending paramedics. Lastly, we aimed to compare task frequencies between services, where services were classified as High- or Low-Populous, based on the size of city's population for which the service provided care. We hypothesized that paramedics working at services in high-populous areas would experience physically demanding tasks more frequently.

2. Methods

2.1. Selecting sites and recruiting observers

Working in consultation with the Paramedic Chiefs of Canada (PCC) and the Paramedic Association of Canada (PAC), the research team identified seven paramedic services from across the country who were then invited, and agreed, to participate in the study. The services were selected to ensure geographical representation and to ensure a mix of High-Populous (HP) and Low-Populous (LP) services. While specific names and locations of the paramedic services have been purposely omitted to protect their anonymity,

“West” denotes a service located in western Canadian, “ON” denotes Ontario followed by a reference to the general region where the service was located within the province (e.g., ON-North, ON-South), and “East” denotes services located in eastern Canada. A total of fourteen active-duty paramedics (hereafter referred to as observers), two from each of the seven services, volunteered to learn how to conduct a PDD and to observe and document physical demands in their service. This project was approved by the University's Research Ethics Board; all observers provided their informed consent.

2.2. Training observers to identify and report on physical demands

Observers attended a six-hour PDD workshop. The workshop was based on the PDD Handbook, published by the [Occupational Health Clinics for Ontario Workers \(2014\)](#). The workshop guided learners through a three-step process for completing a PDD: preparation, observation and data collection, and reporting. To ensure that the workshop was adequately tailored to the needs of active-duty paramedics, a Knowledge-to-Action (KTA) process (Graham et al., 2006; Graham and Tetroe, 2007) was used. This process began by first piloting the PDD training workshop at two services: ON-Central and ON-East. Following this inaugural delivery, the workshop was further refined and tailored using the comments and insights provided by the paramedics attending the workshop. This iterative approach to tailor information is consistent with a branch of the KTA process referred to as knowledge integration (Brazdil and Torgo, 1990). By consulting with and requesting feedback from paramedics, we were able to strengthen the training workshop and streamline data collection.

The workshop prepared observers with the skills and proficiencies required to accurately identify the physical demands and to quantify relevant aspects of each demand (such as distance travelled, or stairs climbed); however they were not trained, or required, to measure the force demands associated with specific job tasks. Previous research (Coffey et al., 2015) has indicated that novice observers can accurately identify physical demands, following a similar bout of training; but, often struggle with accurately measuring variables associated with each demand, such as forces and weights. To overcome this potential limitation, all equipment weights and dimensions were accurately measured and recorded by the research team at the service, while paramedic observers added patient demographics (e.g., age, weight, height) from ambulance call reports associated with each call they observed. Observers were also responsible for counting the number of stairs ascended and descended, as well as estimating the distance travelled walking to and from calls with and without the stretcher. Observers were provided with a standardized data recording booklet to provide a space for their observations, including reminders to help paramedics identify, classify, and report on physically demanding elements in accordance with the methods they learned during the training.

2.3. Protocol

Following completion of the training, paramedic observers conducted two full-shift ride-outs, where they documented physical demands. Where possible, observers completed one ride-out during a day shift, and one during a night shift. All shifts observed were 12 h in length. During each call observers recorded the required information regarding physical demands, and basic call information. In addition, following the completion of each observed call, observers asked the attending paramedics to indicate what aspect of that call was most physically demanding. Observers recorded all data in PDD booklets, which were returned to the

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