

Investigating Informatics Competencies of Community Paramedics: Delphi Study and Survey

Research-in-Progress

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Abstract

Addressing inefficiencies in prehospital emergency care will contribute to increased availability of resources for emergency response, and the health and well-being of citizens. To address these problems, development and expansion of community paramedicine programs are taking place, involving the deployment of trained paramedics for providing care outside of their traditional emergency care provider roles. Initial research indicates that these programs have a positive effect, but many EMS services have a need to develop skills for paramedics to use technologies such as electronic medical records, health information exchanges, and so on. Traditionally, these skills are not within the scope of practice of paramedicine, yet they may impact the ability of the paramedic to practice patient centered care within this new paradigm for paramedicine. This research outlines a theoretical model and methodology for testing the impact of informatics competencies in paramedics on job satisfaction and the ability to practice patient centered care.

Keywords

Healthcare Informatics Competencies, Patient Centered Care, Community Paramedicine, Job Satisfaction

Introduction

Addressing inefficiencies in prehospital emergency care will contribute to increased availability of scarce resources for emergency response, and the health and well-being of citizens. One area in which improvements can be made is the diversion of non-serious patients away from Emergency Departments (EDs), and towards less resource-intensive healthcare providers, such as home and long term care. This problem is documented in various jurisdictions globally (Byrne et al., 2003; Doupe et al., 2008; Mitchell, 1994).

In order to address these problems, the development and expansion of community paramedicine programs are taking place (Misner, 2005). This program will promote the use of trained paramedics for providing care outside of their traditional emergency care provider roles, where they will be referred to as Community Paramedics (CPs). Their work will entail the delivery of non-emergency healthcare services in the community by paramedics, such as outreach to frequent users of emergency services, chronic disease patients, rural populations and the elderly. It is expected that this investment is to reduce the use of emergency services and resources. Initial evidence has been positive, with a drastic reduction in repeat 911 calls in Toronto, Ontario (Olynyk, Thurston, & Klitch, 2010), and a 41% reduction in emergency department among frequent use patients in Hamilton, Ontario (Browett, 2011).

While performing their duties in the community, it is inevitable that the CP will use technology for accessing and updating medical records, sharing data with other professionals, using mobile devices, or adhering to security and privacy protocol. There will be various competencies which these CPs must

possess to utilize these technologies properly, resulting in their effectiveness on the job (Chang & Daly, 2012). Tools for the measuring these competencies have been constructed for nursing (Staggers, Gassert, & Curran, 2001) and public health workers (Cunningham, Ascher, Viola, & Visintainer, 2007), but the informatics competencies for CPs have not been defined in the literature, nor does a tool for their measurement exist. Such a measurement will allow for assessment of these competencies in a population of CPs, and to determine if these competencies have an impact on the firm performance and the quality of care provided. In light of this, this proposed research seeks to answer the following questions. First, *what are the informatics competencies required for CPs to effectively perform their duties*, and second, *what is the impact of these competencies on the ability of the CP to provide high-quality care?*

Background

The general service delivery model of EMS services entails response to an emergency call, treatment patients on the scene, and transportation to EDs if needed. This approach presents several problems. First, many people who call 911 are not truly in need of emergency medical treatment, amounting to an expenditure of an unnecessary amount of paramedicine resources and overcapacity at EDs (Dohan, Hardie, Gale, Johnson, & Tan, 2013). Second, considering that ED visits frequently involve the elderly and those suffering from chronic diseases (Bureau, 2010; StatsCan, 2010), coupled with the fact that that chronic disease prevalence is increasing and the population is aging (WHO, 2005), it is likely that problems resulting from emergency system overcapacity will continue to increase.

Community Paramedics

The CP role has been proposed as a response to these problems (OAPC, 2013). Community paramedicine entails expanding the scope of the traditional paramedic to include non-emergency care in the community (Olynyk et al., 2010). They possess special skills and executes specialized protocols in order to provide this type of care. These include providing care to patients that does not require an immediate response, working collaboratively with other healthcare organizations, providing referrals to other agencies, for example (NHTSA, 2013; NREMT, 2000)

Results of these initiatives have shown initial success in reducing ED volume, 911 calls, hospitalizations, and other positive outcomes (EMSCC, 2011; Moulton, 2011). The leaders of EMS services that are interested in developing and adopting this role within their own organizations are faced with several challenges. The first concerns the role that Information and Communication Technologies (ICTs) will have when CPs perform their duties. Governing bodies are already considering that CPs will need the skills required to interact with technologies such as Health Information Exchanges (HIE) and Electronic Health Records that integrate with other systems (EagleCounty.us, 2013; Patterson & Skillman, 2008; Smith, 2013). These technologies been employed to assist in the same issues that CPs will likely face. To encourage coordination of care, the CP may have to share data or integrate systems with other healthcare providers. This is a minimum expectation, as it is likely that the CP must use the ICTs provided by their own employer. Therefore, *what informatics-related competencies should the CPs have, to ensure a high-quality, effective service is provided by the ambulance service?* Second, as with any healthcare intervention, its outcomes must be measured to demonstrate a benefit. Considering this, *what impact will these informatics competencies have on the quality of care provided by CPs?*

Patient Centered Care

Patient centered care (PCC) pertains to the delivery of healthcare in a way that emphasizes the need for the healthcare provider to understand the patient to a greater degree, including the patients desires, emotional needs, life issues, as well as their disease and health history (Stewart, 2003). It also seeks to include them as a partner in their own treatment decisions, incorporating their desires into these decision making processes, with a focus on lifestyle, prevention and the management of health in the long term (Hudon et al., 2012; Stewart, 2001). This is a shift from the more traditional paternalistic approach to delivering healthcare, where decisions are made largely from a physician- or institution- level. PCC has been adapted for delivering healthcare within family practices (Scherger, 2009), for patients with chronic diseases (Jordan, Briggs, Brand, & Osborne, 2008), and for the elderly (Detering, Hancock, Reade, & Silvester, 2010), typically patients that would benefit from longitudinal care and preventative intervention.

Regarding chronic disease care in particular, the way healthcare has been delivered in this areas is quite different from that of acute care. Since the nature of chronic disease, such as diabetes, is longitudinal in nature, healthcare that is delivered from an acute care perspective with an emphasis of providing episodic care cannot address the needs of the patient sufficiently. Effective care for chronic disease must be delivered longitudinally, so the physician can learn the preferences of the patient, the nature of their disease, the impact of the disease on their life and their family (Barr et al., 2003).

Research has demonstrated the impact of PCC on patient satisfaction (Cecil & Killeen, 1997; Winefield, Murrell, Clifford, & Farmer, 1996), co-ordination of care on various outcomes (Hearn & Higginson, 1998) and healthcare utilization (Bertakis & Azari, 2011). Another benefit of PCC that is reported often is the job satisfaction of the healthcare employees (Avgar, Givan, & Lui, 2011). Although it is regarded as an indirect outcome to PCC, it is important to the approach, as it is theorized that satisfied employees do not intend to leave their professions or their current jobs, which in turn contributes to continuity of the care received by the patient (Chapman, Blau, Pred, & Lopez, 2009).

Job satisfaction is, in simple terms, the emotional state that one feels towards their job (Smith, Kendall, & Hulin, 1969). There have been various conceptualizations of job satisfaction over several decades worth of research, including discrepancy between what the worker values, and how the job meets these values (Locke, 1976; Spector, 1997), or one that conceptualizes job satisfaction as distinct from job dissatisfaction (Herzberg, 1974). An approach that is common in healthcare distinguishes two separate types of job satisfaction: *affective* and *cognitive* job satisfaction. Affective job satisfaction is an attitude based on an appraisal of the job as a career, and cognitive job satisfaction is formed by a logical evaluation of the conditions associated with the employment such as pay and benefits. Job satisfaction has been researched in different ways with the paramedic population. Although paramedics are intrinsically satisfied with their jobs, there is less satisfaction with extrinsic factors (Patterson, Moore, Sanddal, Wingrove, & LaCroix, 2009). The perceived quality of continuing education instructors was an antecedent of both intrinsic and extrinsic satisfaction for paramedics (Blau, Gibson, Bentley, & Chapman, 2011; Blau & Gibson, 2011).

Healthcare Informatics Competencies

Although the need for healthcare professionals to adopt ICTs for healthcare purposes has been expressed, adoption rates have remained low compared to other industries (Mantas et al., 2010; Pew, 1998). When caring for patients with longitudinal, complex, or multiple conditions, technology such as electronic medical records can help healthcare professionals manage the immense amount of data used in support of PCC (Wilson, 2009). In response to this lag, many governmental and organizational efforts have sought to support the implementation of these systems. Many have focused on the development of competencies with using ICTs within practice in current and future healthcare practitioners, managers and other actors (McNeil et al., 2005). Part of what is known as healthcare informatics (Coiera, 2003), competency development goes beyond working with ICTs to include the knowledge of terms, seeking for information, interpreting data, and even offering valuable feedback to healthcare software developers (Staggers et al., 2001). As healthcare has many disciplines within it, there are many informatics competencies that focus on roles in specific areas, such as informatics competencies for nurses (Graves & Corcoran, 1989).

Staggers et al. (2002) developed a model of nursing informatics competencies that has been adapted for nurse practitioners (Curran, 2003), nursing leaders (Hart, 2010), and other healthcare workers. The model proposes that informatics competency is comprised of three components: basic computer skills, informatics skills, and informatics knowledge. Basic computer skills refer to the proficiency in using computer software or hardware (Staggers et al., 2002). Informatics knowledge refer to the knowledge related to the theories and concepts associated with informatics, and informatics skills pertain to the ability to use and apply the theories and concepts (Curran, 2003; Staggers et al., 2001).

Model Development

Given the above review, several hypotheses will be presented. An adapted version of the Staggers et al. (2001, 2002) model will be used. Each hypothesis is explained in detail below.

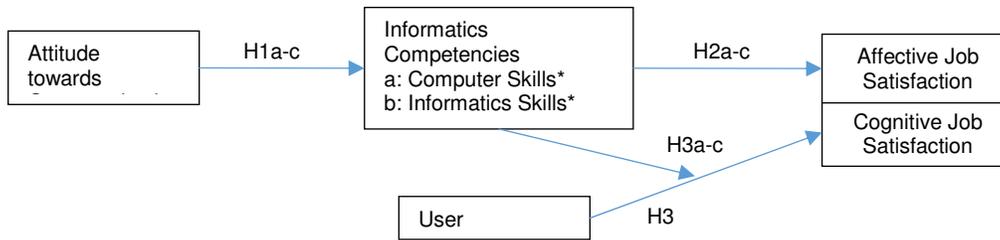


Figure 1: Theoretical model to be validated in this research. * denotes scales whose items will be defined by the Delphi portion of this research.

Hwang and Park (2011) found that the attitude towards computerization was correlated with informatics competencies in a population of nurses. Building on this finding, it can be argued that a low attitude towards computerization would act as a barrier for these skills to even develop, as it may lead to user avoiding using the technology, seeking out learning opportunities, and so forth. In other words, positive attitude towards computerization could enable the development of informatics competencies in the user. Therefore:

H1a-c: Attitude Towards Computerization will positively influence a) Computer Skills, b) Informatics Skills, and c) Informatics Knowledge

Affective job satisfaction pertains to the satisfaction that the person has with their career, rather than employer related characteristics. It is theorized that these informatics competencies will contribute to satisfaction in one's career. This may be, as healthcare workers that can use informatics tools with less effort will ultimately find it easier to accomplish more good for their patients. Although there is no evidence found to support this hypothesis, it can also be expressed in terms of organizational constraints (Spector & Jex, 1998), an empirically-supported antecedent of job satisfaction from the literature (Bowling & Hammond, 2008). It seems that if a paramedic had a low degree of informatics competencies, they would see the use of the technology as a constraint in their daily task and in the fulfillment of their career goals, and informatics competencies would help alleviate this constraint. Therefore:

H2a-c: a) Computer Skills, b) Informatics Skills and c) Informatics Knowledge will positively influence Affective Job Satisfaction

If an ambulance service chooses to implement an electronic medical record or some similar technology, it will be assumed that it will be mandatory to use this technology as part of a job. Therefore, it can be stated that the technology, including all of its complex features, will be a factor of the job, rather than the profession, implying that the technology will likely impact cognitive job satisfaction rather than the affective. With this in mind, the paramedic, forced to use a technology, will express some level of satisfaction (DeLone & McLean, 2003) with using the technology, although they don't have a choice to abandon its use. Therefore:

H3: User Satisfaction with the software used for the job will positively influence Cognitive Job Satisfaction.

If paramedics do have a high level of informatics competencies, it won't be the competencies themselves that will contribute to their cognitive job satisfaction. Rather, the competencies will allow the ambulance to use and interact with the software in a more enhanced way than someone with lower competencies. Therefore:

H3a-c: a) Computer Skills, b) Informatics Skills and c) Informatics Knowledge will amplify the relationship between User Satisfaction with the software used for the job and Cognitive Job Satisfaction.

Methodology

Support for this study is currently secured with the Ontario Association of Paramedic Chiefs. This study will take place in two phases. The first phase entails the development of an informatics competency list for CPs in Ontario, and the second phase will administer a questionnaire developed in part by the first phase

of research. This methodology is described in greater detail, below. The phases of the study are also described in Table 1 (below).

Seq	Study	Description	Participant
1.1	Delphi	Create description of CP, including their functions	Field Experts
1.2		Validate list of informatics competencies	Field Experts
1.3		Narrowing and refining items	Delphi Panel
2.1	Survey	Convert competencies to self-assessment items	Field Experts
2.2		Create scenarios describing how CPs will use technology	Field Experts
2.3		Administer Questionnaire	Paramedics

Table 1: Sequence of events in this methodology.

First Phase: Delphi Study

This first phase will adapt the narrowing phase of a ranking-type Delphi study to develop a master list of informatics competencies that will be necessary to successfully perform the duties attached to the emerging CP role. (Dalkey & Helmer, 1963; Linstone & Turoff, 2002). This method has been used to develop informatics competency lists for nursing (Staggers et al., 2002), nurse managers (Hart, 2010) and healthcare leaders (Westra, Delaney, & Delaney, 2008). Panelists will refine an initial list of informatics competencies that will be required for CPs to perform their duties, constructed from existing lists (eg. CDC, 2009; Curran, 2003; Staggers et al., 2002), and expert opinion, over several iterations. For each iteration, panelists will be instructed to rank at least 10 informatics competencies as relevant to the emerging CP role, and have the option to provide comments on their answers. Factors whose rankings report a sufficient level of agreement among panel members are retained for subsequent iterations or a final list. Panelists will consist of Chiefs or Deputy Chiefs of EMS or equivalent in EMS services in Ontario, of which there are approximately 120. There are approximately 60 EMS services in Ontario, all differing by factors including size, setting (predominantly urban versus rural), level of technology used, and current progress in implementing CPs¹. They will be provided with a description of the CP role in order to give context. Refinement takes place over several iterations, and the final list will consist of about 20 items for each dimension (Schmidt, 1997). Various recommendations exist for the size of the panel, ranging from 7 or more (Dalkey & Helmer, 1963) to “about” 30 (Delbecq, Van de Ven, & Gustafson, 1975). The competencies selected from this phase will be used as the basis of the instrument for the second phase.

Phase Two: Survey

A survey will be conducted in the second phase in order to validate the instrument, including the items selected from the first phase. This survey will take the form of a non-experimental, descriptive study, using an online questionnaire. Informatics competencies chosen from the first phase Delphi study will be converted to self-assessment items as has been done in similar studies (Bakken, Sheets Cook, Curtis, Soupios, & Curran, 2003; Yoon, Yen, & Bakken, 2009). Paramedics in Ontario will be reached through the normal communication streams at their jobs, including email, bulletin boards, and listservs. Paramedics will be offered to be included in a draw for a prize worth \$500 as an incentive to participate. Paramedics who agree to participate in the study will first be presented with a set of scenarios, created and validated in conjunction with field experts, which will capture how they would potentially use technology in their role while performing CP duties. After a brief manipulation check, a questionnaire will be presented, which will include the items that were refined from the first phase. Other pre-validated scales will be used to measure Affective (Cammann, Fichman, Jenkins, & Klesh, 1983) and Cognitive (Weiss, Dawis, England, & Lofquist, 1967) Job Satisfaction, User Satisfaction (Bailey & Pearson, 1983), and Attitude

¹ Source: <http://emsontario.ca>

towards Computerization (Stronge & Brodt, 1985). Principal Components Analysis (Bryant & Yarnold, 1995) will be used to verify that all items load on their original theoretical dimensions. Hypotheses will be tested using regression-based techniques (Licht, 1995), and the model will be refined by using open ended questions and a post-hoc analysis of the dataset.

Discussion and Conclusion

The key limitation of this study is due to the fact that it is confined to Ontario, therefore the ability to make inferences on the larger population of paramedics is limited. However, this is an important first step in addressing the informatics competencies needs of this new type of healthcare worker. As paramedic services look to implement both community practitioners and PCC, future studies in this area can seek to evaluate the informatics competencies of community paramedics on other patient centered outcomes, such as patient satisfaction, or other metrics on healthcare system utilization, such as 911 calls, ambulance transports, or ED visits. This can also be used to help craft and validate the efficacy of educational interventions for community paramedics, such as e-learning and certification programs. As well, managers will benefit with this tool, as they can now direct interventions for the improvement of informatics competencies in their staff, as well as the development and appraisal of technologies that CPs will use in the fulfillment of their duties.

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