

# Application of Cognitive Analysis in EMS

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## ABSTRACT

The issue of 'familiar faces', patients making use of EMS services for non-emergent issues, represents a use of resources inconsistent with the guiding principles of right resources, right treatment. Paramedics frequently lack the knowledge and application of appropriate language and treatment options for mental health patients. The complexity of services available to deal with these issues is often confounded by underlying and multiple comorbidities of the patient, resulting in potential confusion and less than optimal treatment. The applications of Cognitive Analysis techniques at the system, treatment, and practitioner and patient levels are proposed as methodologies clarify and resolve this issue.

## KEYWORDS

*Research; Cognitive Field Research; Learning and Training; Health*

## INTRODUCTION

'Familiar faces' are patients who engage Emergency Health Services (ambulance) with high frequency combined with low medical acuity. This reduces resources for patients with potentially life-threatening conditions and increases strain on the overall healthcare system. These patients typically have complex needs that are not well-addressed through the emergency stream and often have poor outcomes. Recent epidemiological profiles of older adults with cognitive impairment indicated that 'a unique skill set may be required to provide optimal care to this group of patients' [Goldstein, Jensen, Carter, Travers, and Rockwood, 2015].

In consultation with the Patient Care Quality Office the Quality, Patient Safety, Risk Management and Accreditation program, BC Emergency Health Services (BCEHS) identified opportunities to support the integration of primary and community care to enhance engagement with familiar faces. The burden on staff, high costs associated with diverted resources and poor patient experience reflect ineffective engagement and an inefficient use of resources. For BCEHS, a small group of familiar faces is over-represented in their ambulance usage, with 0.01% of the patient population accounting for 3% (24 246) of ambulance calls. A case management approach incorporates clinical assessment, follow-up and health education in a coordinated approach to help patients navigate the healthcare system. Community paramedics in Emergency Health Systems around the world have used this approach to improve the quality of care while reducing service pressures and inappropriate patient engagement. The successful engagement of familiar faces can be evaluated by the reduction in patient transports, emergency department admissions and length of stay which demonstrates improved outcomes, patient experiences and streamlined access to health and community services. The improvements can be quantified in dollars (system wide savings), time (supporting access for other patients) and customer satisfaction. Although familiar faces are supported through BCEHS-facilitated connections between organizational leadership and primary physician support, BCEHS currently lacks a formal process for sustainable management of these patients. A comprehensive strategy, including community-based paramedicine, is a pragmatic and sustainable solution to address dynamic healthcare needs.

The specific challenges to overcome in developing a comprehensive strategy of case management have been identified as:

- Small number of patients make use of large amount of resources
- Transport provided by ambulance does not necessarily result in the appropriate treatment for the patient
- Patients with mental health issues constitute a significant portion of the 'familiar faces' population
- Paramedics, in their initial training, do not receive a sufficient education in the language of mental health to enable them to engage in productive discussions with other health care providers
- Overlapping jurisdictions, protocols, priorities, and lack of collaborative decision-making models can result in patients' needs not being addressed by the most suitable health care provider

Complex sociotechnical systems [Vicente, 2006, p 20] can be better understood through the application of cognitive analysis methods. Several examples from health care can be found in the literature dealing with computer applications in a number of areas [Ashoori & Burns 2012; Ashoori et al 2014; Naikar, 2013]. These specific studies illustrate the potential benefits to an analytic approach of particular, identified challenges.

A literature survey provides some consistency in the approaches [Jioancaro, T., Jamieson, G.A., and Mihailidis, A., 2013]. What does not appear is a parallel approach of three methods to deal with the three levels relevant to the issue. First, Work Domain Analysis to understand the ways in which the system is structured to address the issue, or to illustrate that as currently structured the system of multiple health care providers and institutions is not equipped to address the problem optimally.

Second, a Cognitive Work Analysis to identify the specific interactions, at appropriate levels of abstraction and decomposition that will enable development of an interprofessional approach to assess, communicate, and collaborate on providing appropriate treatment for patients, and ensuring the continuity of care.

Third, Cognitive Task Analysis for practitioners in the relevant health care sectors will support the creation of effective education programs for paramedics to become conversant with the language of mental health professionals; and for other health care practitioners to understand and acknowledge the role of prehospital services as the initial stage in a continuum of health care.

### **Objectives**

To improve patient experience, improve population health, improve the work life of clinicians and reduce per capita costs associated with high frequency/low acuity patients. The implementation of a case management strategy that incorporates clinical assessment, follow-up, health education and the use of a structured verbal communication (such as mnemonics like SBAR) as part of its engagement is needed. A comprehensive strategy inclusive of referral pathways and community-based paramedicine, is a holistic and sustainable approach to improve patient experience, improve population health, improve the work life of clinicians and reduce per capita costs associated with high frequency/low acuity patients.

### **Method**

The participants include a regional health authority, community based mental health providers, paramedic stations within those communities, and a patient population that includes individuals identified as ‘familiar faces’ from analysis of the 911 calls in the previous 2 year period.

The first stage is a work domain analysis involving the participant institutions to determine the commonality of approaches in identifying the issue, and individual responses to provide appropriate patient care. The procedural steps would be as outlined by Naikar [2013] providing a detailed analysis of the organizational responsibilities to deal with the issue of ‘familiar faces’ and the approach taken to provision of health care for this population. The participants will also be completing a Collective Capability survey [Soubhi, 2014; Soubhi et al 2009; Soubhi et al 2010] to establish baseline values for the dimensions of the survey – agreement on tasks, inclusiveness in participation, value accorded to participant contributions. One strength of the Collective Capability Survey is the inclusion of the patient or patient’s family. Either the patient, or those in a relationship with the patient and knowledgeable about the experience with the healthcare system, can provide insights into the nature of interactions the patient has with various healthcare providers.

In phase two of the research, Cognitive Work Analysis of the delivery of care to the specific ‘familiar faces’ population will be undertaken. The intent is to clarify the contributions of the several healthcare providers to create a comprehensive delivery approach that minimizes demands on any specific area, while at the same time ensuring that the patient receives appropriate continuing care. This analysis would be similar to that demonstrated for a birthing unit, and pediatric mobile monitoring [Ashoori et al, 2014; Gorges et al, 2013; Ashoori and Burns, 2012]. The anticipated outcome is a more clearly defined relational understanding of individual healthcare providers in responding to the patient needs.

The third phase involves use of Cognitive Task Analysis to develop a suitable education program for paramedics in the relevant aspects of dealing with mental health patients who constitute a significant portion of the ‘familiar faces’. Both paramedics and health professionals skilled in this area will be interviewed, an application of the expert – novice comparative approach. The contribution of CTA to curriculum development and acquisition of expertise, has been identified in the EMS literature and other areas [Smith, Bentley, Fernandez, Gibson, Schweikhart, and Woods, 2013]. Earlier studies on the acceleration of acquisition of expertise [Fadde and Klein, 2012; Fadde and Klein, 2010; Ericsson, 2008] support these approaches and suggest that overcoming the shortfall in knowledge base for paramedics in the dealing with patients having mental health issues is a reasonable path forward. The preparations of a curriculum directed at paramedics participating in the

community response, as well as an interprofessional curriculum based on the CWA indicated above are the expected outcomes.

### **Data Collection**

From the application of cognitive work analysis in these three domains a detailed Abstraction – Decomposition framework will result from the organizational review. A relational task description, and a comparison of expert – novice understanding of language, constructs and responses will result from the second and third applications. The overall achievement will be a more coherent insight to the ‘familiar face’ patient presentation and will provide a sustained response to patient care.

The Collective Capability Survey data from before CWA applications and post restructuring of the pilot community provision of care is the main assessment of improvement. A reduction on ‘familiar face’ calls to 911 will be the most direct measure of impact but does not inform as to the quality of patient care provided.

### **Limitations**

As with all prototype projects the engagement of multiple players in a time of restricted funding, strong demand on resources, and limited acceptance of the potential worth of CWA in healthcare is the major limitation to successful adoption. The current identified partners are sufficiently engaged to acknowledge that the existing system fails this patient population and the insights gained by adopting newer approaches have potential for improved patient care, significant savings, and better use of resources to meet healthcare needs.

### **POSTER PRESENTATION**

The first stages of review will be outlined in in the poster presentation. The WDA and CWA are dependent on research funding approval anticipated in the first half of 2015.

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