

## **Conceptualizing the patient work system, Part B: macroergonomic challenges**

Richard J. HOLDEN<sup>1</sup> and Rupa S. VALDEZ<sup>2</sup>

<sup>1</sup>*Department of Medicine, Vanderbilt University, Nashville, TN, USA;* <sup>2</sup>*Department of Public Health Sciences, University of Virginia, Charlottesville, VA, USA;*

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### **1. Introduction**

Patients actively perform many important activities, from communication with clinicians during and outside of visits, to daily tasks for managing a chronic disease, to wellness-related behaviors such as grocery shopping and walking the dog. These activities occur within what we call the “patient work system” or PWS and the design of the PWS can influence performance. It is thus important to accurately understand the PWS, both its general structure and its specific attributes with respect to groups of patients and activities.

Current models of the PWS include components such as individuals, tasks, technologies, and more macro-level entities such as the home and family, the health system, or the community. Researchers have conceptualized and begun to empirically measure components of the PWS. For example, Zayas Cabán and Valdez (2012) hypothesized work system factors that should be considered in the design of home care, while Holden and Mickelson (2013) studied characteristics of patients, family members, their task, tool, and environment factors that acted as barriers to elderly patients’ self-care performance.

Such attempts notwithstanding, there are several conceptual, methodological, and practice-related challenges facing macroergonomic researchers and designers who wish to understand and affect the PWS. This paper draws on two independent PWS studies to describe insights into and suggestions for resolving macroergonomic challenges concerning the application of the patient work system concept.

### **2. Methods**

The two studies used separate but similar PWS conceptualizations to collect and analyze data from two patient populations: 1) older adults diagnosed with heart failure and their informal (family) caregivers and 2) patients using mobile health technology for asthma management. Both studies involved field research interviews and qualitative content analyses driven by PWS models.

### **3. Results**

We identified challenges to understanding the patient work system or PWS that were related to variability, levels of analysis, measurement, and translation.

*Variability.* Despite commonalities in the PWS of different patient groups—e.g., daily routines are ubiquitous—it is unclear which aspects of the PWS are generalizable versus

idiosyncratic. There is also variability in individual patients' work systems within a group. Variability raises questions about generalizability and universal design. Different analysts appear to "see" different aspects of the PWS, raising the need for multidisciplinary teams.

*Levels.* Patient characteristics are often distributed or aggregated across multiple individuals. Individuals are "nested" in clinicians (i.e., patient differences may correspond to patients having different doctors), who are nested in clinics, which are nested in health systems. Individuals are also nested in layers of social context: household, neighborhood, region, nation, etc. Similarly, tasks are nested in processes and tools are nested in a technological infrastructure. These issues broaden the scope for design and measurement.

*Measurement.* Measurement is complicated by patients varying in their awareness about or ability to describe macro-level factors such as social determinants of behavior. Robust measurement takes considerable effort, including visits to patients' homes and community settings (e.g., library, church) and developing trusting relationships. Standard methods such as workflow analysis or participatory design must be adapted to PWS studies. Further, new methods may be required to measure variables unique to the PWS such as family routines.

*Translation.* Once PWS information is gathered, it needs to be systematically translated into design, which may require adapting design methods to the PWS because PWS design involves unique timelines, ethical issues, and stakeholders. Higher-level aspects of the PWS such as policy and community resources may require strong collaboration between macroergonomists and relevant experts (e.g., policy makers) and community leaders.

#### 4. Conclusion

As the scope of human factors work in healthcare grows to include patients' work activities (Holden et al, 2013), the challenges described above must be addressed and others must be discovered.

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