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# Provider Centered Coordination, Resource Foraging, and Event Management in Healthcare Tasks

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PROVIDER CENTERED COORDINATION, RESOURCE FORAGING,  
AND EVENT MANAGEMENT IN HEALTHCARE TASKS

A Dissertation

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## ABSTRACT

Garrett, Sandra Kay Powers. Ph.D., Purdue University, May 2007. Provider Centered Coordination, Resource Foraging, and Event Management in Healthcare Tasks. Major Professor: Barrett S. Caldwell

The increasing complexity of healthcare and recent awareness of deaths and injuries associated with system errors has made patient safety an issue of national concern. Improving the quality and efficiency of the U.S. healthcare delivery system is a major theme in healthcare engineering, including the research presented in this dissertation.

This research was focused on the task and resource needs of healthcare providers in clinic-based healthcare delivery. The original purpose of this study was to investigate how and when healthcare providers seek the information and resources necessary to deliver effective patient care, but it quickly branched out to incorporate more global goals of how to describe and improve the medical provider team's ability to provide better and more efficient care to patients. The evolved dissertation defined and interpreted the concept of foraging theory in the context of healthcare providers' strategies; expanded the definition of foraging to include dimensions essential in dynamic, event-driven, time-critical settings; and refined the definition of an event and associated deadline dynamics in team-based dynamic tasks.

The research presented in this dissertation supports the concept that foraging performed in a healthcare environment is a multidimensional construct. The purpose of improved foraging strategies is to increase the quality of patient care and thus future research should investigate how the various strategies affect the quality and efficiency of care outcomes. Further investigation is needed to fully define and establish the use of proactive foraging in healthcare delivery.

Secondary research findings that emerged during the dissertation investigate how observational task analyses are conducted and can be used to create a new taxonomy structure to complement observational data collection. In addition, the issue of team communication emerged as another area for further investigation to separate the problem of interruption classification from necessary task coordination. These findings help demonstrate how improving the ability to study teams of healthcare providers will provide a significant benefit the field of healthcare research.

## PREFACE

Healthcare delivery is becoming increasingly complex and is therefore more dependent on effective teamwork and task coordination in order to maintain efficient operations. The healthcare work environment is made additionally challenging because of the “disjointed supply sources, missing equipment or supplies, interruptions, and difficulty in accessing resources to continue or complete care” (Ebright, Patterson, Chalko, & Render, 2003). It has been stated that “Nurses spend much of their time searching for medications and doctors, hunting down needed equipment, and completing redundant paperwork.” (Hassmiller & Cozine, 2006, p. 270) Thus, the focus of this research was on how to study providers’ resource acquisition strategies, and to determine how to increase the medical provider team’s ability to provide better care to patients more efficiently.

A primary goal was to create a standardized language that can be used to describe the strategies that healthcare providers use to acquire the information and resources needed to deliver effective care in a constantly changing, event-driven environment. The use of terms such as “searching,” “hunting,” and “accessing resources” intuitively suggested that healthcare providers would be comfortable with using extensions of foraging theory, a field that specifically studies these types of processes. Specifically the three initial objectives of this dissertation were to:

- determine the applicability of foraging theory to describe strategies in healthcare
- create a set of standardized definitions to incorporate the variations of these resource acquisition methods
- begin to study medical provider teams more effectively using human factors and systems engineering tools”

This dissertation represents definitional work, and therefore presents research propositions that cannot be quantitatively verified within the scope of this project. Rather the purpose of this research is to validate the propositions as logical existence theorems, and not to conduct statistical testing of quantified metrics. The current understanding of foraging theory in the existing literature has several simplifying assumptions which restrict the ability for progress to be made in applying foraging to significantly different environments than those in which it has already been applied. In addition, current approaches to studying provider tasks in healthcare settings have conceptual and methodological limitations to improving the quality of team-based healthcare delivery. These limitations cannot be resolved without the definitions and foraging classifications developed in this research.

As such, the objective of this research was to develop an empirically supported language for describing strategies and processes that healthcare providers utilize to get, share and use resources during healthcare delivery. A combination of observational data from clinic providers and reviews of prior literature in the resource foraging domain have resulted in an improved theoretical framework of multidimensional resource foraging. Results of the literature review indicate that existing theories of resource foraging, and

previous medical literature on taxonomies of healthcare provider tasks, are insufficient to describe the demands and requirements for team-based, event-driven healthcare task coordination. This improved framework provides a substantial advance in the methodology and measurement of resource foraging and patient care task coordination among healthcare providers across the range of care settings, applied to time-critical healthcare settings.

Ebright, P. R., Patterson, E. S., Chalko, B. A., & Render, M. L. (2003). Understanding the complexity of registered nurse work in acute care settings. *Journal of Nursing Administration*, 33(12), 630-638.

Hassmiller, S. B., & Cozine, M. (2006). Addressing the nurse shortage to improve the quality of patient care. *Health Affairs*, 25(1), 268-274.