

Knowledge Crystallization and Clinical Priorities:

Evaluating How Physicians Collect and Synthesize Patient-Related Data

Introduction

Clinicians perform many tasks—some are urgent and require immediate attention, while others can be postponed. Reprioritizing these tasks occurs continuously as new information surfaces.

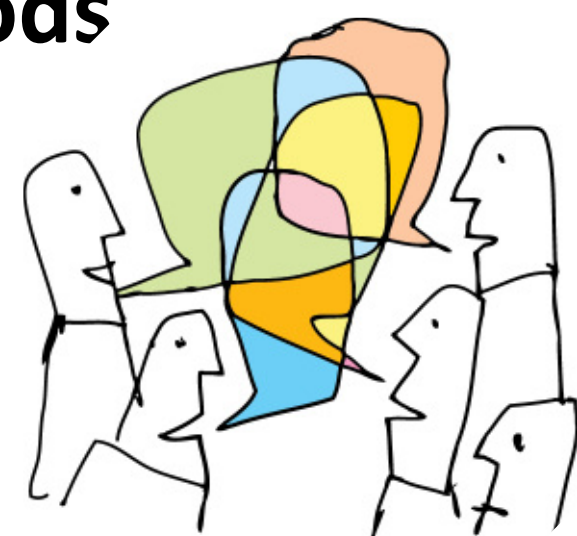
Ensuring that clinicians have all the data they need to make decisions is a significant challenge. Clinicians must wade through volumes of information to find meaning, assign value, and take action. The manual processes of searching for information and analyzing it to understand trends or see patterns require too much time, especially as patients and their problems increase in complexity.

Objectives

- Understand how physicians collect, process, and utilize data during the clinical prioritization process
- Develop a model that describes this process
- Identify opportunities to improve the delivery and utilization of information in the clinical care environment and future medical information systems

Materials and Methods

- Semi-structured focus groups, each with 4-5 physicians from Seattle Children's Hospital



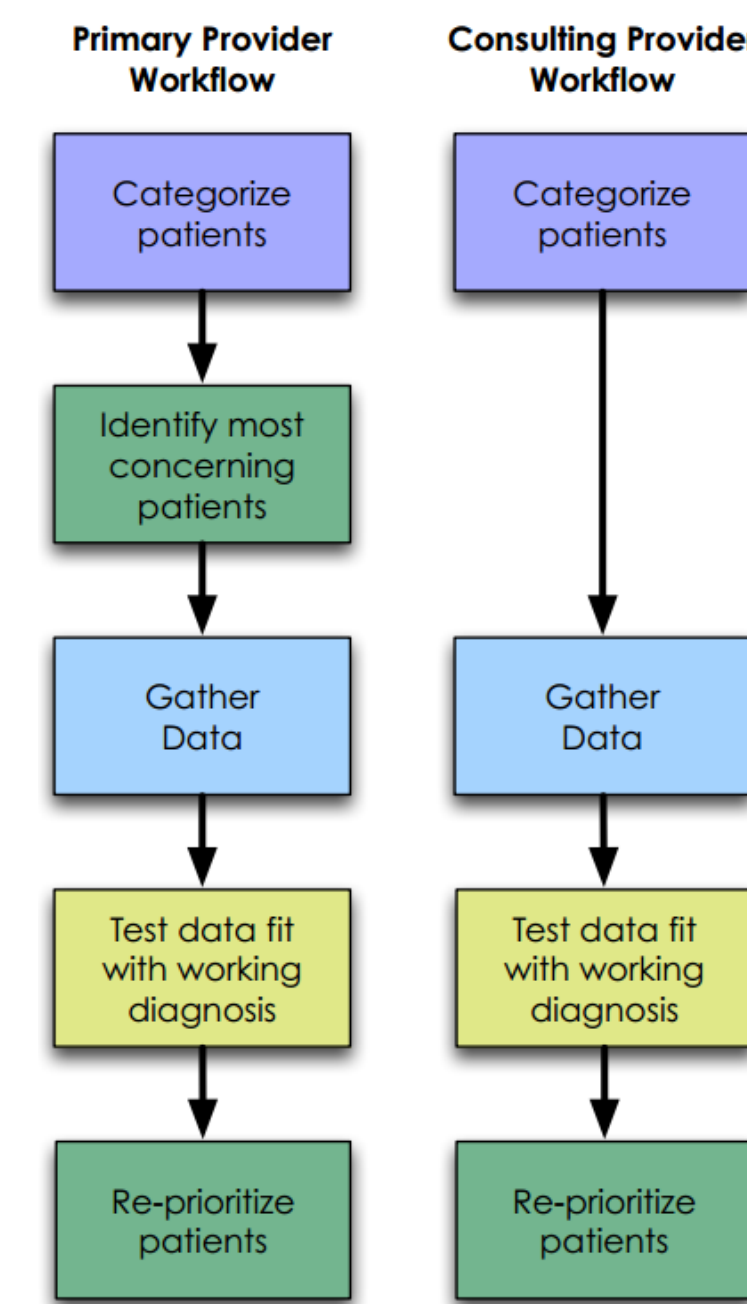
- Participants given questionnaires and fictional cases representing typical inpatient populations
- Transcripts were coded to identify themes and map out process flows

Results Participant Demographics

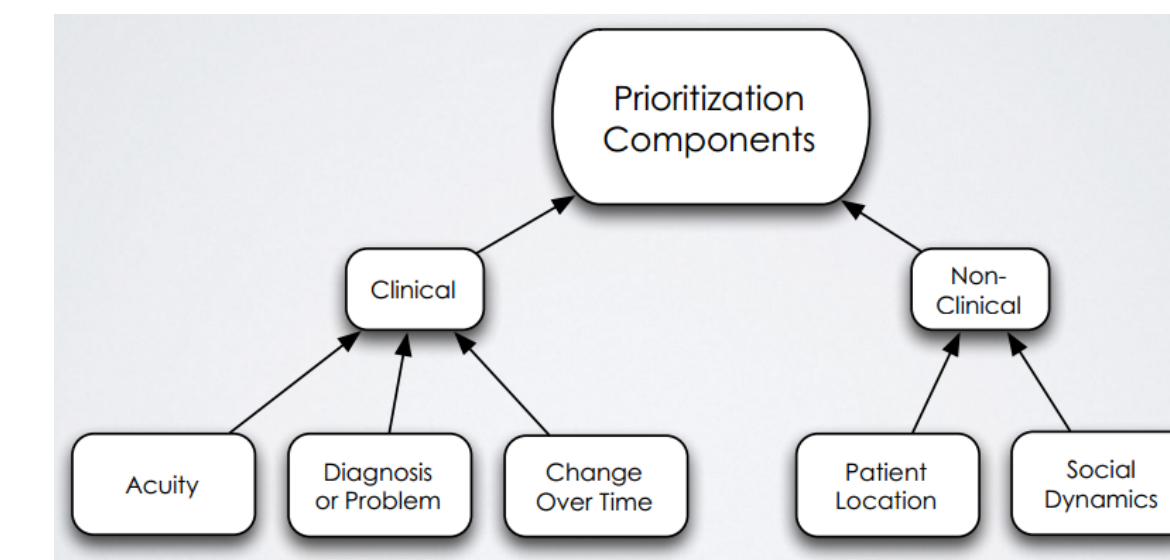


	Fellow	Attending
Number	4	19
Female n (%)	1 (25)	8 (42)
Age Range	30 -39	30 -59
Average number of years since completing medical school (range)	4.5 (4-5)	18.1 (7-31)
Average number of years since completing graduate medical education (range)	NA	10.3 (0-26)

Prioritization: Workflows

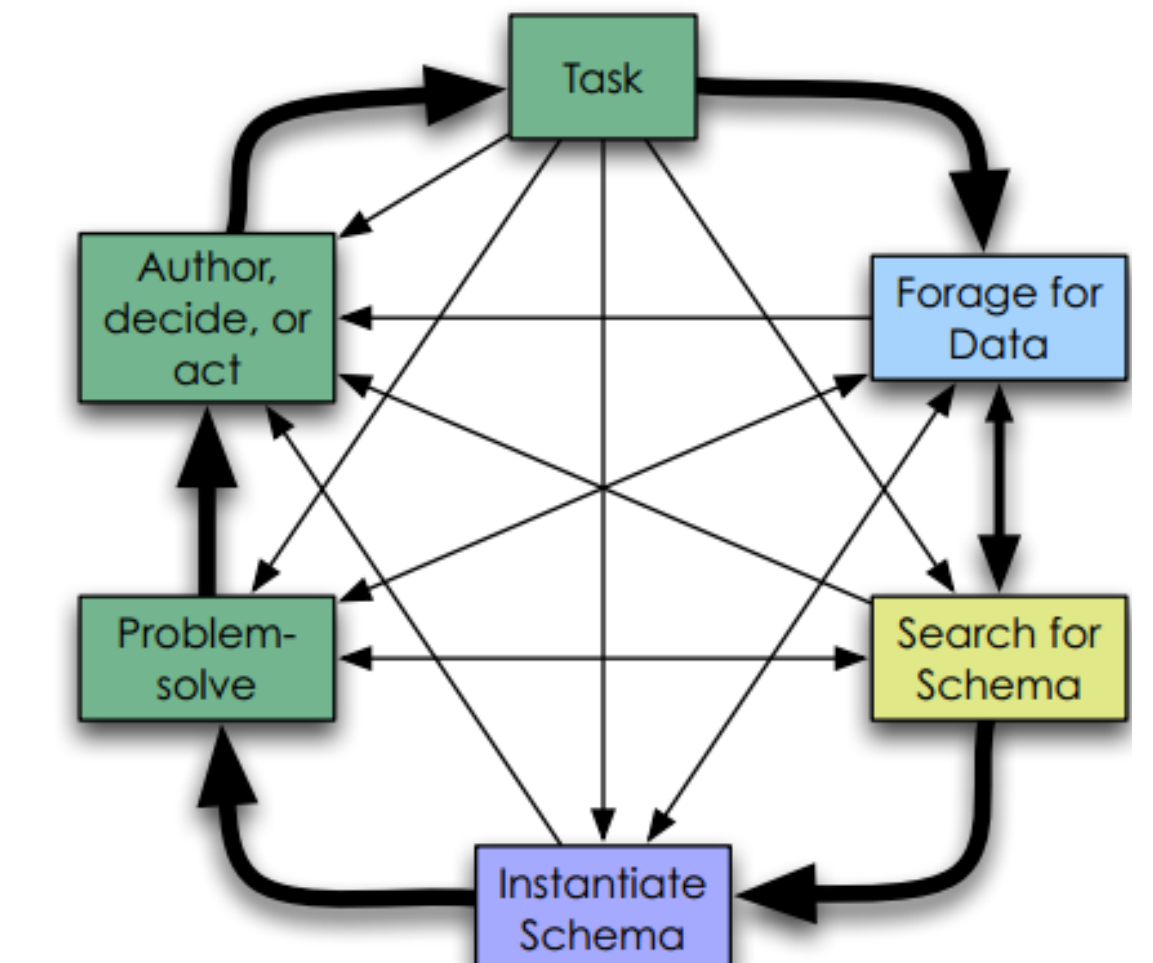


Prioritization: Acuity vs. Change



Most participants cited clinical acuity, trends, and changes in objective or subjective data elements as components driving their prioritization process.

Knowledge Crystallization¹

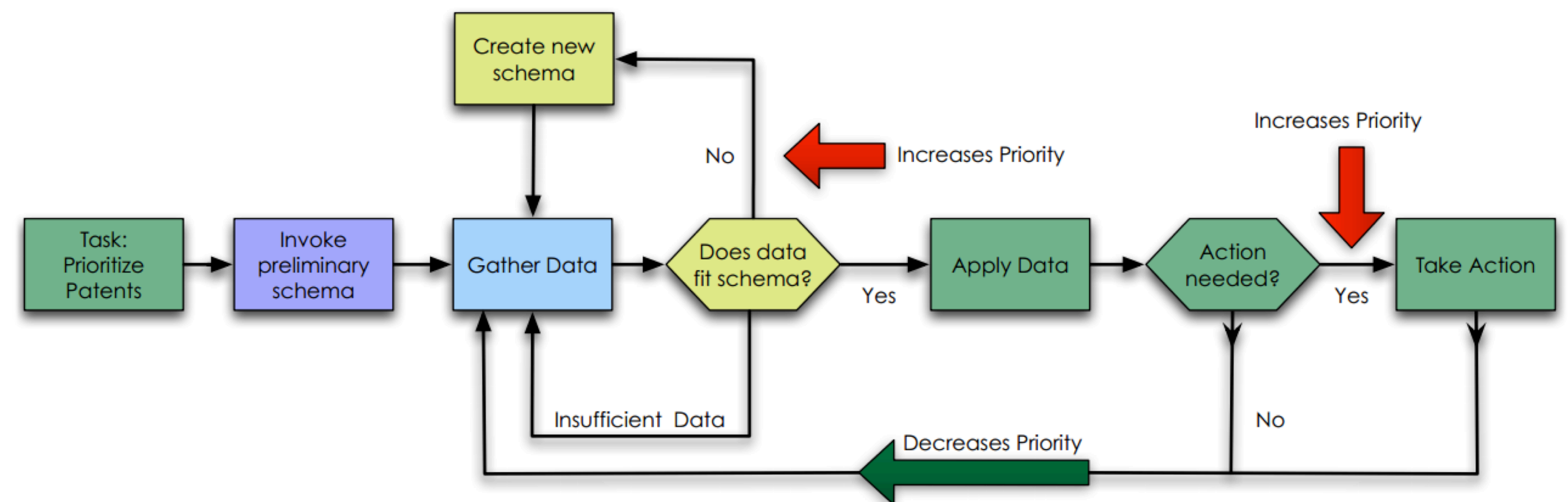


This model provides structure and context to the process of information seeking, and ultimately reduces the cognitive burden required to accomplish a task.

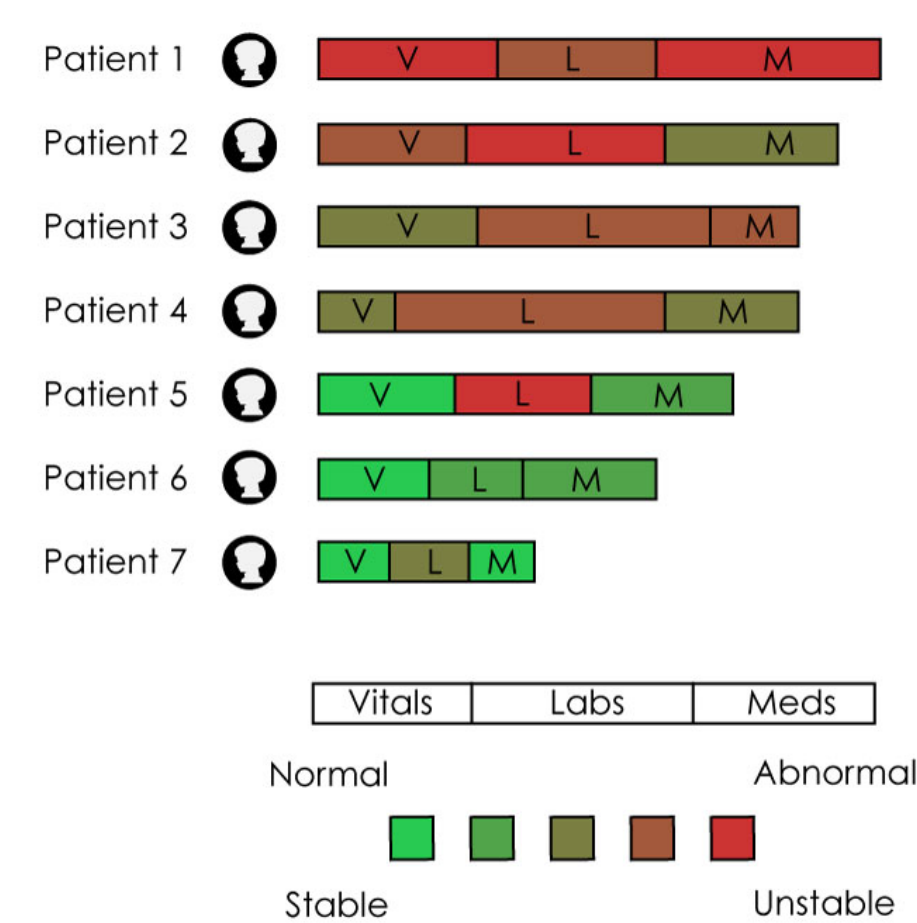
Discussion

Revised Knowledge Crystallization Model

At a high level, the prioritization process used by clinicians models the knowledge crystallization framework. Recognizing and understanding a physician's prioritization process allows us to propose a new model which highlights the importance of patient categorization as a prerequisite for providing care. Our model identifies the value of a physician's use of data in verifying and validating the classification of their patients throughout this process.

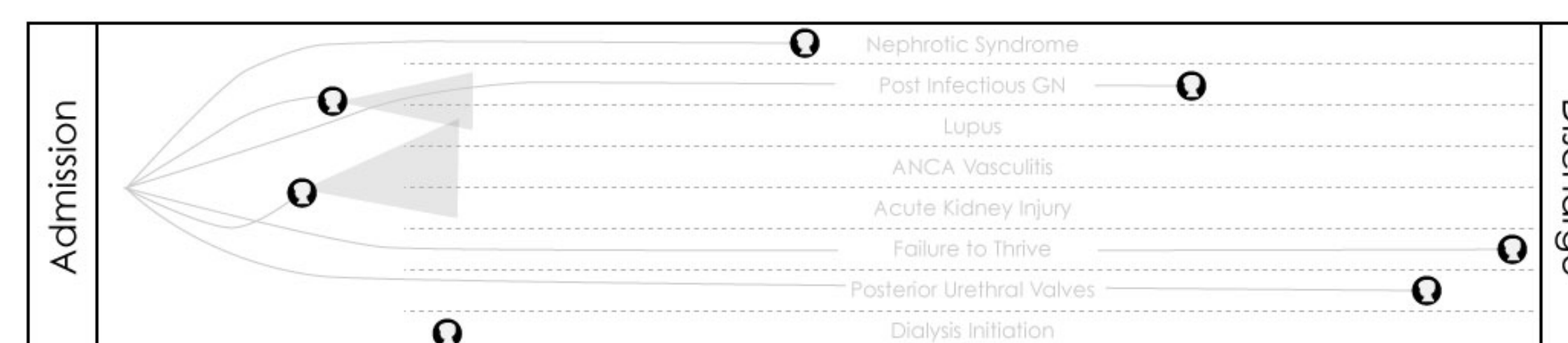


Implications



Physicians expend a significant amount of time and mental effort working with information; understanding the cost structure of information seeking has broad implications in healthcare information systems.

This model can be used to inform information visualization and machine learning applications that improve physician workflows and lead to better patient categorization and prioritization outcomes.



Conclusion

Development of medical information systems should be based on a thorough understanding of clinical knowledge acquisition and processing and the costs of these procedures. Tools designed with these in mind will have a greater capacity to dramatically improve a clinician's ability to streamline their work processes, and provide care for their patients.

Contact Information

apollack@uw.edu, cgtweedy@uw.edu