

Understanding Cognitive Requirements for EHR Design for Primary Care Teams

Laura Farrell, BS,¹ Shimeng Du, MS,¹ Linsey M. Steege, PhD,^{1,2} Randi S. Cartmill, MS,³ Douglas A. Wiegmann, PhD,¹ Amanda E. Hoffmann, MPH,^{3,4} Mica R. Endsley, PhD,⁵ Tosha B. Wetterneck, MD, MS^{1,3}

¹University of Wisconsin-Madison Department of Industrial and Systems Engineering, ²University of Wisconsin-Madison School of Nursing, ³University of Wisconsin School of Medicine and Public Health, ⁴Wisconsin Research and Education Network (WREN), ⁵SA Technologies



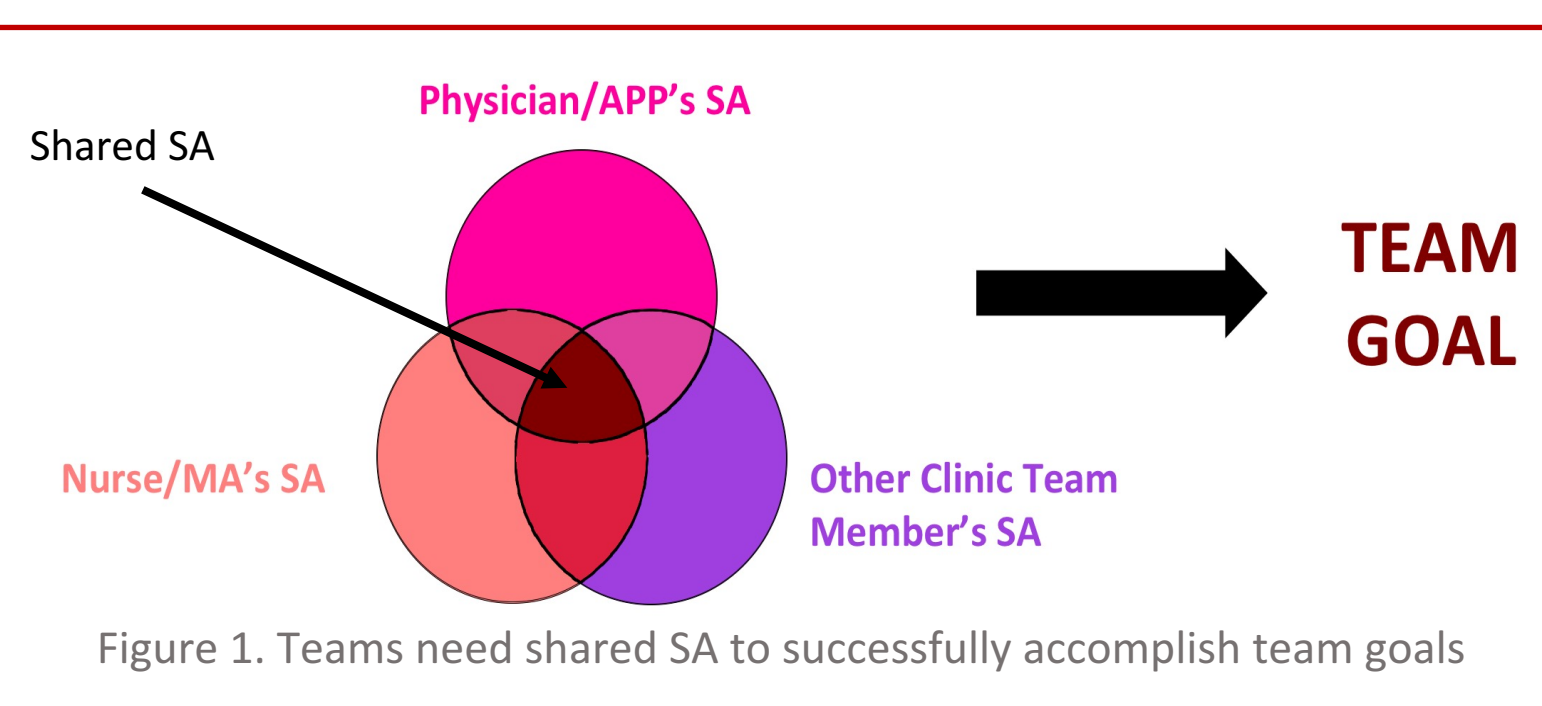
INTRODUCTION

Background

- Electronic Health Records (EHRs) have transformed primary care from face-to-face encounters into technology-mediated team-based activities
- Current EHR design does not provide sufficient support to clinicians' cognitive or workflow processes, including Situation Awareness¹
 - Leads to cognitive overload, diminished team cohesion, and decreased patient care quality²
- Future EHR design needs to support teamwork in primary care through improving clinicians' shared Situation Awareness.

Situation Awareness (SA)³

- SA is how a person understands what is happening around them
 - Key construct of decision making in challenging environments
- Three SA components:
 - Level 1 SA: perception of elements in the environment
 - Level 2 SA: comprehension of their current status
 - Level 3 SA: projection of their future status
- Shared SA: The degree to which team members possess the same SA on shared SA requirements.



Objectives

- Identify goals & information needed to support the cognitive work of primary care teams and individuals working together to deliver patient care
- Present implications for EHR design to support shared SA

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METHOD

Data Collection

- Participants:** Primary care teams from two Midwestern community-based clinics
 - 10 clinics, 20 teams in overall study
- Data collection:**
 - Work observed 2-4 hours each
 - Up to three 90-minute semi-structured interviews on work-related goals and information requirements

Table 1. Number of participants in each clinic

Participants	Clinic A	Clinic B
Core Team Members		
Physician/Advanced Practice Provider (APP)	3	2
Registered Nurse (RN)	2	
Medical Assistant (MA)	3	3
Scheduler/Receptionist	1	1
Unit Clerk	2	
Other Clinic Team Members		
Pharmacist	1	
Social Worker	1	
Diabetes/Health Educator	2	1
Nurse Case Manager	1	
Total	16	7

Data Analysis

Goal-Directed Task Analysis (GDTA)⁴

- Method to assess individual & team member SA requirements
- Goal maps include decisions and SA requirements for each goal
- Data collection and analysis followed an iterative process

Figure 2. Illustration of GDTA map structure

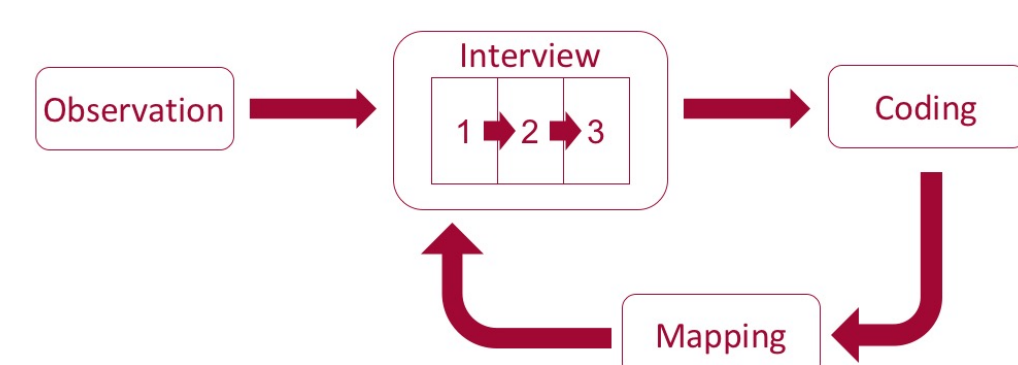
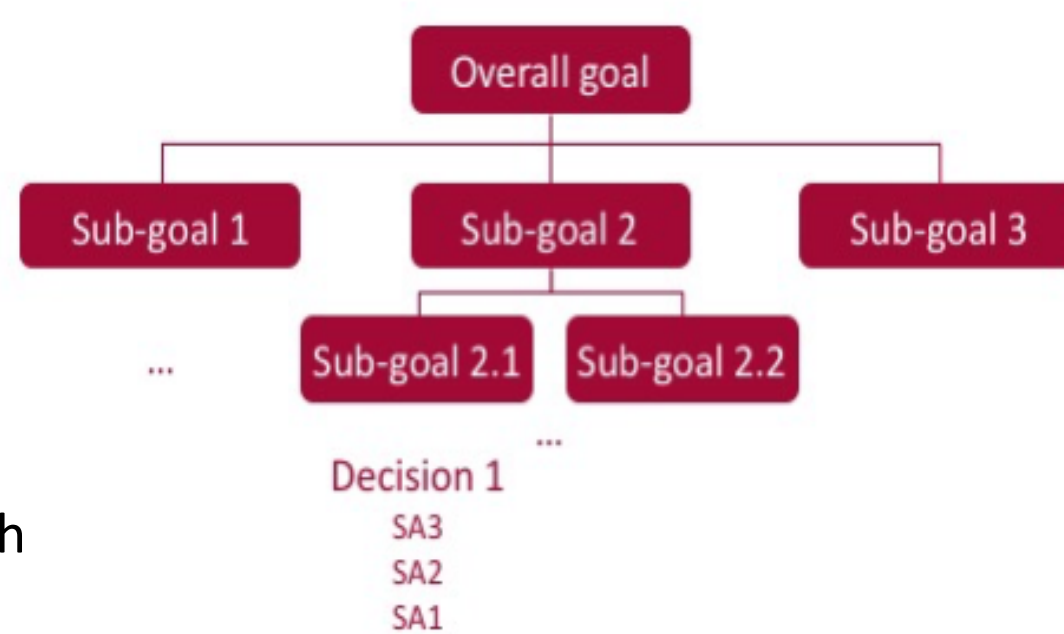


Figure 3. Iterative data collection and analysis process

- Multidisciplinary research team includes experienced human factors engineers, physicians, nurses, and medical informaticists
- GDTA maps were presented at team meetings for validity checks

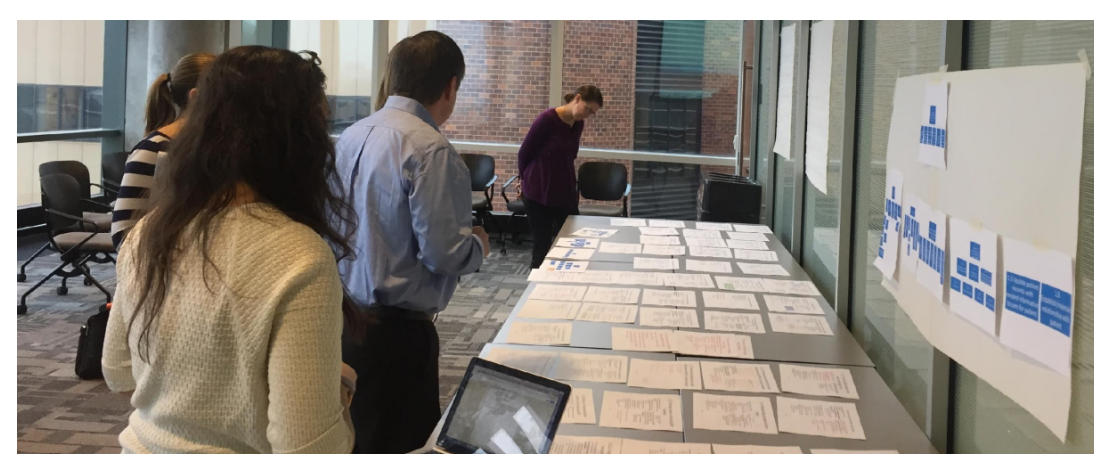


Figure 4. Team meeting to review GDTA maps

RESULTS

- Preliminary overall GDTA map summary:
 - Physician/APP map: 5 top-level goals, 7 second-level subgoals
 - RN/MA map: 5 top-level goals, 26 second-level subgoals
- Overlap in maps is frequent = shared goals, decisions & SA elements
- Example in Table 2 - Shared goal: "Involvement of Other Clinic Team Members in Patient Care"**
 - While SA elements are shared in general, depth & breadth differ
 - Elucidates information requirements for both individual- and team-based tasks

Table 2. Shared SA between Physician/APPs & Nurse/MAs in Decision Making about Involving Other Clinic Team Members (e.g., Case Manager or Health Educator) in Patient Care

	Physician/APP only	Shared SA requirements	Nurse/MA only
Level 3 SA (Projection)		<ul style="list-style-type: none"> Projected benefit in patient ability in self-management of disease 	
Level 2 SA (Comprehension)	<ul style="list-style-type: none"> Severity/Complexity of patient problem Degree of patient compliance with care plan 	<ul style="list-style-type: none"> Continuity of care Patient has uncontrolled disease Availability of other clinic team member in addressing patient needs Urgency of patient issue 	<ul style="list-style-type: none"> Exhausted Physician/APP & Nurse/MA resources Patient's complex psychosocial needs
Level 1 SA (Perception)	<ul style="list-style-type: none"> Patient discharge information Detailed current care plan 	<ul style="list-style-type: none"> Patient reason for visit (RFV) Patient relationship established with other clinic members Patient's preference/request Expertise/program available in patient need area Other clinic team member schedule Test/lab results Medication prescribed Patient's cognitive status Clinic protocol (for chronic disease management & team member involvement) 	<ul style="list-style-type: none"> Physician/APP/nurse schedule Patient has high utilization of care

DISCUSSION

Findings	Implications for EHR design
Identified SA elements needed by Physician/APPs & Nurse/MAs to decide if and when other clinic team members should be involved	EHRs should make these SA elements available to support assessments and decision making processes
Decision making occurs before, during and after a patient visit	EHRs should have information needed for assessments/decisions easily accessible, rather than embedded patient notes
Many overlapping SA elements were identified, indicating shared (team) needs for information to support assessments and decision making in this coordination process	EHRs should make the shared decision making process transparent by allowing each team member to see other team members' decisions EHR interfaces for all clinicians should have a similar structure, to support team discussions when looking at each other's screens
Physician/APPs & Nurse/MAs need to know whether other clinic team members have followed up with their patient, and other clinic team members (e.g. case manager) need to know when to see a patient	EHRs should support communication of coordinated care by allowing clinicians to share the patient visit schedule and review patient notes

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