

Why Do Senior Clinicians Ignore CDSS? A Case for Clinical Sensemaking

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Abstract

Studies have reported relative successes, but incomplete adoption of Clinical Decision Support Systems (CDSS), especially point-of-care references. Recent integration of CDSS references within EHR system enable clinicians to locate conditions and diagnostic information in the care context. While adoption has reportedly increased in these cases, studies have not addressed why many clinicians use these resources less as they advance in practice. The current study presents a cognitive theory drawn from analysis of interview and observation of information activities with medical and surgical clinicians. Analysis suggests differences in clinical expertise and problem solving style shows a meaningful difference in clinical problem solving. Based on theories of sensemaking in cognitive work, the study indicates that these clinicians employ a sensemaking mode to respond to clinical problems, based on repertoire and pattern recognition. Medical students and junior clinicians tend to employ a rote decision making mode, enabled by CDSS tools that optimize rule-based selection from option sets. These findings suggest that adaptive informatics modes might be employed to better serve all cognitive styles.

Keywords: Sensemaking, Decision Making, Clinical Decision Support Systems, Clinical cognition

Introduction

Clinical decision support systems (CDSS) are emerging at the point of care as intermediary applications that directly augment clinical interaction associated with the patient record [1]. While a range of CDSS resources exist, we focus on clinical reference information systems in particular. While available for over a decade in Web-based and handheld forms, CDSS are now integrated with the patient record as EHR assistants. The principle guiding this integration is actuating *information in context*, enabling the clinician instant access to drug or diagnostic test information from a preferred CDSS database when a question arises, prompted by values in the patient record. It is presumed that this

functionality will increase practitioner satisfaction with and utilization of EHR products.

The literature presents an inconsistent body of findings regarding the true effectiveness and appreciation of CDSS at the point of care [2,3]. For example, systematic reviews and studies of the effects of CDSS use on clinical performance report significant positive findings with use of early-stage information technology [4]. In most cases, these studies should be considered a snapshot of the state of the art of the time.

Caveats are presented in the conclusions of these reviews suggesting the improvement of study design, and that the consideration of patient outcomes, not just clinician satisfaction or decision outcomes. The current study presents a cognitive hypothesis that may explain variances in clinician uses and satisfaction, but moreover presents a novel way to formulate information at the point of a care decision.

Methods

The current research was based on a series of 35 in-depth interviews with attending physicians, surgeons, and senior residents at 12 large healthcare institutions in 3 North American cities. The primary purpose of the research was to investigate the current information resources used by senior specialists and surgeons, and to evaluate the effectiveness of clinical informatics resources in practice to identify gaps in information practices. Research protocols were structured to evaluate current, commercially available informatics tools reported by clinicians and to understand the factors influencing their preference, use, and adoption. A semi-structured interview protocol was designed and tested with pilot participants, and was used in all clinician interviews. In the interviews, relevant informatics tools were identified and evaluated by following an interactive cognitive walkthrough protocol. Similar in method to usability testing, interactive interviews were video recorded from the computer screen to assist analysis of responses to informatics content. Sessions were further supported by field notes and transcripts.

Results

Responses from clinicians in multiple specialties were analyzed to characterize information practices. Analysis revealed that practicing clinicians show qualitative differences in clinical activity and relevant information demand, compared to the information resources and formats available in most cases at the point of care. The difference in information use was especially pronounced between senior clinicians and residents, yet differences can be characterized based on the differences in intended uses of information.

Senior clinicians have a deeply-established repertoire based on thousands of patient cases encountered over their history of practice, and they have an established base of clinical understanding to employ in problem solving. Surgeons and senior medical clinicians may not have similar content demands, as their practice questions differ. Their information seeking cognitive tasks were found to be similar when analyzed from a cognitive work perspective. Comments such as the following from an orthopaedic surgeon were typical, reflecting significant time constraints for CDSS use:

“I use (unnamed), but their service is not comprehensive. I’ve wasted 3 minutes, when I only have 5 minutes to find what I’m looking for. This is typical. Thirty minutes between cases, if it’s a new case you’ve never seen the patient before, you have to know treatments, outcomes.”

Practicing clinicians (nurses and physicians) require a supplementation to their working repertoire, rather than the structured facts and topics from a CDSS to make decisions in care. While a demand for new facts exists, especially for atypical presentations and diagnoses, the expert’s use of information was found to supplement an existing deep repertoire of clinical knowledge. The problematic patient presentation will not be addressed by an information-supported decision but by referral to another clinician with a known repertoire requisite to the problem.

Both residents and experts are faced with time contingencies, but residents are in training and support learning with multiple information tools. Residents in a specialty are developing repertoires of cases and knowledge, and require in-depth, frequent access to procedures, diagnostics, lab report interpretation, and drug information. In brief, the cognitive tasks and information needs of the trainee match the characteristics of current CDSS resources.

Some studies suggest that CDSS and other advanced informatics are used less by senior clinicians due to differences in computer familiarity, generational preference and age. We found senior clinicians often used different resources, and for different purposes than trainees. Surgeons used the primary medical literature for review and primary articles for clinical requirements but not general references. Residents

often located conditions, diagnostics, therapies, and drug interactions. The latter represent the typical content provided by CDSS databases in the study.

Senior clinicians reported infrequent use of general CDSS resources (e.g. UpToDate, Micromedex), as they expressed less need for the content (diagnostics, procedural steps, drug data, and lab interpretations) these resources provide. Unsurprisingly, senior clinicians reported that their use of these CDSS tools declined throughout and after residency. They learned from their own case experience, having established a repertoire, requiring supplementation but not continual information seeking using a CDSS tool. This change in information practice is consistent with recent experiments showing that senior clinicians use a decision making style identified as conscious reasoning for complex diagnostic problems [5], a process of supplementing or activating the scaffolds of long-term memory patterns.

Distributed cognitive work may hide this process, as senior physicians have professional trainee staff that perform common information tasks as needs arise. Information tasks are easily delegated, as simple questions are readily answered. In clinical contexts, questions are often answered by knowledgeable and trusted colleagues rather than by CDSS resources.

Discussion

The findings suggest a systematic rationale for the observation that might explain the variability among studies finding that CDSS resources can improve performance but are not used frequently by clinicians at the point of care. To date, studies explain this variance by suggesting that CDSS use is not yet established within clinical “workflow”[1], that interfaces are insufficiently easy to use, and that the EHR may not be a conducive context for clinical problem solving, even if helpful information were provided at the point of care. One of the most significant recommendations is that information must be as specific as possible to the context of care, a guiding rationale for the Infobutton model [6]. Yet an overlooked factor of context itself may be of issue.

Differences in expert versus trainee problem solving may explain differences and help informatics researchers design and evaluate improved resources. Field studies (naturalistic or ethnographic) of clinical team performance in acute care [7], emergency room, and critical care operations [8] emphasize that care is performed as an integrated team effort, often described in terms of distributed cognition [9]. The distributed nature of technical clinical work obscures systematic differences in information behavior.

While distributed cognitive work enables teams to perform effectively by sharing artifacts (including

CDSS) and procedural knowledge, distributed work also hides differences between experts and trainees. Yet supporting these differences may necessitate that different informatics resources are available for the requisite cognitive and clinical demands of both.

Furthermore, prior studies showing effectiveness of CDSS resources reveals that informatics research participants are usually residents or interns, generally trainees. They are clinicians with a mandate to deepen their learning of the “canon.”

As clinicians progress in a career, they show less need for a CDSS; usability and content may not result in increased use. Two cognitive mode differences can be characterized: Clinical decision making, the task supported by CDSS tools, and clinical sensemaking, the orientation to problem solving characteristic of experts. Decision making selects an optimal choice from a field of options presented in response to a case. As trainees will not yet have a deep repertoire (roughly 1000 or more cases) from which to make self-informed judgments, they are obligated by training and liability to formulate decisions supported by evidence, rules, and best practices as documented and organized in current informatics resources.

In contrast, clinical sensemaking is an expert problem solving modality. Sensemaking [9] involves the assimilation of multiple streams of information, using experience to resolve gaps in situation awareness, and accommodating (not necessarily resolving) ambiguity. Experts rely on literature because they must resolve more complex problems, not addressed by general resources, to help “make sense” of a situation. From an information seeking perspective sensemaking attempts to inform and respond to the possibilities and constraints in an emerging situation. In clinical sensemaking, experts recognize the salient cues of an emergent or novel problem, drawing on a deep repertoire of relevant patterns, mentally testing alternatives, and identifying possible actions. To an observer, sensemaking appears “intuitive,” but it can be considered a holistic, skilled response by an expert. While other (junior) clinicians also engage in sensemaking, their obligation to the canons of practice prevent them from practicing (or informing) beyond the constraints of institutional guidelines.

Conclusion

Healthcare informatics currently are not designed for a clinical sensemaking context. A decision making paradigm may prove insufficient in current and future CDSS resources. From an informatics design perspective, clinical cognition should not be supported solely from a “workflow” perspective, as this assumes clinicians follow a stepwise pattern. There are well-known differences between explicit workflow and the natural flow of work practices [7].

Currently, clinicians rely on published research and other expert colleagues to aid in the sensemaking necessary to respond to and situations not addressed by the institutional canon. We suggest that new forms of sensemaking media may be designed and introduced into the clinical information ecology to enable clinical experts to more readily formulate and test the working theories and possible outcomes for critical clinical situations. Informatics research should also consider the possibility of recording and explicitly justifying sensemaking practices to enhance the development of junior clinicians. Further research on expert sensemaking is called for to inform new approaches to sensemaking informatics.

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