Information Behavior and Workplace Procedures: The Case of Emergency-Department Triage

Morten Hertzum

University of Copenhagen, Copenhagen, Denmark, hertzum@hum.ku.dk

Abstract. In workplace contexts the performance of many information tasks is prescribed in procedures. Knowledge of the relationship between workplace procedures and actors' real information behavior is important to understanding information behavior. We explore this relationship by looking at how emergency clinicians' information behavior relates to clinical triage guidelines.

Keywords: information behavior, information seeking, workplace procedures, healthcare

Introduction

The information behavior of professionals such as engineers, lawyers, and medical physicians has been researched extensively (Case, 2012). Yet, this research tends to detach the professionals' information behavior from their engineering work, legal work, and medical work. As a consequence the work-domain characteristics, organizational structures, local conditions, and other properties of the workplace merely loom in the background. For example, Reddy and Jansen's (2008) model for "understanding collaborative information behavior in context" was developed on the basis of an empirical study of two healthcare teams but is devoid of information specific to the healthcare context. The model describes information behavior at such a distance from the medical work that the information behavior is dissociated from the clinical knowledge, procedures, and particulars that determine how the two healthcare teams go about the treatment of their patients. This dissociation appears noteworthy – but it has the strength that it increases the scope of application of the model. In this paper we explore the potential return on embracing more of the workplace specifics in studies of information behavior. Specifically, we explore the relationship between emergency clinicians' information behavior and clinical guidelines for patient triage.

Research on information behavior has investigated how tasks influence information behavior through their level of complexity, importance, and urgency (e.g., Agarwal et al., 2011; Byström & Järvelin, 1995; Vakkari, 2003). The introduction of the task as a variable in explaining variation in information behavior is an important step toward embracing aspects of the workplace context. Many tasks are not merely simple or complex, inconsequential or important, stress-free or urgent but also regulated by procedures. Such procedures may be developed at the workplace in response to local conditions, instituted by national agencies to obtain standardization, or recommended by international societies as best practice. A procedure prescribes the way in which a task should be performed, including – when relevant – the information to be obtained and the criteria for assessing it. While the procedure prescribes what the workplace has decided should be happening whenever the task is performed, the information behavior describes what the actors really do in performing the task, see Figure 1. Knowledge of the relationship between workplace procedures and information behavior is important to understanding information behavior (Hertzum & Reddy, 2015).

In this paper we focus on the information behavior of emergency clinicians when they assess newly arrived patients. This assessment, known as triage, is governed by clinical guidelines. Empirically, the

paper is based on a longitudinal study of the emergency departments (EDs) in Region Zealand, one of the five healthcare regions in Denmark. The study concerned the design, introduction, and evaluation of electronic whiteboards in the EDs. During the project we observed the work in two EDs for about 210 hours to build an understanding of it and assess the effects of the electronic whiteboards (e.g., Hertzum & Reddy, 2015; Hertzum & Simonsen, 2015; Hertzum & Simonsen, 2016).
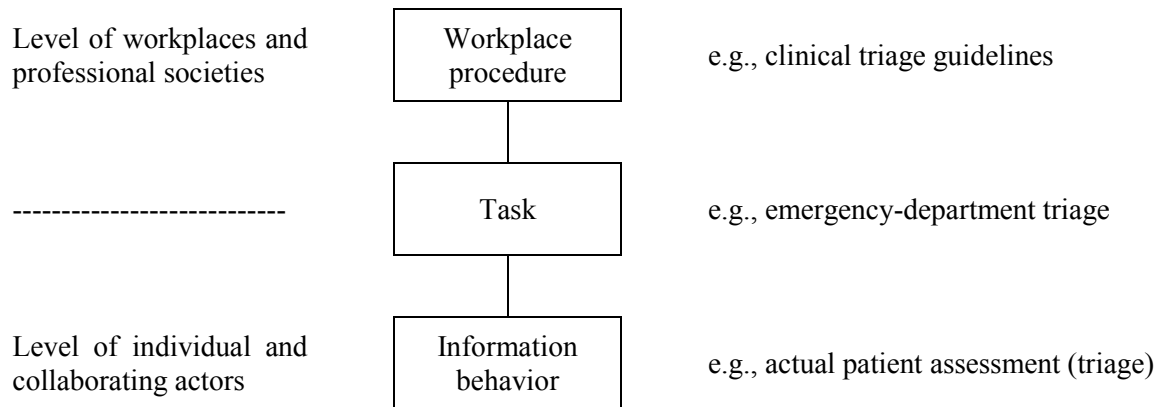
Level of workplaces and professional societies | Workplace procedure | e.g., clinical triage guidelines

-------------------------- | Task | e.g., emergency-department triage

Level of individual and collaborating actors | Information behavior | e.g., actual patient assessment (triage)

Figure 1. Tasks as the link between procedures and information behavior.

Clinical guidelines and emergency-department triage

Clinical guidelines are systematically developed statements to assist practitioner decisions about the appropriate healthcare for specific clinical circumstances. Studies of the use of guidelines mostly find that they improve practice. For example, Grimshaw and Russell (1993) reviewed 59 studies of the use of guidelines and found that guidelines improved the process of treatment in 55 of the studies. In spite of the strong evidence in favor of the use of guidelines, studies repeatedly show that it is difficult to change clinician behavior into complying with guidelines (Grol & Grimshaw, 2003). The most effective strategies for implementing guidelines tend to have multiple components, rather than to rely on a single component such as either training, information, or audit (Francke et al., 2008).

At EDs, clinical triage guidelines serve the important purpose of quickly and accurately prioritizing patients by determining how urgently each patient needs care. Prioritization is especially valuable for patients with potentially serious complaints, such as chest pain, because it may be vital for these patients to receive treatment quickly, because unnecessarily admitted patients may draw resources away from severe cases, and because many ED physicians choose to err on the side of caution by admitting too many patients. Triage involves that ED clinicians continuously seek information especially about the condition of the newly arrived patients but also about the other patients because their condition may change dynamically. While individual clinicians may obtain this information for different patients, it must be collaboratively grounded in a manner that allows for patient prioritization. The triage guidelines should provide this grounding by establishing common criteria for the assessment of the patients. In addition, the triage guidelines must be resource-efficient to use because each of the EDs that we studied received about 40,000 patients a year.

Figure 2 shows the triage procedure, which results in characterizing the triaged patient with one of five triage levels: red (life threatening), orange (seriously ill), yellow (ill), green (in need of assessment), or blue (fast track). The triage level is determined by assessing the patient's airways, breathing, circulation, disability, and exposure (the ABCDE approach). For each of these five areas, the procedure specifies the information to be obtained and the threshold values against which to interpret it. For example, the circulation category includes the heart rate with the threshold values, from most to least severe: (1) above 130 beats per minute, (2) above 120 or below 40, (3) above 110 or below 50, (4) between 50 and 110, and (5) no threshold specified. This way, the triage procedure standardizes

the information seeking involved in determining the urgency of a patient's condition. For red and orange patients the procedure also quantifies how quickly the patient must be seen by a clinician.
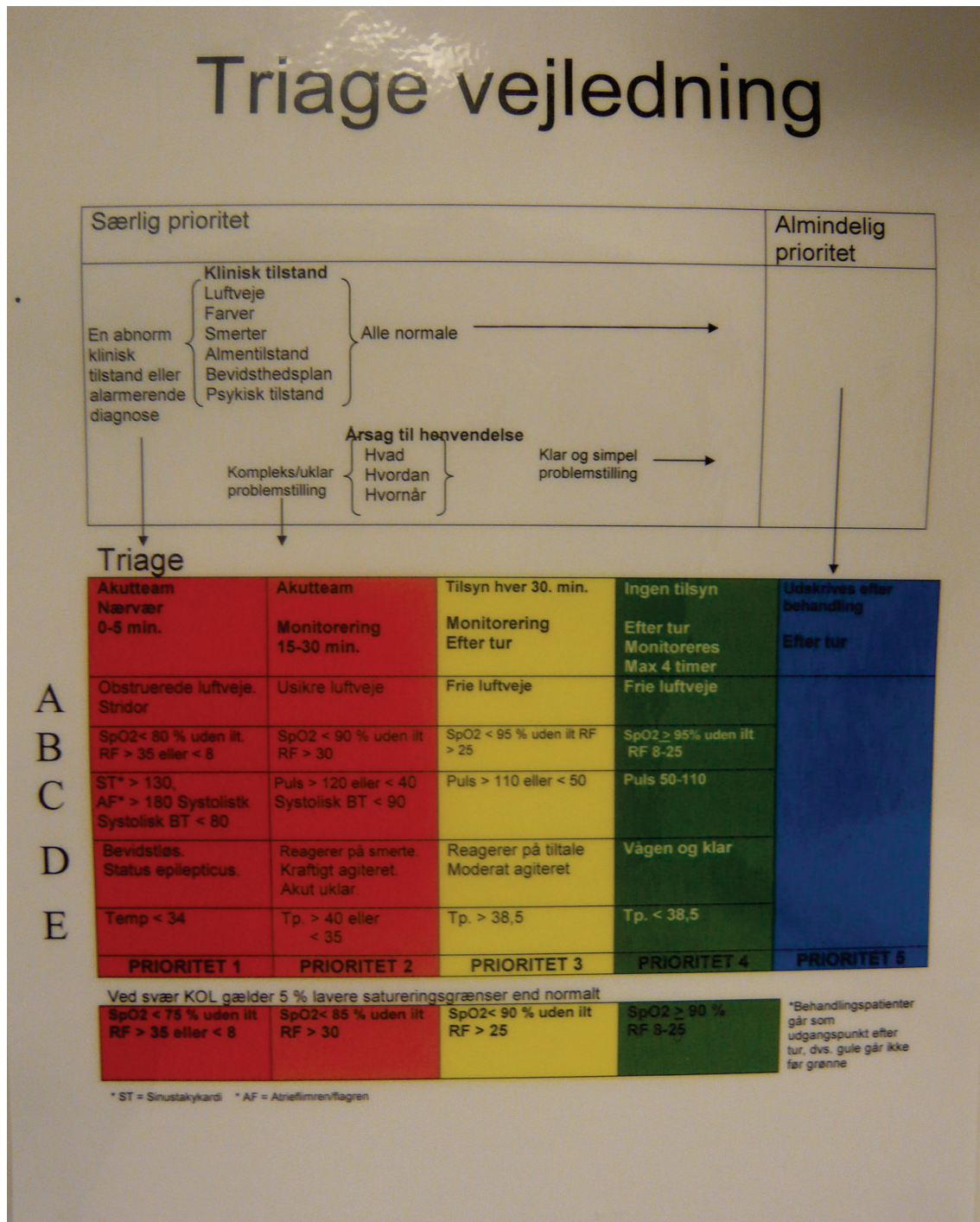

Figure 2. The ED triage procedure (in Danish).

In spite of the specific triage criteria the patients at the studied EDs were often triaged on the basis of a more holistic impression of their condition. Triage decisions were often based on information that was incomplete or collected by others, and they were often changed by merely glancing at the patient:

It is announced that the paramedics are en route with a patient who has fallen in her home. The patient's blood pressure is worryingly low. Before the patient arrives the coordinating nurse selects Room 10 for the

patient, sets the triage level to red, and finds a nurse and physician for the patient. [Seven minutes later] the patient arrives and the patient, nurse, and physician immediately enter Room 10. As they go to Room 10, the coordinating nurse records the patient on the whiteboard and triages her as orange. [Nov 5, 2010, at 13:00]

The change in triage level from red to orange resulted from the additional information that became available to the coordinating nurse upon seeing the patient for herself. This information added to the information she had been able to obtain from the paramedics prior to their arrival with the patient, but it did not include explicit application of any of the criteria in the triage procedure. It appears that the coordinating nurse rather became more confident than more evidence-based in her revised assessment of the patient.

In another instance a patient had already been triaged by an ED physician but the coordinating nurse came to a different conclusion, even though both clinicians expressed their assessment of the patient in terms of a triage level defined in the triage procedure:

A physician has just triaged the newly arrived patient in Room 10. In passing the control desk the physician says to the coordinating nurse that "Room 10 is yellow/orange". The coordinating nurse nods and records the patient's triage level on the whiteboard. The coordinating nurse is now looking for a physician and nurse to examine the patient in Room 10. She enters Room 1 to ask whether the physician or nurse in there can take Room 10. They cannot. The coordinating nurse briefly visits Room 10. As she returns to the control desk, she says that the patient "is red; he is shaking". [May 11, 2011, at 10:30]

The evidence ("he is shaking") volunteered by the coordinating nurse as she returned to the control desk was not directed at anyone in particular but it was also not reflecting any of the criteria in the triage procedure. It appears, again, that the triage level conveyed her holistic impression of the patient's condition rather than the application of the triage procedure as such. In general, differences in the triage level assigned to the same patient by different clinicians were not perceived as errors in the application of the triage procedure but as variations in professional judgement. It was not uncommon that the physicians assigned lower triage levels than the nurses.

Discussion

Clinical guidelines may be harmful if they include recommendations that are wrong or if the clinicians find the guidelines complex and inconvenient to use. This does not appear to be the case with the triage procedure. Rather, the triage of the patients appears to exemplify a tension between the application of guidelines and of clinical discretion. If applied too rigidly the triage procedure may replace the application of appropriate clinical discretion and lead to an information behavior that fails to appreciate the particulars of the individual patient. If applied too loosely the triage procedure may fail its purpose of focusing clinical attention on the most critical information and lead to an information behavior in which any piece of information may potentially drive a triage decision. This way, the triage procedure, which was prominently displayed in the EDs, raises interesting questions about the clinicians' information behavior. These questions include:

- Did the clinicians recognize that their information behavior was not compliant with the procedure?
- Were the clinicians supposed to behave in the rule-following manner the procedure prescribed?
- Were the clinicians confident that their information behavior resulted in quality triage?
- Did the clinicians' triage decisions exercise information not mentioned in the procedure?
- Could the procedure be rewritten to provide better support for the clinicians' information behavior?

The relationship between the triage procedure and the clinicians' information behavior can be seen as an instance of the relationship between plans and situated action (Suchman, 2007). Whereas Suchman shows that plans are under-specified compared to the richness of the concrete situations in which people act, the triage procedure appears at risk of over-specifying the clinicians' information behavior. If the procedure is taken literally, it leaves little room for clinical discretion. The two possibilities of over- and under-specification span one dimension along which to investigate the relationship between information behavior and workplace procedures. Another interesting dimension is spanned by whether gaps between procedures and information behavior are perceived as unwelcome deviations or indicators of skill-based expert behavior.

References

Agarwal, N. K., Xu, Y., & Poo, D. C. C. (2011). A context-based investigation into source use by information seekers. *Journal of the American Society for Information Science and Technology, 62*(6), 1087-1104.

Byström, K., & Järvelin, K. (1995). Task complexity affects information seeking and use. *Information Processing & Management, 31*(2), 191-213.

Case, D. O. (2012). *Looking for information: A survey of research on information seeking, needs and behavior* (3rd ed.). Bingley, UK: Emerald.

Francke, A. L., Smit, M. C., de Veer, A. J. E., & Mistiaen, P. (2008). Factors influencing the implementation of clinical guidelines for health care professionals: A systematic meta-review. *BMC Medical Informatics and Decision Making, 8*(Article 38), 1-11.

Grimshaw, J. M., & Russell, I. T. (1993). Effect of clinical guidelines on medical practice: A systematic review of rigorous evaluations. *Lancet, 342*(8883), 1317-1322.

Grol, R., & Grimshaw, J. (2003). From best evidence to best practice: Effective implementation of change in patients' care. *Lancet, 362*(9391), 1225-1230.

Hertzum, M., & Reddy, M. (2015). Procedures and collaborative information seeking: A study of emergency departments. In P. Hansen, C. Shah & C.-P. Klas (Eds.), *Collaborative Information Seeking: Best Practices, New Domains and New Thoughts* (pp. 55-71). Berlin: Springer.

Hertzum, M., & Simonsen, J. (2015). Visual overview, oral detail: The use of an emergency-department whiteboard. *International Journal of Human-Computer Studies, 82*, 21-30.

Hertzum, M., & Simonsen, J. (2016). Effects of electronic emergency-department whiteboards on clinicians' time distribution and mental workload. *Health Informatics Journal, 22*(1), 3-20.

Reddy, M., & Jansen, B. J. (2008). A model for understanding collaborative information behavior in context: A study of two healthcare teams. *Information Processing & Management, 44*(1), 256-273.

Suchman, L. A. (2007). *Human-machine reconfigurations: Plans and situated action, 2nd edition*. Cambridge, UK: Cambridge University Press.

Vakkari, P. (2003). Task-based information searching. *Annual Review of Information Science and Technology, 37*, 413-464.