Information Behavior in the Context of Improving Patient Safety

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Although it is assumed that information about patient safety and adverse events will be used for improvement and organizational learning, we know little about how this actually happens in patient care settings. This study examines how organizational and professional practices and beliefs related to patient safety influence (1) how health care providers and managers make sense of patient safety risks and adverse events, and (2) the flow and use of information for making improvements. The research is based on an ethnographic case study of a medical unit in a large tertiary care hospital in Canada. The study found that front-line staff are task driven, coping with heavy workloads that limit their attention to and recognition of potential information needs and knowledge gaps. However, a surrogate in an information-related role—an "information/change agent"—may intervene successfully with staff and engage in preventive maintenance and repair of routines. The article discusses four key functions of the information/change agent (i.e., boundary spanner, information seeker, knowledge translator, and change champion) in the context of situated practice and learning. All four functions are important for facilitating changes to practice, routines, and the work environment to improve patient safety.

Introduction

Over the last 15 years there has been a growing surge of interest in the topics of patient safety and the incidence of hospital-related injuries and adverse events. Researchers have estimated that in approximately 3% to 16% of inpatient admissions some form of medically related injury occurs and that half those injuries are preventable (Baker & Norton, 2001; Brennan et al., 1991; Leape et al., 1991; Thomas et al., 2000; Vincent, Neale, & Woloshynowych, 2001). In 2001, the Agency for Healthcare Research and Quality set out a challenge in the form of a research agenda for improving patient safety and learning from medical errors. The agenda includes two questions that are directly related to information behavior in clinical settings: "How can useful information be provided to those who can act (e.g., consumers, providers and provider organizations, purchasers, states, and oversight organizations)?" and "How can we encourage the adoption and use of safety information?" (Meyer, Foster, Christup, & Eisenberg, 2001, p. xvi).

To answer these questions we must first understand how information about risks to patient safety and adverse events is perceived and handled in health care organizations. How *do* health care providers make sense of and use such information as part of their day-to-day work? This article presents a case study of the flow of information in a patient care unit in an acute care hospital and highlights the functions of an information/change agent involved in surrogate information activity. The information needs of front-line staff may be latent, and staff may not recognize their potential knowledge gaps related to patient safety, which can contribute to the erosion of procedures and routines. To counter this, a surrogate in an information-related role, or an information/change agent, may carry out four functions (boundary spanner, information seeker, knowledge translator, and change champion) in the preventive maintenance and repair of the routines. The first part of the article describes the roles involved and explains some of the factors that facilitate health care providers' use of information to make improvements in the safety of patient care processes. The second part presents six significant themes that run through the discourses of the study participants, which complicate the information behaviors related to improving patient safety. The implications of these themes are then discussed in the context of situated practice and learning.

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Background

Our aim was to develop an in-depth understanding of the beliefs, values, and practices about change, patient safety, adverse events, and information; the way information about adverse events, near misses, and risks is perceived and managed in the unit; and the internal and external information resources that are used. These questions were explored from the vantage point of the clinicians and managers working in an acute care hospital unit. The ethnographic case study combined observation of work on the floor and meetings over a 7-month period, interviews, and document review.

The unit, located in a large urban teaching hospital in Canada, had almost 40 beds, and the staff cared for a mix of general medicine and geriatric patients. As a tertiary level health care organization, the hospital tends to handle a larger proportion of complex, difficult cases that require more specialized care and services from a diverse array of health care professionals. The more complex the care processes are, the more scope there is for the hospital to have experience with patient safety issues, adverse outcomes, and near misses related to medical management (Berwick, 1998, 1999; Bogner, 1994; Spath, 2000).

Methods

This article is based on doctoral dissertation research, so we shift voice to the first-person singular to explain the field work, analysis, and interpretation of the first author.

Interviews

In-depth interviews provided crucial insights from a full array of clinicians and managers (including nurses, allied health professionals, and physicians) directly linked to the unit. The first set of interviews focused on practices related to patient safety, information, and learning and improvement, using a semistructured interview protocol (see MacIntosh-Murray, 2003, for all the interview guides) to allow maximal flexibility for participants' responses (Kvale, 1996; Lofland & Lofland, 1995; Wengraf, 2001). Between additional periods of observation, the second interviews focused on adverse events and error. Attending meetings and observing discussions between interviews informed the evolving picture and the approach to the questions as I made frequent iterations of coding, analysis, and memo writing.

Because of our specific interest in the way staff thought about patient safety risks and handled them, I used critical incident technique (Chell, 1998). Participants were asked to tell stories of situations involving an adverse event, one they thought was handled well and one they thought was not handled well. Likewise, they were asked for an example of a change implemented on the unit that they thought worked well and one they thought had not worked well. This approach elicited a variety of incidents and stories, ranging from near misses with no adverse outcome to two stories involving the death of a patient. Participants' descriptions of the incidents and changes and the ways they were handled provided the basis for the portrayal of their views of how the incident identification, follow-up, and improvement processes worked, as well as the associated information flows.

Twenty-six individuals participated in a total of 39 interviews (ranging from 35 minutes to almost 2 hours), most of which were tape-recorded. I transcribed all interviews and field notes and downloaded the files into ATLAS.ti (qualitative analysis software) for data management.

Observation

I spent time on site observing meetings and daily activities, in order to build firsthand impressions of the practices and information behaviors over time. I attended morning staff meetings, patient care rounds, quality improvement committee and managers' committee meetings, and a quality improvement workshop. Detailed notes described the communication and decision processes, procedures followed, the emotional tenor of the discussions, types of information considered and used, and outcomes. Whenever possible, the participants' comments were recorded verbatim.

Document Review

I reviewed various documents, including the quality committee terms of reference, minutes, and reports; blank incident reporting forms; organizational charts for the unit and the division of which it was a part; issues of the hospital's newsletter produced during the duration of the study; and resource material produced by the chief nursing officer's staff about the hospital and nursing mission, vision, and values and about nursing objectives and standards. I also reviewed the material available online from the College of Nurses of Ontario about their quality assurance program, including the competency review and self-assessment tools. I used the documents to gain a sense of the context and language used and to trace the linkages of discourses related to key themes.

Analysis

I began the coding with grounded theory in mind, reading through transcripts and texts in successive iterations to identify concepts that I then indexed by using the respondents' own terms from the text and codes I created (Seale, 1999; Strauss & Corbin, 1998). As the analysis proceeded, I continued to scan theory and methods literature for ideas that would help me make sense of the emerging themes and concepts. I amended my initial grounded theory approach and began to take a more discourse-analytical view of the data (Phillips & Hardy, 2002; Potter & Wetherell, 1987; Wetherell, Taylor, & Yates, 2001). The language and practices of the participants moved to the forefront as I looked for the patterns in the language in use (Taylor, 2001).

As I coded, I created analytic memos and theoretical notes, with commentary about emerging themes, anomalies or inconsistencies, and relationships (Miles & Huberman, 1994; Strauss & Corbin, 1998). This method also helped me

cluster like codes in categories and subgroup them in code trees. I created diagrams for each main topic and moved the subgroupings around to place like with like and highlight contrasting codes (Miles & Huberman, 1994). After many iterations, over time this resulted in clusters of codes under the key topics: space and layout, knowing the patient, and a typical day; adverse events and patient safety; quality improvement and making changes; and information pathways. I then wrote portrayals (Piantanida & Garman, 1999) related to each topic, building from the specific codes and quotes, and created diagrams to depict the nurses' work cycle of knowing the patients and the information roles (see MacIntosh-Murray, 2003).

Findings

Although it is called a patient care unit, in many senses it is a nursing unit, in that it is the nurses who are the most constant presence, spending virtually all their shifts there. All the other staff have offices off the unit or are based elsewhere and go to the floor for varying parts of the day. The nurses were the largest group of study participants, and a more coherent pattern and fuller picture emerged as the interviews and observation progressed. Consequently, we will focus on the interplay between the nurses' activities and the functions of their practice leader/educator.

Information to Support Nurses' Work of "Knowing the Patient"

There are several striking and interrelated concepts in the stories the nurses told about their work and work environment. One such concept is "knowing the patient," which is a continuous and subtle process intertwined with the steps and tasks of providing care (Whittemore, 2000). It describes both a form of knowledge (tacit and explicit) as well as the ways of building and sharing the knowledge and information. It is important not only because it allows the nurses to do the work of caring for the patients, but also because it appears to be a criterion they use to weigh the value of information sources. As will be described, if a source or channel helps with the work of knowing the patient, the nurses may adopt it more readily.

The work of "knowing the patient" can be visualized as a cycle of iterative steps. The nurses begin to know patients at the beginning of the shift by attending intershift report, in which they hear pertinent highlights about all patients on the unit. They get more detail about their assigned patients by reading their charts and by doing assessments, so they can carry out their clinical and personal care tasks. This procedure also gives them a baseline knowledge of the patients so they can monitor for changes or risks. The knowledge is often tacit; they cannot explain it specifically ("something isn't right," "doesn't look good," "aura") and it is based on experience and judgment. By contrast, clinical skills and training help them to articulate to others explicit knowledge of "what to look for" ("a quick verbal") so they can cover their patients when one nurse goes for a break.

This circle of iterative steps unfolds in the context of the nurses' typical heavy days and is multiplied by their normal patient assignment. It is easy to see why the nurses become task driven, trying to complete the cycles within the time allotted in one shift. They deal with multiple tasks and frequent interruptions, such as making and taking phone calls about tests, intravenous (IV) lines, and consultations. They spoke of trying to "catch" the doctors whenever they appeared on the floor, to alert them to changes in patients' condition, to ask them questions, and to suggest medication changes.

The nurses appear to prefer *aural* and *oral* communication, perhaps because it is a more efficient and timely way to give and receive information that helps them know the patients. Although it involves time-consuming writing and reading, charting in the patient records is part of the circle because it is an expected standard of practice. They use the computers on the unit mainly to enter workload measurement data and patients' blood test results. Although some also used the hospital intranet for access to policies and procedures, several indicated that they used the computers as little as possible and preferred to ask colleagues or use hard copies of documents. When it was first implemented, the nurses complained about the intershift report and the extra written work it involved, until they began to appreciate the "gathering" and the "interaction," in other words, the aural communication. Now they say it is working because it helps them all know the patients. Voice mail has not yet become part of the cycle's routines. They know they are supposed to check their voice mail but often do not because they are too busy and because they know that "if it's important, staff will tell them." Consequently, voice mail boxes are often full and accounts are deactivated as a result of lack of use.

The morning staff meeting, hovering at the edge of the circle, provokes a mixed reaction. There is acknowledgment that the morning meeting is needed for communicating important general information, but it cuts into precious patient care time. So, although it is aural information, it is not always directly helpful for knowing the patients. The Internet and e-mail do not even appear near the circle; they are not aural and do not directly facilitate knowing the patients, so perhaps they are not worth the time or effort. Unlike all the other disciplines, few of these staff nurses used voice mail and even fewer used e-mail for communication. They reported a lack of interest and time for journals or use of the Internet. They receive journals and newsletters from the College of Nurses, some with disciplinary committee reports relating to adverse events, but as one nurse observed, "I don't like reading about bad things that happen to nurses. . . . I prefer to read magazines on my leisure time." They reported that their journals accumulate unread and they do not actively scan them for information (cf. Blythe & Royle, 1993; McKnight & Peet, 2000; Spath & Buttlar, 1996). Their workloads and their shift-work orientation appear to squeeze out such activities from their days: "You can't fit it [reading] into your lifestyle." Interestingly, some of the physicians said the same thing. Whereas the staff physicians said they participate

in journal clubs and discuss articles (for example, about adverse drug events) in those venues, the residents said they do not have time. Unless it relates to a pressing problem with a particular patient, information will not earn attention, much less act as a catalyst for change.

The nurses' daily cyclical work of knowing the patients may be seen as creating boundaries around those who know and can understand. The nurses do not appear to see the managers as part of their "knowing the patients" cycle; if anything, "managers are not around" and they do not know the patients "because they are not there." By contrast, their practice leader/educator may be seen as a boundary spanner. She is able to bridge into the circle as someone who is more approachable, is not too "swamped," and has time to listen to the nurses' ideas and to follow up on them. She will also give them reminders and oral information relevant to patient care ("She's pretty good on the verbal").

An Information/Change Agent's Role

Many of the nurses are very dependent on the practice leader/educator for much of their information related to education needs. Because the practice leader/educator is often present on the unit and is seen as a neutral party (not management), staff can ask her questions, and she can observe what they are doing when caring for patients and carrying out their tasks. One of the nurses reenacted an exchange with the practice leader/educator about standards of practice for changing IV tubing, to provide an example of information that they hear at the morning staff meeting.

> Like for the first time in a long time we were talking about IV tubing and oxygen tubing. She'll say how often do we change that? And then everybody starts looking [she looks from side to side, raising her eyebrows as if to say I don't know or do you know?] You know? Because you just change them automatically, nobody really thinks about how often *should* we change them, although we knew that some way back when! So that's one of them. And then she'll say well, the literature said da da da, and she'll give us a little teaching session there. And then each time in [the morning staff meeting], "How often the IV tubing should be changed?" You know, throw the questions out [she smiles and nods].

Her brief description highlights key functions of the practice leader/educator. She "notices things" and acts as the eyes and ears scanning for process and systems problems on the unit. To draw an analogy, the practice leader/educator carries out preventive maintenance and repair of routines and procedures that may break down in the nurses' circle of work. She raises a problem with the nurses, plumbing to test whether it reflects a practice issue or a lack of knowledge. She then draws on "the literature" to teach the nurses the appropriate practice, and she reinforces the knowledge by testing them periodically with questions. Because the nurses are not active scanners and seekers of information related to patient safety and practice issues, the practice leader/educator has to create the pull and push for the information. Another way to describe this role is as an *information/change agent*. The functions of the information/change agent in this case include the following:

- Acting as a *boundary spanner* bridging three types of gaps: (1) between the nurses' patient level of focus and the system and process levels, (2) between the front-line and management, and (3) between the nurses on the unit and resources outside the unit
- Recognizing patient safety issues and acting as an *information seeker* for front-line nurses, identifying their needs and seeking appropriate information
- Using the information (research, policies, procedures, standards) as a *knowledge translator* to explain to the nurses how it applies to their practice
- Actively intervening as a *change champion* with "just-in-time" education, change initiatives, and ongoing coaching

Although there is overlap between the functions and they can be closely interrelated, there are features of each that deserve emphasis. In this study site the practice leader/educator, acting as an information/change agent, carried out all four functions to maintain and repair routines and procedures to promote patient safety. However, it is possible that more than one individual could perform the functions of an information/change agent in a distributed fashion, to different degrees and in different combinations, in other situations or settings. Consequently, we have separated the interrelated functions into four sets of activities to highlight the specific features observed.

The term *boundary spanner* (Tushman & Scanlan, 1981; Yan & Louis, 1999) emphasizes the bridging or "go-between" activities and communication with people outside the nurses' circle of knowing the patient. This function includes communication of information from the chief nursing officer and manager. The practice leader (PL)/educator also meets regularly with her internal network of peers who perform similar functions in the hospital. She has frequent e-mail contact with them when issues that require problem solving arise. In one circumstance, when a certain type of dressing caused complications when used with a patient's central line, one educator shared what she knew about the situation with another, and so on, through the group. "It all got sorted out" when they subsequently met face to face as a group. The PL referred to this practice as their "underground" system, which connects them rapidly and in an informal manner to share information: "Most of our information sharing goes on via that underground e-mail, or what I call 'water cooler talk', but it's usually photocopier talk, because that's where you run into a lot of educators, because educators are *always* photocopying stuff." Information about external events, such as details about an incident that occurred in another hospital that were passed along informally through a colleague who had a contact at the other hospital, is also shared through the internal peer network.

The term *information seeker* highlights the role activities related to identifying specific information needs of the nurses and looking for information to meet those needs. The

practice leader/educator spends time on the unit reading patient charts and nurses' notes, observing both the work environment and the way care tasks are carried out, as well as talking with the nurses, the team leader, and other staff. She looks for problems related to patient safety and professional practice that could indicate an information or education need. She then locates the relevant policy or procedure, such as one about central lines, or turns to the research literature at hand. In some cases this involves a literature search, for example, on various models of patient care as background for planning a project on the unit.

The term *knowledge translator* emphasizes the activities the practice leader/educator carries out in explaining the content of research ("the literature"), policies, and procedures so that the nurses understand how it applies to their specific tasks and work activities. She takes the printed material to the morning staff meeting and either reads it to the nurses or gives a quick verbal summary before posting it on the board in the conference room; she may also schedule multiple education sessions, depending on the complexity of the topic. Because she is often present on the floor, she can answer questions about how to apply the knowledge to particular patients.

Finally, the term *change champion*, or *change agent* (Rogers, 2003), highlights the activities related to making intentional changes to processes. This process includes the design, implementation, and ongoing monitoring of change initiatives, such as the intershift report. Over a series of meetings the practice leader asked the nurses for their input about the benefits and problems of sharing information about patients' status between shifts. She asked what information would be "pertinent" and how it should be recorded, and even what color they wanted the shift report binder to be. *Champion* emphasizes the ongoing nature of the coaching and the extent to which the practice leader/educator extends herself to influence and sustain the changes. She attended the shift reports to ensure nurses were there and to hear what information was shared and how. She also reviewed the reports recorded in the binder, checked with nurses about what they decided to record and why, and gave them feedback about the appropriateness of their entries. She gives frequent reminders to the nurses both on the floor and at the morning staff meeting and reinforces knowledge she has shared by asking questions at subsequent meetings. She also makes phone calls to the floor during off-duty hours to reach other staff who are working night shifts and cannot attend the staff meeting.

Information Use in Preventive Maintenance of Routines

As she creates the push and the pull for risk and safety information, the information/change agent can be described as following Lewin's change model by unfreezing, changing, then refreezing the behaviors. Hatch reports that Lewin "defined change as transient instability interrupting an otherwise stable equilibrium" (Hatch, 1997, p. 353). The practice leader/educator creates the "transient instability" by identifying patient safety issues and raising the nurses' awareness of them and the need for change, pointing out both risks and potential legal and regulatory ramifications. She introduces the needed change through education and provision of information and then "refreezes" the new behavior through ongoing monitoring and reinforcement. However, this model assumes an underlying stability and equilibrium in the processes and routines, which Feldman (2000) has suggested do not occur. "Work practices such as organizational routines are not only effortful but also *emergent* accomplishments. They are often works in progress rather than finished products" (Feldman, 2000, p. 613) (emphasis in the original).

Variation occurs in processes over time, as individuals interpret methods of performing tasks within the routines (Feldman & Rafaeli, 2002). "Even routine actions are quite likely to have an element of indeterminacy, hence they are susceptible to change" (Tsoukas & Chia, 2002, p. 574). Though it is expected that such care delivery processes are carried out in a "routinized" fashion, there can be erosion in the way the tasks are performed. As a result, an IV line may not be tagged with the date and time when it is changed, and this omission may become the norm. This may be an example of negative adaptation, perhaps in response to production pressures that result in shortcuts or to lack of knowledge about correct procedures. In Feldman's performative model of routines, the participants may make repairs to the routine because unintended or undesirable outcomes result (Feldman, 2000, p. 621), implying that the participants are aware of and take action based on an adverse outcome. However, in the IV example, it is the practice leader/educator who is acting in a preventive mode, intervening to make changes before the nurses do and before infections or adverse outcomes occur. She is bridging into the nurses' routine as an informed outsider to the process.

The practice leader/educator role serves to create connections between the nurses and the larger "what" and "why" understandings (Feldman & Rafaeli, 2002, p. 323) about patient safety and regulatory requirements and standards. As Wenger points out, "Communities of practice can steward a critical competence, but they can also become hostage to their history, insular, defensive, closed in, and oriented to their own focus" (Wenger, 2000, p. 233). This tendency may contribute to the slippage in procedures over time.

In terms of observations of the practice leader/educator's interacting with staff, as well as comments she and other staff made during interviews, there are important characteristics of the relationship that influence the effectiveness of her role as an information/change agent. These include (1) *cognitive skills and knowledge*, such as access to information (including a network of peers), clinical knowledge, methods to facilitate change, and interpersonal skills; (2) *affective characteristics*, such as trust built by spending time being available on the floor, combined with clinical credibility and experience; and (3) *situational characteristics* that contribute to authority and political positioning, such as support from the manager and playing a "neutral, nonthreatening" role (because she has no management responsibility and is not involved in the process if disciplinary action results from an incident or error). These

attributes are consistent with McCormack and Garbett's (2003) description some of the characteristics, qualities, and skills of practice developers and Harvey et al.'s (2002) description of facilitation. We suggest that these are also important attributes for information/change agents who act as information behavior surrogates in any work context.

Tensions Underlying Situated Information Practices

All four information-related functions described are at play in making changes to the nurses' routines, practice, and practice environment in order to improve patient safety. However, underlying these functions are tensions that complicate the ways problem identification and resolution and the related information behaviors occur. These tensions or dilemmas can be characterized in terms of six themes that run through the discourses of the study participants: coping from shift to shift and the power of the prosaic; critical thinking; accountability and responsibility; focus on people or process; message–method mismatch relating to quality improvement; and voice, power, and boundaries. These themes underscore the potentially contentious nature of social, contextually dependant information processes.

"Coping From Shift to Shift": The Power of the Prosaic

Although we had anticipated that the unit would reflect the same production pressures currently facing most health care providers and organizations, we had underestimated the level of preoccupation with the prosaic, the day-to-day routines and tasks. The staff juggle a large number of tasks and interruptions, and even the morning staff meeting can be perceived as a distraction from their patient care work. This workload may raise the threshold and make it difficult to make more time-consuming quality improvement meetings, training, and projects relevant to staff. In these circumstances, it also may be difficult to balance the pressures on production processes with adequate attention to safety processes, such as scanning for risks and recognizing problems. The nurses have a geographically bounded, unit-centric focus in their daily work and often rely on others for many of their information needs. Understanding the context of the nurses' work, the problems they face, and their characteristic task-mindedness is vital to gaining insight into their information behaviors, as indicated by Taylor's (1991) concept of information use environments.

The unit pharmacist sympathetically described the nurses as "doers," "coping from shift to shift," but he wondered why they persisted in inefficient processes for years without changing them. He remarked that "the nurses don't seem to be able to problem-solve their way out of situations. . . . They don't necessarily look for solutions." The manager also talked about trying to help the team leaders with their problem solving, that is, "trying to decide what is the right thing to do in different situations," as well as supporting staff to enable them to do so themselves. "I think what I try to do is to encourage staff to seek solutions, and, it's a learning thing for them to start to problem-solve solutions, either on their own or collaboratively with their peers, that's great. If they need me to back them up I'm quite happy to do so, but I'm not there to solve all their problems."

Some participants believed that because of the busyness of the workday, the staff do not have time to stop and make changes; they just "muddle through" and work around the problems. This belief is consistent with Tucker, Edmondson, and Spear's (2002) findings that the nurses they studied primarily engaged in "first-order problem-solving," that is, overcoming immediate obstacles so that they could deal with the current situation they faced, but at the expense of taking time to dig for underlying causes of problems, which they labeled *second-order problem solving*. Although the lack of time certainly contributes to the situation, there are other complicating issues.

One example illustrating first-order problem solving is the practice leader/educator's story about lack of medical supplies on a cart and the frequency with which the nurses sent ward assistants to pick up missing items from the stores department instead of raising the issue and finding a more efficient solution. But why did the nurses persist in this repetitive cycle of first-order problem solving? Tucker, Edmondson, and Spear (2002) would suggest that this practice could be caused by lack of time and the resulting need to do whatever it takes not to interrupt the care of patients, combined with the sense of personal competence and satisfaction the nurses gained from coping. A more cynical view might attribute the behavior to laziness or lack of caring, but neither was apparent in this case in the responses of the nurses when the practice leader raised the supply problem at the morning staff meeting. As she put it, it was "as if a light bulb went on," and they began suggesting other items that would be useful on the carts. They may have coped with the missing supplies by sending the ward assistants for the needed items, but they did not reach the stage of first-order problem solving about overlooked expiration dates on the other products. This adds another significant obstacle to risk identification and improvement. Coping from shift to shift and being caught up by the daily routines and tasks are obstacles to the recognition of information needs. Information seeking is not triggered, because the needs are not identified. This finding ties in with another theme suggested throughout the interviews, namely, critical thinking.

Critical Thinking

The concept of "critical thinking" surfaced directly in the practice leader/educator's comments when she said "that critical thinking piece is just not there." She used the term when she made the observation that the nurses were not identifying and acting on their "knowledge gaps." She described it as "recognizing what you do not know and seeking resources."

The pharmacist's astute observation about the benefits of education sessions he had given for the nurses points out an important facet of critical thinking. "It elevates nurses

tremendously *from just doers to appreciaters of what it is they are doing and why*. And it improves their ability to report what the patient is experiencing. *If you are not alerted to the possibilities sometimes they go unnoticed*" (our emphasis). The chief nursing officer made a similar comment that one has to see the possibilities for change before one can help make change happen. This notion, that if you are not alerted to possibilities you may not notice them, links directly to sense making and is an important precondition for problem detection and for information seeking and use.

The practice leader/educator engages in information behavior by surrogate, a remedial measure for the nurses' deficits in critical thinking. As their information/change agent she is acting as a critical thinker, teaching them skills and transferring to them the responsibility for critical thinking. This situation suggests that a focus on critical thinking is a vital step in situated learning and improvement of practice. As are fire safety drills that use realistic scenarios on the floor, this focus must be localized and immediately relevant to the nurses' work on the unit, at the point where care is delivered.

The pharmacist's remark raises the possibility of relating the apparent lack of critical thinking to educational level or experience (Profetto-McGrath, Hesketh, Lang, & Estabrooks, 2003). All the front-line nurses interviewed had graduated from 2-year diploma programs; one was pursuing her nursing degree on a part-time basis. All the allied health and medical staff had university degrees, some at the master's level. A physiotherapist described the need for a higher and more uniform level of competence to allow staff to act as autonomous practitioners.

> Because all the allied health professionals are all degree-educated they certainly have probably a more uniform level of competencies, but they also have a more stringent standards and monitoring system . . . because we're smaller groups for one thing, but because of just the basic level of education. Whereas the nursing staff, because it's so diverse, because we have such a large range of ages and levels of training, it's very, very hard to raise the standard to the point that all of the important things are being managed on a competency level. . . . [Nurses] have this odd level of education and standards. So what's good for one of us is not going to work for the other, unless everybody is practicing at the same level, then you can expect people to be autonomous. But you can't if they don't have the same kind of level of competence.

However, when asked about the proportion of nurses who were diploma-prepared compared to the number who had nursing degrees, the director responded in a manner that discounted the validity of the potential difference implied.

> I try not to paint people with that brush because I have worked with fabulous diploma nurses who had all the skills and had that innate ability and were very keen to learn different approaches, and I've had degree nurses who couldn't work their way out of a paper bag. Educationally they knew what to do, but they didn't have it together, they couldn't get it together on the unit with any practical sense.

She did say that some are more task oriented and some are more conceptual problem solvers. This is a sensitive topic, perhaps because it links to political issues of professional identity and status.

The College of Nurses' Competency Review Tool for Nurses in Direct Practice (College of Nurses of Ontario, 2001, p. 5) includes a category of competency statements related to "critical thinking, research, and leadership":

> Nurses use critical thinking to problem-solve when assessing and managing client responses to various health conditions. Critical thinking is integral to good decision-making, and includes activities of organizing and analyzing information, recognizing patterns, and gathering evidence to support conclusions drawn. Nurses use research to ensure their practice is current and consistent with best-practice evidence. This involves questioning and appraising information, and exercising judgment when integrating new knowledge into practice. Leadership is demonstrated when nurses identify situations that compromise safe, effective, ethical care, and advocate for changes to support the well-being of clients.

The nurses often called attention to a need for changes in particular patients' care plans and acted as advocates on behalf of their patients. However, there were also instances in which the components of critical thinking, research, and leadership described were not evident. The strains in these stories underscore a dilemma facing the nursing profession. The College of Nurses and the health care organization expect nurses to act at the level of knowledge workers, as competent critical thinkers. But given the differing levels of education and experience, many nurses are task-minded "doers" who may not yet have the skills and competencies to conform to those expectations. They need the ongoing support of information/change agents while they learn to take on more of those functions and become more autonomous professionals. Once again, information seeking by the nurses themselves is not triggered because the problems and information needs are not recognized.

The chief nursing officer also included "taking responsibility to think critically about your practice" as an aspect of accountability, the third important theme.

Accountability and Responsibility

Individual accountability is an explicit aspect of regulatory and legal discourse. As critical thinking is, it is included in the College of Nurses guidelines and documents (College of Nurses of Ontario, n.d., Quality Assurance Glossary of Terms), which define *professional accountability* as "being responsible for one's actions and decisions, and accepting the consequences. Nurses demonstrate accountability through their decision-making process, competency and integrity. It is reflected through nurses' actions and through accurate documentation."

The practice leader/educator stated repeatedly that the lack of accountability is at the root of all problems and spoke of "bringing in the College to talk to the nurses" about it.

Accountability is a complex notion with a sharp edge, because it entails the *consequences* of responsibility: the potential for blame and legal threat. When she challenged the nurses about the issue of changing and labeling IV lines, the practice leader/educator asked them, "If a lawyer were to come here, can you prove beyond the shadow of a doubt . . . ?" and "If the College or anybody was to report you, you should be able to know. . . . " She appealed to the language of legal and regulatory accountability to emphasize the importance of the practice standard.

The rhetoric of accountability is potent. It seems to place a heavy burden on individuals, because the discourse of individual accountability and responsibility appears to be given more weight and surfaces more frequently than evidence of looking at processes or systems. As one allied health professional pointed out, the public do not want to know that mistakes happen and prefer not to hear that health care providers are fallible. When problems occur, adverse event talk is still heavily weighted toward blame and individual responsibility, so that thinking may be reinforced and channeled in that direction. What acts to channel thinking in the direction of potential *systems* causes?

The conflict of improvement goals with the legal and accountability discourses also surfaced in the director's story about a recommendation that she made when she was a manager to install a call bell in a washroom after a patient fell. She stated that the "whole purpose of reporting an incident is to improve the situation," voicing indignation that an administrative staff person questioned her including that recommendation on the incident form. The administrative staff person said "You can't write that," unless it is certain that the change will be implemented, for fear of potential future liability if the condition is not changed. The act of completing an incident report is not only an attempt to point out areas for improvement; it also becomes part of the potential liability arsenal of legal documents, claims, and defenses. The emphasis on individual accountability creates an imbalance that shifts the focus from improving the system to improving the people in it.

Focus on People or on Process and Systems?

The manager, the pharmacist, and the practice leader/educator referred repeatedly to education and learning plans. Perhaps if you are an information seeker and educator, you tend to use information provision and education as your main intervention, and that tendency may reflect a professional role bias. The practice leader role monitors and guides individuals' practice standards and competence, and the educator role responds with skills training and education sessions. Both are very much focused on individuals. The practice leader/educator did refer to the potential importance of asking more systems-oriented questions when she briefly spoke about an incident that had occurred at another hospital, reports of which had appeared in the press.

> To me it would've been better if it would've been handled differently where we could have learned from it in a positive manner, but instead it's already plastered and blackened by the public and that's not sending a positive word to nurses. Whereas if we had looked at it from the other way and said okay, how did they go wrong here. Here we have somebody who's post-op, and they weren't monitored properly, where did it break down? Did the nurse maybe not know a full history? Did they not maybe get a detailed shift report about this person? Maybe they did get a shift report but maybe the format of their shift report, you know, was not allowing them to get relevant information? So all these things, nothing like that was really addressed. Because it's just so marred by the result and not, okay, what can we learn from this?

Her comments underline the difficulties of trying to focus on potential process issues, for example, design of the other hospital's shift report, when the bad outcome directs attention to the people involved, namely, the nurses.

The manager espoused a philosophy of focusing on processes rather than blaming the people involved. She was very conscious of the power of language and said she tried to avoid terms such as *error* or *mistake*. She used the language of systems improvement, which implies looking at elements of the work and the work environment and the way they are structured as contributing factors in patient incidents. However, many of her responses and examples are consistently focused on repairing *people*, not processes; her language referred to "mistakes" and to employees' thinking "I did something wrong." Even her supportive and well-intentioned preference for "the education plan route" rather than "the discipline route" still points to individuals rather than systems causes such as workload or inadequate equipment.

Radley and Billig's (1996) work suggests a way to think about the tensions embedded in people's accounts. Through accounts, a speaker discursively constructs an identity in relation to others (p. 225) and may legitimate or justify her statements as claims within a "wider shared reality" (p. 229). "The words should be understood in terms of what they are rhetorically accomplishing" (p. 231). Talja cites Wetherell and Potter's (1988) discussion of handling apparent inconsistencies from a discourse-analytic approach (Talja, 1999, p. 465):

> In discourse analysis, this kind of variability and inconsistency in explanation is not seen as a potential source of error when trying to make coherent sense of participants' views. Interview talk is the resourceful, context-dependent application of common interpretive resources. The variability of interpretations does not mean that there is no regularity at all in participants' discourse; it only signifies that regularity cannot be pinned at the level of the individual speaker.

This approach suggests the importance of analyzing the manager's as well as the practice leader/educator's accounts and explanations within the broader discourses about accountability described earlier. The health care manager's wider shared reality includes discourses of problem solving and of accountability to patients, administration, and external agencies such as the College of Nurses. Her focus on

people is set in the context of broader discourses about professional standards, reporting requirements, and disciplinary procedures, which may exert a stronger influence than notions of systems improvement.

There are other examples of the difficulties of thinking first of systems causes. Both the practice leader/educator and some of the allied health professionals made comments about the need for ongoing reminders to staff in relation to changes that had been attempted. They observed that the nurses had to be reminded constantly to complete a skin risk assessment form, and an earlier attempt to implement a fall risk assessment failed because it had been unwieldy and required constant reminders. At what point does the need for constant reminders shift from being regarded as legitimate reliance on a change champion to unacceptable reliance on "spoon-feeding" and "hand-holding"? It is easy to slip into blaming the individuals for lack of initiative; it is much harder to think of this as a problem related to the way the work process is designed. How could the assessments be designed so that completing them would become a natural part of the work and information flow? As another example, some staff complained about the need to hunt for charts that were not returned to the chart racks. Did this occur because "people don't care," or does the design of the work space contribute to inefficient information handling? Likewise, it is interesting that the practice leader/educator pointed out that the nurses "just assumed" that the medical supplies would be usable instead of checking the expiration dates. However, it would appear that no one checked the supply process until the practice leader/educator noticed the frequent trips by the assistants to obtain needed items. The medical stores department stocked the carts daily on the basis of quotas that had been set up some time earlier, before changes in the patient population and their needs had occurred. Organizational processes, even when missing steps and lacking role clarity, may "muddle along" on a routine basis. There is often a strong focus on the role and responsibility of individuals after the fact, and less on the design of the processes and the need to alter them over time.

Message–Method Mismatch Regarding Improvement

The efforts to establish a quality committee and implement improvement initiatives illustrate the difficulties of making improvement a seamless part of the way work is done on a unit. In a sense, there are boundaries around the quality committee and information does not move readily between the nurses who are members and the rest of the unit. When one of the nurses who was a committee member was asked whether she thought the other nurses were aware of the committee and its activities, she said, "I'm not exactly sure actually; that would be something to discuss with the practice leader/educator." The quality committee, its activities, and its language may not be very meaningful to those who are not members. It can be a somewhat isolated pod of activity that requires a boundary spanning effort that may not readily occur. Once again, a push function is required. Although she was enthusiastic about the quality committee and clearly championed the focus on improvement, the manager had to provide a great deal of cheerleading encouragement to the others. She created an atmosphere that encouraged participation by celebrating staff contributions to achievements with frequent praise, certificates of merit, and social events, for example. However, the agenda may fall behind as she is distracted by many other pressures and responsibilities. Nurses' workload makes ensuring that they have time to attend the meetings difficult.

There is a mismatch between the way the quality improvement skills training was delivered and the staff's perceptions of the relevance of the approach. For instance, the training did not fit the way their work is structured and the way they talk about making changes. Managerialist discourses represent quality improvement as an admirable effort to "empower" and involve staff. But that representation presupposes that the work processes and environment can be structured to support this goal, without exacting unfair extra effort from the staff.

The director described her responsibility as creating the structure and supporting the manager in ensuring time for staff to analyze their work. She also talked about the education profile for committee members, including improvement methods, conflict resolution, and decision-making skills. However, a combination of factors appeared to conspire against her efforts to build such a foundation for improvement. The staff did not find an improvement methods workshop they attended relevant to their needs. Although attendance was reasonably good, not all quality committee members were present, and there has been significant turnover of staff since. There was little evidence of follow-through after the workshops in using the skills presented. Some of the efforts were comparable to trying to build a bridge by throwing shovel loads of sand into a fast-moving river: The message erodes too quickly to allow a foundation for supporting improvement to be created.

Power, Voice, and Boundaries

Another theme that wound its way through the participants' stories is related to the concept of having a voice or being heard and the exercise of power. This theme manifests itself in several ways.

First, several staff, mostly nurses, explicitly referred to the notion of either "having a voice" or having no power. This was particularly apparent in the comments about making changes and the desire to have a central nursing station (which had been redesigned earlier into a decentralized form) on the unit. The daily cycle is heavy and busy and the unit is complicated enough without the added stress and confusion caused by an "untidy layout," misplaced charts, and "lack of proper places for everything." Such a layout compounds the unpredictability of a typical day. But perhaps a nursing station represents more than a place to carry out information tasks such as documentation and storage of charts; it may be a buffer against the incursions by others and their constant

demands, a place where "nobody can come in." As one nurse remarked, "In life you must have boundaries; even if they are abstract boundaries, there are boundaries in life." If this is seen by some nurses as a basic need and they perceive that it has been denied by those with the authority to make changes, the situation may fuel their sense of being "powerless." Why bother raising issues if there is no change? The result is either resigned acceptance, or bitter endurance, or a decision to leave and find a "more conducive environment." Any of those responses may also adversely effect information flow for improvement of patient safety.

The nurses may lack a voice in some senses, but there are interesting ways in which they do exercise power. This second manifestation of voice and power is more subtle and is linked to information behaviors as a way of exercising power. For example, the way the nurses talked about asking and being asked questions, particularly when working as or with temporary agency nurses, illustrates a strategic use of questions as an exercise of power with each other. This mode of questioning may be intimidating when compared to asking questions in a way that is intended, and is perceived, as a helpful and supportive offer of information or assistance. Several nurses talked about situations in which they were afraid or unwilling to ask questions or admit that they might need help because if they did, they might be seen as incompetent. One nurse described the subtleties of the "simple" question "Are you managing okay?" It can be either a well-intentioned offer of help or a suspicious prod to reveal weaknesses, and such a question is often directed at an agency nurse.

> Um, I help out as much as possible. Um, find out is everything okay. Sometimes, sometimes a nurse will say yes everything is fine, because ah, that nurse might feel like if she asks a question it might, she might, you know, someone might feel like she doesn't know what she's doing, ah, which is not so, but sometimes if we approach another nurse, you know, um if I, if I ask "Is everything okay?" and I ask it in a way where "I'm sure you don't know what you're doing," you know, *I* would say I'm fine! [laughing] you know so, sometimes that's an issue. The agency nurse might not feel comfortable with the person who actually offers to help.

Information behaviors may also constitute an exercise of power through passive resistance. The nurses may be managing their work by refusing to use certain information sources, such as e-mail and voice mail. Likewise, when the practice leader/educator said that a nurse "chose not to read" a copy of a procedure that she had placed on a patient's chart, perhaps that action could be construed as a form of resistance. It is possible that continuing to do things in the customary way and choosing not to read something "that is in plain view" indicate a denial or refusal to access knowledge. Of course, it is possible that the nurse really did not see it.

These behaviors might be characterized as an interesting variation of Chatman's (1996) concept of information poverty. Chatman proposes that people may find themselves in information-poor situations when they invoke self-protective behaviors and decide not to use information resources for fear of risking unwanted exposure of their weaknesses. "These behaviours are meant to hide our true crisis in an effort to appear normal and to exhibit acceptable coping behaviors" (Chatman, 1996, p. 197).

The temporary agency nurses in particular may well be trying to maintain an impression of coping by not asking questions or asking for help because of perceived high social costs. However, the staff nurses engage in a different form of information-ignoring behavior. They know that someone will provide the needed information, and that even the preliminary work of identifying their information needs will be done for them. By sticking to their familiar ways of handling their work and to some extent avoiding active information seeking, the nurses have by default forced the practice leader/educator and manager to adapt to their oral/aural information culture. The pattern is reinforced daily: Take information to the morning staff meeting, read it to the nurses, explain it, and then post it on the board.

Accountability and critical thinking may be contested ground, a tug-of-war between responsibility and accountability as a professional, on the one hand, and dependence on the practice leader/educator to be a "spoon-feeder" and "handholder" on the other. Information behaviors may be a means of resisting and dealing with implicit power issues.

These six themes influence the ways problems are recognized, information seeking is (or is not) initiated and by whom, and information is used for making changes and improvements. Coping from shift to shift and being caught up by the daily routines and tasks, combined with the lack of critical thinking, can create obstacles to recognition of the need for risk and safety information. Information seeking by the nurses may not be triggered because they do not recognize a need. An intervention by someone who is acting as an information/change agent is required to remedy the problem. The language of individual accountability and responsibility, along with the focus on fixing people rather than processes, may create conflict that negatively influences the seeking and use of information for improvement and learning. Likewise, the mismatch between the improvement workshop methods and the staff members' perception of their usefulness may undermine their willingness to participate and undermine the context for information use. If the nurses feel they do not have a voice, that attitude may erode both the willingness to mention the need for changes and the flow of information about risks and incidents. Information needs and seeking may also be suppressed through their use of questions as an exercise of power with one another. The avoidance of certain information sources such as voice mail and e-mail also may indicate an exercise of power. In this way the nurses can exert some control over the information flow because the information seekers and knowledge translators have to give the information to them and explain it in a face-to-face forum.

An Additional Dimension: Situated Practice

We have characterized the six themes as tensions or dilemmas underlying the four information-related functions

of an information/change agent. However, there are limitations to the metaphors and labels that we have chosen to use in portraying the phenomena, which reflect our theoretical and experiential viewpoints. John Law might describe this in different terms, as a particular enactment of knowing by rendering certain things distinct and leaving others obscure (Law, 2000).

The focus on information resources, sources, and information pathways has underemphasized the concept of *knowing in action*. By doing so, we have downplayed the socially constructed nature of information and temporarily separated information from situated learning and knowing. The description of information roles artificially divides and labels activities and functions that are most meaningful when understood as operating together. Although teasing apart the strands serves a purpose, namely, taking a closer look at the component activities, it does not explain the interwoven nature of the phenomena and the underlying tensions. This aspect can be better understood by emphasizing the information roles and patient safety as collective, social, and situated practices (Brown & Duguid, 2001; Gherardi, 2000, 2001; Gherardi & Nicolini, 2000a, 2000b; Law, 2001; Lloyd & Roen, 2002; Nicolini, Gherardi, & Yanow, 2003; Suchman, 2000).

A number of researchers have considered the situated nature of knowledge and learning. Gherardi and Nicolini (2000a, 2000b) provide a very useful approach that combines elements of research on communities of practice and actor network theory. Their work, focusing on occupational safety practices in construction sites, applies as well to the interactions observed on the nursing unit. Their method is useful in understanding some of the themes and tensions highlighted earlier, which were not explicitly accounted for in the initial description of the practice leader/educator' information roles.

Gherardi and Nicolini describe how members acquire knowledge and information about construction safety practices by applying Lave and Wenger's notion of communities of practice to learning about safety in the workplace (Gherardi & Nicolini, 2000a). They have extended the concept of action-driven, situated learning developed by others (Brown & Duguid 1991; Cook & Yanow, 1993) by also drawing on actor network theory (Law, 1992, 2000). Central to this is a metaphor of knowing as "an enactment . . . an occasion in a location, a set of actions with a series of effects" (Law, 2000, p. 349).

Gherardi points out, "Practice is a system of activities in which knowing is not separate from doing. Further, learning is a social and participative activity rather than merely a cognitive activity" (2000, p. 215). In a similar fashion, Tuominen and Savolainen (1997) note that people construct versions of reality together in conversation and that "knowledge is something that people do together rather than an individual possession" (p. 83). Gherardi and Nicolini describe organizational knowledge as distributed social expertise that is situated in the system of ongoing practices, relational and mediated by artifacts, rooted in the context of interaction, acquired through some form of participation in a community of practice, continually reproduced and negotiated, and always dynamic and provisional (2000b, p. 330).

These characteristics help explain the problems inherent in accomplishing patient safety in the context of information behaviors on the unit. The elements are at the same time fragile and persistent because they are thoroughly dependent on ongoing interaction and performance. The practice leader/educator's interactions with the nurses can be described as a "practical performance" (Suchman, 2000) of safety and learning, or a "materially heterogeneous set of arrangements and processes, including and producing" documents, devices, and people (Law, 2001, p. 1; Law, 2000). Chatman (1999) also observes that information is a performance, in the form of an interpersonal narrative produced within a specific context. The practice leader/educator's performance of safety with the nurses is intertwined with the materials they use and physical plant in which they work. This situation can be illustrated by the role of the print materials such as e-mails, policies, procedures, and notices. The information is presented in the meetings with the nurses and read aloud to them. The posting of the material on the board takes on secondary significance because the content carried by the paper is made meaningful largely by the performance of reading and dialogue, which is repeated on an ongoing basis. A vial taped to the white board in a meeting room, with a warning printed beside it that the substance was not to be used for injection, plays a similar role. Fire safety drills on the unit worked well in part because of their performance-oriented and participatory nature. Interactive dialogue and "real time" scenarios incorporate the environment in the performance. The learning takes place in the course of practice and becomes part of practice (Lloyd & Roen, 2002).

The group of staff nurses can be characterized as a community of practice, described by Brown and Duguid (2001) as "groups of interdependent participants [that] provide the work context within which members construct both shared identities and the social context that helps those identities be shared" (p. 202). Such communities can develop strongly local and distinctive views, but this development does not necessarily imply complete unity or cohesiveness.

The nurses share the cycle of tasks that create the effect of boundaries between those who can and cannot know and understand their work with the patients. The boundaries around their community and the nature of their practice reflect each other, in that one constitutes and reinforces the other. Brown and Duguid offer the caveat that "often too much attention is paid to the idea of community, too little to the implications of practice" (Brown & Duguid, 2001, p. 198). Becoming overly fixated on the metaphor of "community" may contribute to that problem. The metaphor of the nurses' cycle of tasks is predominantly based on their shared practice and so may preclude that concern.

Brown and Duguid (2001) note that some communities "receive the right to search for new knowledge," and "others are strictly regimented and expected to follow routine" (p. 208). The staff nurses as a community are subject to both expectations; that condition creates some of the underlying

tensions. On the one hand, it is assumed that they will follow standards and routines; on the other, that they will be critical thinkers and engage in and initiate improvement initiatives. This balance may require a level of skill and flexibility that many have not yet acquired, hence their reliance on the information/change agent's functions. Knowing is "a contested and negotiated phenomenon" (Gherardi & Nicolini, 2000a, p.13) as conflict arises in the learning process, and in the relationship between the boundary spanner and the bounded community.

Knowing and learning about patient safety are contested and negotiated partly because practices "are embedded in an extended network of organizational activities of sensemaking, persuasion, and accountability" (Suchman, 2000, p. 315). This network is illustrated by the use of liability rhetoric to persuade the nurses of the importance of tagging the IV lines. The rhetoric is part of the regulatory and accountability discourses that link the front-line nurses' practice to the expectations of the College of Nurses and of the organization.

In summary, paying attention to the importance of practice casts further light on mapping information uses and pathways. The metaphors used to convey the four information/change agent functions risk reinforcing "an idealist conception of knowledge" by treating information and knowledge as commodities that can be transmitted, circulated, and appropriated (Gherardi & Nicolini, 2000b, p. 329). Placing the emphasis on the *actions* of spanning, seeking, and translating highlights the enacted and interactive nature of patient safety. Looked at this way, information resources are part of the material of practice, a network effect produced through interaction, akin to knowledge in practice, which is "situated in the historical, socio-material, and cultural context in which it occurs" (Gherardi & Nicolini, 2000b, p. 330).

The description of the information/change agent roles and the six themes provides insight into the intricacies of the ongoing local work required to identify patient safety risks and to intervene with information and knowledge. The identification of information needs, information seeking, and information use for learning and improvement are situated practices; that is, they take place in the discourse and action of the daily work on the unit, "in the flow of experience" (Gherardi, 2000, p. 214). There is a reflexive and constitutive interrelationship among all the elements: the context, the discourse, the actions, the roles, the learning, and the information.

Conclusions

The goal of this research was to develop an in-depth understanding of health care professionals' different beliefs and practices related to change, patient safety, adverse events, and information; how information about adverse events, near misses, and risks was perceived and managed in their unit; and what internal and external resources were used. At a more conceptual level, the following are the main findings and contributions of this study:

1. *Information needs of individuals (or groups) can be latent and may need to be revealed to them.* Individuals may not see problems, and information needs may have to be drawn to their attention, in keeping with Turner and Pidgeon's assertion that "a way of seeing is always also a way of not seeing" (Turner & Pidgeon, 1997, p. 49). As one impediment, the mundane, daily cycle of task-driven work may be as great an obstacle to information flow and improvement as the potential repercussions of individual accountability. It limits attention to and recognition of potential information needs and knowledge gaps. To varying degrees, all disciplines appear to manage overload by adopting a "Do I need to know this right now" threshold for information. This may also apply to other work environments as well.
2. *Identification of information needs and information seeking may be carried out by a surrogate.* Because individuals may not see some risks or problems, they may not recognize information needs themselves. However, others may undertake to act as surrogates or information/change agents. We have described four key functions of that surrogate behavior: boundary spanner, information seeker, knowledge translator, and change champion. All four functions are important for facilitating changes in practice, routines, and the environment to improve safety.
3. *Routines can break down as a matter of course, but adverse outcomes can be prevented when a surrogate intervenes to repair the routine.* Though it is expected that many processes are carried out in a "routinized" fashion, there can be slippage or erosion in the ways the tasks are performed and they may become the norm. This result may be an example of negative adaptation, in response to production pressures that result in shortcuts or to a lack of knowledge about correct procedures. An informed outsider to the process or a surrogate can act in a preventive mode, intervening to change workers' routines before they do, and before adverse outcomes occur. In this way, safety is achieved as an ongoing performance involving the workers and the surrogate (among others), as well as information sources and other material objects of the physical environment. It is a somewhat fragile accomplishment because it depends on continual interaction and negotiation, and it is characterized by inherent tensions.
4. *Workers may not be as competent in critical thinking and information skills as might be assumed and required for their position.* Tensions can arise from a conflict between the expectation that individuals will be reflective and self-directed learners and critical thinkers and the reality of their work situation. There can be a gap between the expectation or vision and the current level of practice and thinking of workers. Many may be more task minded doers than conceptual problem solvers and knowledge workers. There are lessons here that could apply to knowledge workers in other environments as well. We may be assuming that many workers are better equipped and supported to function at a more sophisticated level of information and knowledge use than they actually are. This assumption may inadvertently set up staff for failure, especially given the regulatory and legal discourses that focus blame on individuals.

At a broader level, information behaviors and the degree of critical thinking may be indications of the evolving status of the profession and the varying levels of education of those entering practice. Over time, the profile of information behaviors may shift from "doers" who do not actively seek specific types of information to "appreciaters" who are more attuned to information, to borrow the pharmacist's terms.

The lack of critical thinking skills and training, power, and status can create impediments to information seeking and use for preventive maintenance and repair of routines.

Implications for Practice

Identifying and understanding how these information and routine repair functions are carried out by an information/change agent have practical implications for organizations. There are several ways in which an organization could leverage the efforts of those who act as boundary spanners, information seekers, and knowledge translators at the local levels. The organization's information professionals could work in partnership with them to help them actively scan for safety and risk information. The information/change agents could then interpret the information and determine how it could be applied in their workplace. In a similar fashion, quality improvement directors and risk managers could collaborate with the surrogates to give information to front-line staff and to involve them in making changes to routines and procedures. Such collaboration could support the more subtle processes of local, situated learning on a unit. The formal improvement training for teams may be more appropriate for tackling larger, more focused process improvement projects. Managers can support individuals carrying out those functions by providing the time and resources and by providing recognition for the work.

Given the preoccupation with daily workloads and tasks, combined with the variability of information behaviors and critical thinking skills, it may be unrealistic to expect all staff to be attuned consistently to problems or risks. It may be necessary also to foster the four functions identified (boundary spanner, information seeker, knowledge translator, and change champion) and deliberately build in support for them, as suggested. These surrogates may act as coaches to impart the skills to other staff members over time.

Questions for Future Research

Instances of differences in the information seeking and use behaviors between disciplines and between levels of staff create potential directions for future research. As noted earlier, it would be interesting to explore whether the profile of information behaviors of a particular discipline changes over time. This may relate to the evolution of a profession from a task orientation to a knowledge work orientation.

Other questions are related to the phenomenon of information behavior by surrogate. In the absence of one specific person who undertakes to be an information/change agent in an organizational setting, how are environmental-scanning, boundary-spanning, and information-seeking functions to be accomplished? Do patterns in such information behaviors exist in different health care settings, and why do they exist? Given the variation in information behaviors and critical thinking, what role can be played by just-in-time education and knowledge translation interventions on the unit at the front lines? In what situations does this work? These questions could explore the potential synergies between knowledge transfer and exchange research and the domains of information behaviors and organizational learning.

This study also suggests further possibilities for research linking information behavior to patient safety and improvement. For example, there was little information entering the unit about incidents and trends related to adverse events. It could be interesting and productive to explore the environmental-scanning practices related to information about potential risks in health care organizations and their processes for gauging the relevance and applicability of such information. This study would combine concepts from information studies, knowledge translation, and organizational theory, including organizational attentional mechanisms and Cohen and Levinthal's (1990) notion of absorptive capacity.

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