

From Standardization to Resilience: How Day-To-Day Life in Healthcare Organizations Shapes Safety

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Abstract

This paper focuses on the working strategies nurses develop and employ in their day-to-day routine in an attempt to identify "red alerts" which enable them to maintain patient safety despite the load and interruptions characterizing their work environment. Based on insights gained from three studies (focusing on nurses' medication administration, use of protective measures and transferring information during handover) we develop a theoretical model that describes how understanding aspects of the day-to-day life in healthcare organizations, and the system of meaning that guides everyday life, can inform our understanding of workplace safety. The model illustrates how the chaotic, turbulent, and complex environment characterizing the nurses' workplace prevents them from fully complying with the declared safety goals practices and procedures. Yet even under these near-impossible circumstances, the nurses' main mission is to maintain patients' safety. Embracing a resilience strategy allows nurses to actively prevent something bad from happening or becoming worse, and to repair something bad once it has occurred, which of course contribute to patient's safety. Otherwise, nurses might rely on an implicit theories strategy, limiting the likelihood that they will discover their misperceptions, thereby putting patients' safety at risk. The model further describes how each of these two strategies is reinforced by positive feedback loops on the individual, ward, and organizational levels. Practical implications for managers include work practices that can encourage nurses' resilience by creating a work environment of professionalism, mindfulness and awareness of errors.

Introduction

Since the publication of the influential report *To err is human* [1], a tremendous amount of multidisciplinary research has been devoted to identifying safe work contexts that promote safety [2]. However, almost thirteen years later experts note only modest improvements in hospital safety, while emphasizing the "frustratingly" slow pace of change despite substantial investments in research and numerous policy and regulatory activities [3]. Accordingly, patient safety has begun to receive renewed attention from researchers and practitioners alike [4]. In the search for ways to improve safety, two main, somewhat rival, approaches have been suggested: standardization and resilience (Table 1). The former has received a boost from many regulatory

bodies and professional associations [5-11]. Thus standardization has become the most common approach to ensuring patient safety. Typically, it advocates repeatability and routines, coupled with adequate training in, and supervision of, compliance with these procedures. With standardization, certainty is aimed at through such mechanisms as centralization of authority, routinization of requirements, and formalization of actions by heavy emphasis on mnemonics [12-15]. Inspired by the evidence-based medicine movement [16] and clinical governance [17], it was assumed that the formalization and standardization of work tasks, in the form of evidence-based guidelines, checklists and systematic processes, could potentially reduce the chances of sub-standard safety behavior [18].

	Definition	Focus	characteristics	Advantages	Drawbacks
Standardization	Advocates repeatability and routines, coupled with adequate training in, and supervision of compliance with these procedures [12].	What went wrong?	<ul style="list-style-type: none"> Centralization of authority Routinization Formalization of actions Reporting and monitoring [12,13]. 	<ul style="list-style-type: none"> Guarantees certainty and limits ambiguity Encourages compliance to rules and procedures Limits variation in behaviors Reduces sub-standard behaviors 	<ul style="list-style-type: none"> Enforces stiffness Minimizes professional latitude Buffers innovation and creativity Limits the ability to respond to unexpected events Suppresses motivation and proactive behavior
Resilience	Individuals and organizations develop capabilities to detect, contain and bounce back	Why does it go right?	<ul style="list-style-type: none"> Intuition, and wisdom based on professionalism Flexibility and improvisations 	<ul style="list-style-type: none"> Advances the capacity to absorb disruptions without fundamental breakdowns 	<ul style="list-style-type: none"> Leads to variations in responses May generate multiplicities

	from unexpected events [32].	<ul style="list-style-type: none"> • Anticipation for preventing something bad from happening • Recovery from something bad, once it has occurred [14]. 	<ul style="list-style-type: none"> • Enables adaptation to unexpected events • Allows continuous learning and improvements • Creates enriched job environment 	<ul style="list-style-type: none"> • May create employees' overload
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Table 1: Standardization versus Resilience: Summary of the key features

For example, in an attempt to maintain safety during handovers, standardization is believed to reduce the costs of communication in the process. Hence, the "rules" of interaction (e.g., function, process, content, timing, and who is directly or indirectly included in the conversation) are imposed, making communication during handovers less resistant to variation [14,15,19,20]. Similarly, approaches to employee safety in most health care organizations have been limited to modifying individual behavior through enforced compliance with safety rules and procedures and mandatory participation in safety training [21].

Nevertheless, such standardization efforts have been of only modest benefit in reducing injuries and adverse events [21-25]. Apparently, what mattered was not merely the existence of procedures and training systems, but also their implementation [25-27]. Namely, healthcare workers recognized the precautions, policies, and safety procedures and acknowledged their rationale, but failed to put them into practice [28]. Moreover, there seems to be fundamental miscalibration of how much content standardization and content ordering is desirable or even possible [19,29-31].

Whereas the standardization approach focuses on strict adherence to procedures, the resilience perspective suggests that where there are high consequences for failure, individuals and organizations should develop capabilities to detect, contain and bounce back from unexpected events [32]. Resilience involves anticipation and is an active process, which may be a better match for healthcare settings than the principles for high reliability, because it more effectively addresses the unique complexities of healthcare [33]. Patients' care presents opportunities to systematically utilize intuition, anticipation and foresight skills to prevent something bad from happening or becoming worse, and to repair something bad once it has occurred [14,33]. The emerging concept of resilience moves the focus away from "What went wrong?" to "Why does it go right?" and exceeds simplistic standardization solutions for erring, advancing to error prevention and recovery [34]. For example, while standardization views such events as handover, or medication administration as vulnerable points of care that can pose threats to patient safety, the resilience approach recognizes that these crucial encounters provide an important "audit-point" essential for potential recovery from failure [14,30,33,35,36]. Communication at the handover can also furnish new perspectives on a patient's situation as a result of the outgoing party's renewed attention to it while preparing for the handover, or of the incoming party's "fresh perspective and a rested mind" [29]. By examining the assumptions underlying actions, a process Patterson and colleagues call "collaborative cross-checking," errors can be caught and their effects minimized [37]. Similarly, from a resilience viewpoint, nurses administering medication, are the "the last line of defense" [38], that can identify, correct and bounce back from errors, previously conducted by pharmacists or physicians.

To sum up, while standardization efforts may have their place, we still need to learn more about how individuals and organizations

create foresight, coping strategies and recovery strategies so that they can better manage the efficiency–thoroughness tradeoffs [14,39]. Addressing this issue, the main aim of the current paper is to present insights gained from three studies with healthcare providers on how, in their routine practice in the medical ward, they manage the balance between efficiency and thoroughness in striving to maintain patient safety. We will present findings from three studies, which explored different health-provider–patient encounters such as handover, medication administration, and providing care, which require safety precautions. Finally, on the basis of these findings, we develop a theoretical model for better understanding how day-to-day life in healthcare organizations shapes safety.

Study 1: Nurses safety behaviors: Protecting their own

This study [40] comes at a time of emerging consensus that successful safety initiatives will depend on a theoretically sound understanding of employees' perceptions, cognitive processes and heuristics [25,28]. It focuses on the hospitals' standardization efforts to facilitate nurses' compliance with safety rules and procedures when they are exposed to health hazards during care provision. Specifically, the aim of the study was to understand the decision-making processes that led to nurses' conclusions about a particular safety risk: whether real-hence requiring compliance with safety rules, or theoretical-hence allowing cutting corners and ignoring safety rules.

This qualitative study took a multi-method approach, including semi-structured interviews (perceptions), observations (real-time behavior) and documentary evidence. The sample consisted of 90 nurses from 15 nursing units (internal, geriatric and pediatric) [40]. Content analyses of the interviews and the observations revealed that nurses' generally were aware of the high occupational risk factors at their workplace. Specifically, 94% of the nurses identified the biological hazards (e.g., blood borne pathogenic exposures such as HIV, HCV, HBV); 89% identified the physical hazards (e.g. skeleton injuries); 56% identified the emotional hazards (e.g., burnout); and 32% identified chemical hazards (e.g., allergic to latex). In addition, nurses also recognized the safety procedures aimed at diminishing these risks: 91% of nurses acknowledged procedures to protect themselves against the biological hazards; 93% of nurses acknowledged procedures to limit physical hazards; and 45% acknowledged procedures to limit chemical hazards. Yet, we also found, in keeping with previous research, that they frequently cut corners and did not comply with these safety rules [28]. Nurses apparently developed implicit rules for when and how to protect themselves. These findings show that whereas nurses' non-adherence to safety rules might seem random, it occurs in systematic and predictable ways. Many of these deviations from safety procedures stemmed from the uncritical use of implicit theories, heuristics, rules of thumb, and self-assessments, which led to biased decision-making in day-to-day conduct in the unit [22].

Specifically, we identified five such implicit rules

- Continue caring for patients, even at the cost of risk to themselves. Nurses acting by this implicit rule tended to weigh up the pros and cons of handling patients without protection, and set the provision of quality care for patients as the higher priority. In contrast to the notion that nurses are reluctant to comply with procedures owing to ignorance and lack of awareness of risks or safety procedures [28], we found that they tended to derive a sense of competence and wellbeing from their ability to continue caring for patients even at the cost of risk to themselves. Expressions such as "You have to move on" and "You can't let things get to you" might reflect a way of containing these events, when needing to move forward and help other patients. If this is so, it is somewhat disturbing that coping mechanisms that serve to protect the individual psychologically also serve to impede organizational efforts to improve occupational safety [22].
- A professional must cope by him/herself! Nurses found complying with safety rules bothersome, because it often necessitated waiting and it increased their dependence on others, with possible damage to their professional reputation. Consequently, nurses preferred to work independently at the risk of harming themselves. Social support literature is prolix on the potential social cost of seeking help. It highlights its negative effect, as it is experienced as potentially stigmatizing and a threat to the worker's self-esteem and public image [41]. However, such self-reliance and individual problem-solving efforts work against organizational efforts to implement safety rules, particularly those that embrace teamwork as a means of protecting oneself (as in the case of avoiding physical hazards when handling and moving patients).
- "It can't happen to me!" Nurses noted that their experience, professional judgment and competence could "immunize" them against risks, so they could safely continue providing care while unprotected. This motif in nurses' decision-making is in line with the self-serving bias, namely that when good fortune chances on individuals, they believe that it is somehow deserved because of their good qualities and skills, and is therefore justified [22]. The problem, of course, is that when people minimize their role in adversity and exaggerate it in success they perpetuate a falsehood.
- The recency (white bear) effect referred to the prevalence of an inverse U-shaped accumulation of safety behaviors. Frequently, after an accident attention was focused on the specific location to guard against recurrence, whereas before and after the accident safety behaviors faded out. This guiding principle in nurses' decision-making processes is in line with the recency bias [42]. Nurses, like other people, judge certain events to be frequent or infrequent by how easily they can recall specific examples of the event. If relatively infrequent events that harm nurses go unreported and are not openly discussed, they remain unremarkable, so it is not surprising that nurses in our sample did not consider infection with a contaminated needle a problem in their institutions [28]. At the same time, infrequent, vivid events make a powerful emotional impact because of their tragic nature and recent occurrence, and are more available for recall.
- "Protect yourself only when others are watching," in particular the head nurse. This finding is in keeping with social facilitation theory [43,44], which asserts that the presence of others (especially significant others) facilitates adherence to social standards and goals, in contrast to situations in which the individual works alone. In sum, our findings revealed that in their attempt to cope with the complex work environment constrained by high demands, low

staffing, and multi-tasking, nurses, like other decision makers, developed implicit theories on whether or not to comply with safety rules, which gradually substituted the formal safety rules.

Study 2: Nurses' safety behaviors: Protecting their patients during medication administering

Medication errors can occur at any time along the continuum of the medication system, from prescribing to administering. [45] found that most errors occurred at the transcription stage (56%), followed by the stages of nurse administering (41%) and doctor prescribing (39%). A much lower error rate was evident at the pharmacy dispensing stage (4%). This study focuses on the complex and demanding medication administration stage, conducted by nurses. Similar to study 1, it focuses on the hospitals' standardization efforts to facilitate nurses' compliance with safety rules and procedures. However, whereas study 1 focused on compliance aimed at guarding nurses' safety, in this study we centered on nurses' safety behaviors during medication administering aimed at guarding the patients' safety. Hence, the aim of the study was to identify and explain under which conditions nurses choose to follow the safety guidelines concerning medication administering, in contrast to the circumstances in which they choose to deviate from them.

The study employed an observational design. Participants were 360 nurses at four large urban hospitals working in 76 nursing wards [46,47]. Medication administering safety was measured as any deviation from its standard procedure. This procedure consists of nine distinctive steps: verifying the physician's prescription of medication, prescription documentation in the cardex (nurses' reporting sheet), preparation of the medication for a specific patient, bedside patient identification before administration of the drug, taking relevant measurements (e.g., blood pressure), giving information about the medicine, giving the medicine and ascertaining that it has been fully taken, signing the cardex to confirm administration of the medication, and checking for possible side effects. Our findings indicated that the mean medication administration error ratio was [28]. Computing the ratio of nurses' compliance with each of the nine steps in medication administration, we found that four were consistently performed by all nurses, with negligible deviations from the procedure: verifying the physician's prescription of medication, documenting the prescription in the cardex, signing the cardex to confirm execution of the medication administration, and medicine provision. In 22% of the observations, nurses did not adhere to the guideline to identify the patient by name prior to medication provision. Next, in 31% of the observations, nurses did not prepare the medicine according to the "triple check" principle, and in 37% of them nurses did not take relevant measures (e.g., blood pressure) during the medication administration, as required. More importantly, in 62% of the observations nurses did not provide the patient information about the medicine, and almost in all cases (97%) they did not check for possible after effects. We also compared the compliance ratios of nurses who did and did not use computerized medication administration. Only in two out of the nine steps of medication administration, computerization proved significantly safe as compared with manual medication administration: preparing the medication was (22% and 37% respectively), and identifying the patient (17% and 24% respectively). However, computerization was significantly less safe than manual medication administration in taking patients' relevant measures (44% and 32% respectively), and administering the medicine (6% and 0.06% respectively). Finally, non-significant differences

between computerized and manual medication administration were found in the remaining five medication administering steps.

Our findings match previous results, suggesting that the reasons for non-compliance with medication administration guidelines are mostly cognitive rather than stemming from lack of knowledge or motivation [48,49]. Nurses seem to choose primarily to follow guidelines that are more easily supervised by the ward's management, and to neglect those typically performed at the patient's bedside, hence more difficult to monitor [40,48]. Other authors noted that nurses frequently weighed the risks of not following the exact guideline (e.g., not providing the patient information about the medication) against the benefits of continuing the care for patients, and generally preferred the latter [50,51]. Another example is poor adherence to the procedure of checking possible side effects or providing information about the medication. When approached, nurses explained that because they were familiar with the patient it was not necessary to replicate these procedures at each administering of medication. And because they had provided the patient with the medication before, with no adverse consequences, there was no need to repeat these procedures. As not clinging to the guidelines generally does not result in serious accidents, many nurses do not acknowledge the fallacy of their choices, and mistakenly perceive their implicit theories as correct, thus contributing to the worsening rates of medication administration errors [40]. Our findings on the use of medication administration technologies as means to limit errors accord with previous studies. That is, despite their great potential, the contribution of such technologies to patient safety has not proven very solid: certain types of errors are indeed reduced (e.g., errors due to prescriber's handwriting), others are not. Even more striking, a new generation of errors came into being when technology interacted with real-life care practice [52,53]. Our findings attest to a generally beneficial impact of technology on medication administration errors. Yet closer inspection shows that while computerized administration was significantly safer through the steps of preparing the medication and identifying the patient, it was less safe through those of taking patients' relevant measures and administering the medicine, and non-significant in all the other steps. This pattern of findings illustrates that technologies can help in giving the right medication to the right patient, but may be less effective in preventing other, less vigilant deviations, committed at the patients' bedside. Nevertheless, why nurses comply with some steps, and not with others, remains unknown, and merits more research through qualitative, in-depth studies of the implementation sites [52,54].

Study 3: Maintaining patients' safety during handovers

Taking the resilience approach, this study addresses recent calls in the literature to examine "what varied anticipatory techniques healthcare practitioners already use to develop their intuition and foresight so that they can prospectively manage and cope with ambiguity and uncertainty" [14]. More specifically, we focused on maintaining patients' safety during handovers. Our aim was to identify the working strategies nurses develop and employ in their day-to-day routine in an attempt to identify "red alerts" which enable them to maintain patient safety in the loaded, noisy, constantly interrupted and fragmented typical handover.

This qualitative study involved 18 nurses in the surgery division of a large hospital. They were interviewed individually through semi-structured in-depth interviews. Content analysis of the interviews revealed that while all the participants emphasized the importance of the declared handover procedure, they described how it was

informally shaped to create a procedure "in practice," which better conformed with ward reality. Moreover, in an attempt to cope with the ward's daily routine, characterized by high overload and numerous interruptions, the healthcare providers developed and operated strategies to bridge the gap between the declared and the actual procedures, so as to accomplish better the goals of the nursing handover, as they perceived them. We identified the following strategies:

- Comparing verbal information from the departing nurse with the impression gained personally at the patient's bedside. This impression allows identification and treatment of urgent problems.
- Comparing the patient's existing condition with the disease's normative process. Incongruity between the patient's current condition and the expected condition turns on a red light and calls for an immediate, more comprehensive examination of the patient.
- Comparing verbal information delivered during the handover about a patient's condition with written reports. This strategy rests on listening to the ideas of team members, without accepting them as is. Then the information is checked against written reports for an independent evaluation of the patient's condition.
- "Ten minutes early." This strategy is typical primarily of head nurses and shift managers. It is meant to produce an impression of the general atmosphere in the ward, with exchange of experiences during the previous shift with the outgoing team, and obtaining managerial information on the situation in the ward regarding expected admissions or releases.

To sum up, one of the most important goals of a nursing handover is delivery of comprehensive and correct information in order to maintain care continuity. Nevertheless, respondents described great difficulty in dealing with the information load and the pressure during a handover. Hence, the nurses developed resilience strategies to cope with the load while delivering the information necessary for further treatment. They actively look for contradictory pieces of information from the various sources, which then serve as red flags. These guide nurses in handling patients' care, which in turn helps in identifying errors, and preventing them in the first place.

General Discussion: Towards a Resilience Model of Care

The findings from these studies helped develop a theoretical model (Figure 1) that describes how understanding aspects of the day-to-day life in healthcare organizations, and the system of meaning that guides everyday life, can inform our understanding of safety. The model starts with what an "ought to be" box; this refers to the formal/declared aspects of work, such as declared goals, formal role descriptions, procedures, and guidelines. But due to the complex work environment constrained by high demands, low staffing, and multi-tasking, these "ought to be" goals and work procedures cannot be fully executed in the day-to-day routine of the ward. Instead, nurses develop feasible goals, procedures, and practices that enable them to balance efficiency and thoroughness.



Figure 1: a Multi-level model for understanding safety

This is represented in the model by the "what actually is done" box. This declared-in practice transition of goals was exemplified in our three studies. Nurses admitted that they could not adhere with all safety precautions to protect themselves, due to overload, life-risking situations, lack of equipment, and emphatic concern towards their patients. They were observed as not complying with all the steps of the medication administration procedure, due to lack of time and less control. Finally, nurses re-defined their goals, so it better fits their needs in the chaotic context where care is provided.

The model further proposes two possible strategies for handling the discrepancies between the "ought to be" and "what is actually done" in the ward: relying on implicit theories and resilience strategies. These two strategies differ in several respects. First, whereas the resilience strategy is about a proactive, forecasting approach; relying on implicit theory strategy reflects a reactive approach, which mistakenly relies on biased probabilities. Further, while the former draws on professionalism and expertise, the latter reflects pseudo-professionalism, which encourages acting on "an automatic pilot" mode.

The first strategy describes how nurses rely on implicit theories, heuristics, rules of thumb, and self-assessments in their effort to cope with workplace constraints. Examples are "Continue providing care for the patient even at the price of protecting yourself," "Do not disturb other nurses' work," "It can't happen to me!" "De aware of recently occurring accidents," and "Protect yourself when significant others are present." These implicit theories serve as decision rules for determining when to go by the book and follow the declared goals and procedures, and when it is possible to cut corners.

These implicit rules seemed to be reinforced by personal, social and contextual factors at the unit (feedback loops), limiting the likelihood that the decision makers (nurses) will discover their misperception. First, at the personal level, taking pride in one's competence to provide quality care for patients and saving lives in emergencies without the assistance of others, might serve as an immediate reward for not using personal protection equipment, for cutting corners in the medication administration process, or in not devoting equal time and effort to every patient during and after handover. The negative reward, namely the possibility of personal harm, or harm to the patient, was deferred, and was thus less reinforcing [51]. Consequently, nurses apparently preferred efficiency over thoughtfulness [39], as it provided them with an immediate reinforcement that they were professional and could manage patient's care albeit the obscurities.

Secondly, nurses, like other individuals working in teams, look to others as valuable sources of information and behavioral guidance. Research suggests that teams may serve as powerful sources of norms for their members regarding how to behave [55]. Further, social learning theory posits that people learn by observing the behavior of others [56]. For example, if nurses perceive that physicians or other staff members do not comply with the safety rules, they will tend to conform to this norm [22]. In similar vein, if nurses perceive that following structured forms of handover, or using checklists, is conducted only by novices, they will tend to ignore these aids as well.

Finally, because cutting corners does not usually result in serious accidents, many nurses do not acknowledge the fallacy of these heuristics, and mistakenly perceive their implicit theories as correct. Moreover, as our findings indicate, because of organizational silence, namely the collective-level phenomenon of doing or saying very little in response to serious organizational problems [57,58] such as occupational safety, even the infrequent accidents are swept under the carpet. Incidents that are not acknowledged or brought out into the open cannot be addressed. Relying primarily on the implicit theories strategy raises the probability of low safe and quality care.

The second strategy depicts the resilience perspective, where nurses actively develop anticipation, intuition and foresight capacities to prevent something bad from happening or becoming worse, and to repair something bad once it has occurred [14]. For example, in the case of handovers, these strategies represent ways of examining the assumptions underlying actions through the constant search for inconsistencies-a process [37] named "collaborative cross-checking." It is about actively identifying "red alerts" that help nurses prevent something bad from happening. Thus, errors can be caught and their effects minimized, and safety is improved. In the case of medication administration, the resilience strategy captures nurses awareness that they can prevent an error, thus identifying red alerts to how, when and where an error can occur.

Similarly to the implicit rules strategy, the resilience strategies can be reinforced by personal, social and contextual factors at the unit (feedback loops), facilitating the likelihood that nurses proactively detect and handle risks, errors and deviations from best practices. First, at the personal level professionalism provides nurses with the necessary knowledge and skills required for identifying the red alerts [14]. Accordingly, resilience strategies are built upon experience and wisdom gained through experience. It is the "know how practices", professionals develop in order to identify red alert, and that help them to identify vulnerability, as well as to bounce back from it [38]. These resilience strategies frequently distinguish among novices and experts [14]. Secondly, on the ward level a climate of mindfulness may prevent nurses from operating in "automatic pilot" mode. It encourages resilience by casting doubt, raising questions, and producing inferences when monitoring ambiguous cues. Mindfulness compels nurses to anticipate and process cues preventively to make better predictions; take a wide range of global and local data into account in diagnosis encode new information quickly and completely [4]. Thirdly, on the organizational level, raising awareness of errors can also encourage resilience. Discussions of near misses and accidents, independent of their actual likelihood, at staff meetings, in written protocols and in informal storytelling will highlight the salience of errors and their perceived risk [22].

Summary and Implications

The chaotic, turbulent, and complex environment that characterizes the nurses' workplace prevents them from fully complying with declared goals practices and procedures. Yet even under these near-impossible circumstances, the nurses' main mission is to maintain patients' safety. Embracing the resilience strategy allows nurses to actively prevent something bad from happening or becoming worse, and to repair something bad once it has occurred [14], which of course contribute to patients' safety. This is where managers can encourage nurses' resilience by creating a work environment of professionalism, mindfulness, and awareness of errors. Otherwise, nurses might rely on

implicit theories, limiting the likelihood that they will discover their misperception, thereby risking patient's safety.

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