Untenable Expectations: Nurses' Work in the Context of Medication Administration, Error, and the Organization

Sara F. Hawkins[1] iD and Janice M. Morse[2]

Abstract

We explored nurses' work in the context of medication administration, errors, and the organization. Secondary analysis of ethnographic data included 92 hours of non-participant observation, and 37 unstructured interviews with nurses, administrators, and pharmacists. Think-aloud observations and analysis of institutional documents supplemented these data. Findings revealed the nature of nurses' work was characterized by *chasing a standard of care*, *prioritizing practice*, and *renegotiating routines*. The rich description identified characteristics of nurses' work as cyclical, chaotic and complex shattering studies that explained nurses' work as linear. A new theoretical model was developed, illustrating the inseparability of nurses' work from contextual contingencies and enhancing our understanding of the cascading components of work that result in days that spin out of the nurses' control. These results deepen our understanding why present efforts targeting the reduction of medication errors may be ineffective and places administration accountable for the context in which medication errors occur.

Keywords

ethnography, medication errors, models (theoretical), nurses, patient safety, Northwestern United States

Nurses are accountable for, and vulnerable to, institutional safe medication practices and make this their highest priority; yet, contextual factors relevant to nurses' work encompassing medication administration are not well understood. Recent events, May 2022, involving the criminal conviction of a registered nurse for a medication error have spotlighted the significance of understanding the context of nurses' role in medication administration. Thus, the ethical, professional, and moral ramifications for the nurse as well as to the hospital, the patient and family, and the nursing profession as a whole need to be identified and addressed (American Nurses Association, 2022; Kellman, 2022).

Even though researchers recognize that medication errors are associated with the context of medication administration, research has not yet investigated the process of giving medications in context of the nurses' workflow. Efforts to quantify nursing workflow or nurses' work are few and have been limited to work sampling, time-motion studies, and self-reporting. Such approaches often separate nurses' work into categories of medication-related activities and non-medication related activities (Burke et al., 2000; Keohane et al., 2008) and fail to consider the cognitive workloads associated with these activities.

The prevailing assumptions remain that errors can simply be reduced by streamlining, partially automating processes, and decreasing interruptions during medication administration. While, Leeman and Sandelowski (2012) note that this rationale is flawed, this approach to resolving errors continues today. Only one study was found to explicate the complexity of medication administration through an ethnographic study of workplace turbulence (Jennings et al., 2011). Jennings defined turbulence as the "disorder and turmoil that characterizes contemporary hospital environments" (p. 1442). As such, Jennings et al. suggested that medication administration was inseparable from other nurses' work and temporally structured the entire workday.

With the aim to further depict the nature of nurses' work, we use secondary analysis of clinical ethnographic data to extend the work of Jennings beyond the lens of medication administration by (1) exploring the internal and external structural standards arising from the organization and the nurse; (2) drawing attention to how direct patient care can be placed secondary to the conventions of

[1]Eastern Idaho Regional Medical Center, Idaho Falls, USA
[2]University of Utah, College of Nursing, Salt Lake City, USA

Corresponding Author:
Sara F. Hawkins, Director of Patient Safety & Risk, Eastern Idaho Regional Medical Center, 3100 Channing Way, Idaho Falls, ID 83404, USA.
Email: sara.hawkins@hcahealthcare.com

medication administration; and (3) developing a theoretical model that adds insight and understanding of the conditions that cause the workday to cascade to an out-of-control situation.

Background

Serious medical errors in general pose a significant threat to patient safety as evidenced by mortality rates and cost. Overall mortality associated with preventable hospital care is approximated to be as high as 400,000 deaths per year (James, 2013) at a cost of $20 billion per annum (Rodziewicz et al., 2022). Investigating the circumstances of medical errors, Prothero (2020) classified five circumstances of medical error among nurses: accidental errors; unanticipated errors; distracted errors; unrecognized errors; and external errors. The staffing shortage and pressures on workload that occurred during COVID may have measurably increased the numbers of accidental and distracted errors in the clinical setting (Bruyneel et al., 2022; Hoogendoorn et al., 2021; Kakemam et al., 2021).

Medication administration is highly error prone and contributes to most adverse hospital events at a cost that exceeds an estimated US $871 million annually (de Vries et al., 2008; Slight et al., 2018). Medication errors, which are considered preventable (Hines et al., 2018), are reported to occur between 2.4 and 11.1 per 100 doses administered (Committee on Identifying and Preventing Medication Errors, 2007). Research confirms that most errors during medication administration occur from distraction, interruptions, alert fatigue and nursing workload (Huckels-Baumgart et al., 2021; Schroers et al., 2020; Slight et al., 2018). Nurses administer as many as 50+ medications per shift (Hawkins et al., 2017; Mayo & Duncan, 2004) placing the nurse in the most vulnerable and accountable position with increased potential for error.

The competence of the nurse, the controls which surround the medication use process, and the culture of the organization are central elements to consider in the reduction of medication errors and have been well studied (Barber et al., 2003; Hawkins et al., 2017; Leape et al., 2009; Reason, 2000; Sarfati et al., 2019). The prevention of medication errors is fully integrated into nursing education through the "5 Rights"[1] of medication administration. This checklist is long rooted in nursing practice and provides a historical framework for judging nursing competence (Hanson & Haddad, 2021). High fidelity simulation has also emerged as a successful pedagogy integrating human factors, technology, and experience-based training to reduce medication errors (Ardern, 2021; Sarfati et al., 2019).

The success of computerized provider order entry (CPOE) with clinical decision support (CDS), bar coded medication administration (BCMA), automated dispensing systems, and medication reconciliation processes in mitigating human factors associated with medication administration are well documented (Slight et al., 2018). However, the negative impact technology has on cognitive overload, misguided trust, and circumvention of competencies cannot be ignored (Hawkins et al., 2017). This negative impact was intensified during the COVID-19 pandemic as nurses were faced with the rapid and forced introduction of emerging crisis technologies on top of staffing shortages, burnout, personal protective equipment rationing, and high-level exposures to infection (Dykes & Chu, 2021).

With competency, controls, and culture in perspective, long shifts during the day or at night (typically lasting 12-hours or more) accompanied by variable and heavy workloads all affect nurses' levels of performance (Vitale et al., 2022). From the perspective of healthcare organizations, a growing body of evidence supports the importance of the context of care and organizational resilience to promote psychological safety for nurses. This psychological safety is characterized by an adequate workforce, mutual trust, collaboration, and non-punitive responses to error (Hines et al., 2018; Machen et al., 2019; Rangachari & Woods, 2020). Leape et al. (2009) noted that regulations and forced functions alone are inadequate and impractical for safe care. The timely provision of care is often the metric used to measure the performance of the nurse (Van Scotter, 2000). To adequately explore the complexity of the nursing care system within the larger system, we frame our study within the boundaries of the shift.

Theoretical Perspective

Patterson et al. (2002) defined workload as a perception of task demands by the nurse. This workload historically is viewed as having a beginning and an end and thus measured by the construct of time (Jennings et al., 2011). Pressures on nurses' work time results in tension between actual time (clock time) and perceived time (process time) characterized as unpredictable and non-linear (Davies, 1994). Process time may result in periods of waiting as the nurse completes other or "parallel" tasks (Davies, 1994, p. 280). Patterson et al. (2002) identified that during medication administration, nurses may compensate for this tension by trading accuracy for speed, reducing performance criteria, shedding tasks, deferring tasks, and recruiting resources from other personnel (p. 543). Figure 1 below shows other activities that were considered a higher priority and superseded medication administration.

As workload increases, the perception of clock time decreases while process time may increase or decrease. Examining nurses' work as tumultuous activity, in the context of competing perceptions of time, Jennings et al. (2011) noted that the function of medication administration required nurses to structure their work day around complex and often competing demands. Jennings (p. 1448) noted that nurses may build in efficiencies to their workload by clustering tasks, multi-tasking, or managing the tasks through work-arounds.
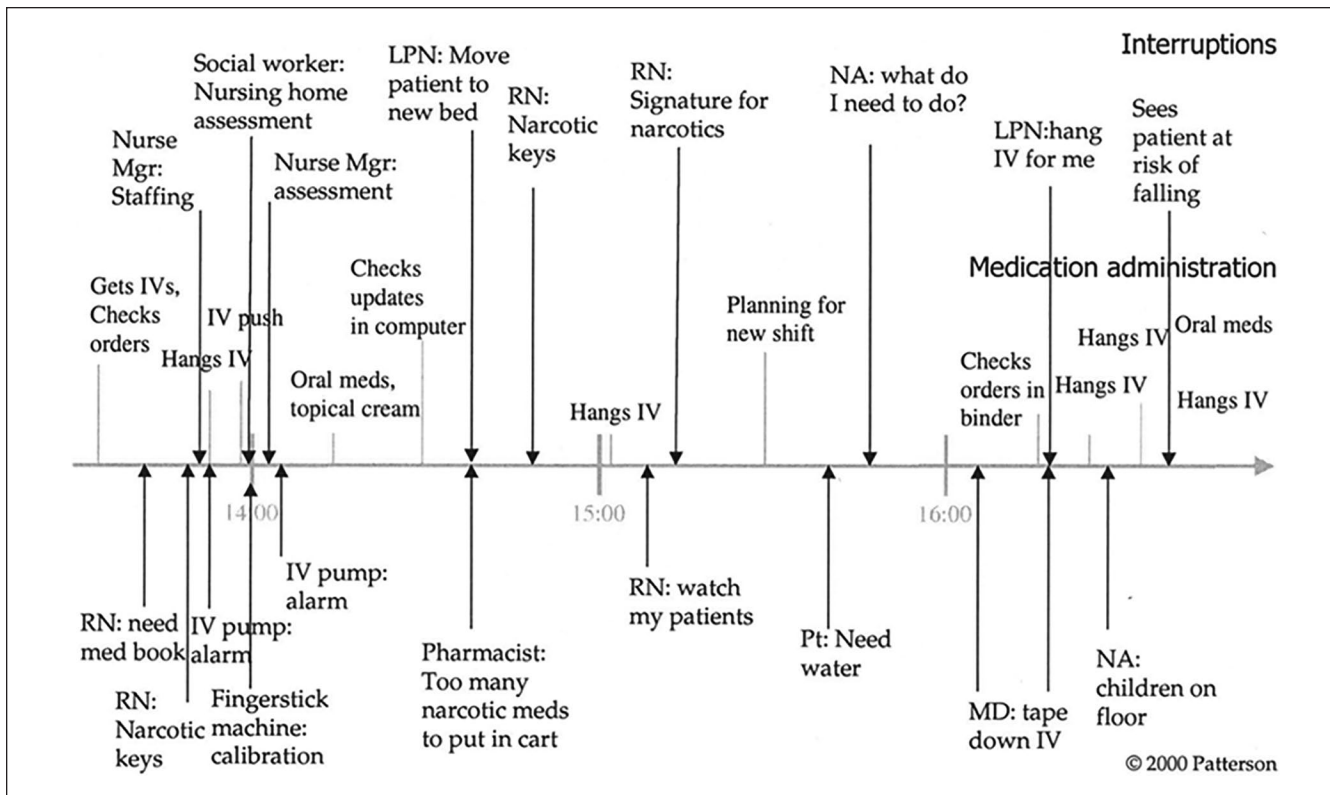
Figure 1. Example of Workload.
Note. Interruptions during medication administration prior to the introduction of barcoded medication administration (BCMA). After the technology was introduced, nurses became acutely aware of the timeliness of medication delivery, creating tradeoffs in the completion of other work.
Source. Patterson et al. (2002), Used with permission.
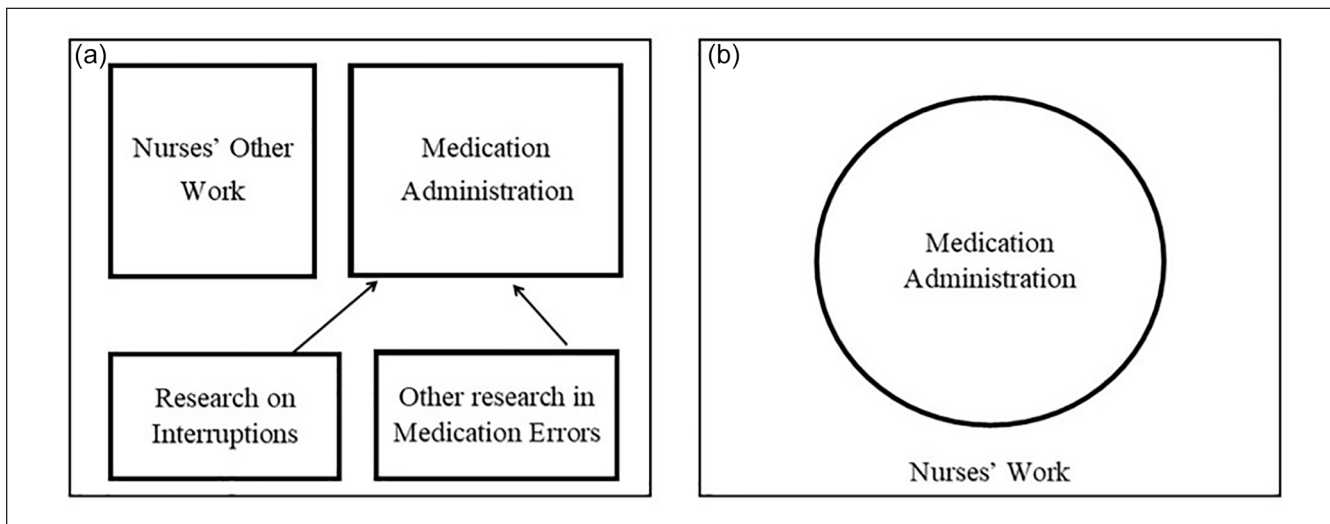

Figure 2. A comparison of perspectives on nurses' work. (a) depicts research designs segmenting medication administration from nurses' work. (b) shows research exploring medication administration as a delineated component of nurses' work.
Source. Hawkins et al. (2017).

This restructuring did not have defined temporal boundaries as shown in Figure 2a. Rather, it was inseparable from nurses' other work as depicted in Figure 2b.

Because administering medications inherently includes interruptions from patients and families, or inquiries from other nurses or physicians, research that emphasizes reducing

interruptions as an intervention for decreasing medication errors is invalidated. The inseparability of medication administration from other nursing work further amplified the pressures between clock time and process time.

The flow of medication administration can be further complicated by changes to patient presentation, a need to validate or clarify medication orders, patient or family questions amongst other activities. The result is that nurses sequence medication administration with the goal of giving "as many medications 'on time' as possible" (Jennings et al., 2011, p. 1448). While Jennings' work was not focused primarily on medication errors, it identified that nurses' working environment is chaotic and is in the *context of nurses' work that errors occur.*

What is ultimately determined is that giving medications cannot be separated from other tasks. Even when nurses reprioritize their workday to increase efficiency by clustering other activities, multi-tasking, and developing time-saving workarounds, these do ". . .not allow them to isolate medication administration as a discrete uninterruptible event". Thus, the theoretical framework for this study (see Figure 3) uses the Patterson et al. (2002) perspective of prioritization of competing tasks and the Jennings et al. perspective of nurses' work.

Method

Methods of clinical ethnography have been established in nursing for three decades and were designed to enhance understanding of nursing care (Germain, 1979). This research undertook a secondary analysis of ethnographic data collected from man-on-the street interviews[2]; 92 hours of nonparticipant observation; 3 think-aloud interactions; and 37 unstructured interviews with licensed nursing personnel, pharmacists, physicians, and administrators. Additionally, observations of patient responses to care delivery were recorded in fieldnotes. Key documents reviewed, included hospital policies, and data collected by the facility on daily census and medication administration. The project was approved by the University of Utah Institutional Review Board (IRBNet ID [942586-1] [803414-1]) and informed, voluntary, written consent was obtained prior to any focused observations or scheduled interviews, with processual consent used throughout.

Sample and Setting

The original study was conducted on an adult medical unit in a mid-sized urban hospital part of a larger healthcare organization in the United States. The average patient census on the unit was 29 and in all, the unit employed 34 licensed Registered Nurses and five Licensed Practical Nurses in addition to a cadre of unlicensed assistive personnel. Using purposive sampling, recruitment began in unit staff meetings and participants were selected based on willingness to
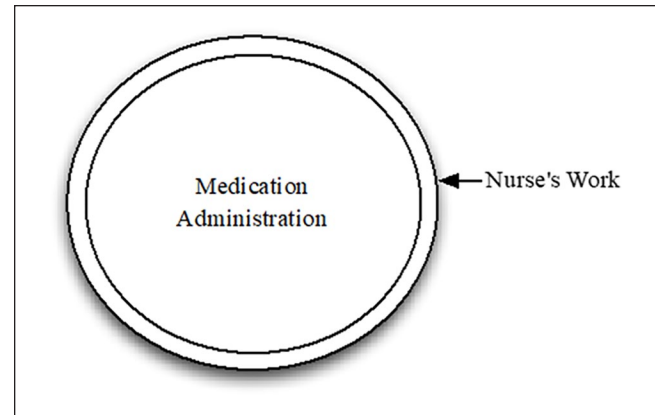

Figure 3. Hypothetical Model for Data Collection. Researchers perceive medication administration as defining nurses' work with other tasks scheduled around, clustered, or multi-tasked with medication administration.

participate. While the primary focus was the medical unit and its staff, the scope of this study extended to those departments involved with quality, risk management, pharmacy, and hospital administration. Socio-demographic data were self-reported by study participants.

Data Collection

Fieldwork spanned a 4-month period, beginning with broad observations by Hawkins in the unit to describe the physical setting, unit activities, and participant interactions. This period of observation enabled staff to become accustomed to Hawkins and enabled her to be oriented to both the workflow and staff. Using Jennings et al.'s (2011) protocol, observations were done in 4 to 5-hour increments, covering the full 24-hours of the day, 7 days per week. Using non-participant observation, nurses were accompanied as they went about their planning, decision making, and interactions with patients, physicians, and colleagues.

Man-on-the street interviews were used to engage participants. These conversations were short, information-seeking questions and discussions (Schütz, 1946; Spradley, 1979). Individual, in-depth, unstructured recorded interviews (from 25 to 60 minutes) were conducted during work breaks or after shift in private locations. These interviews began with demographic questions, followed by an open-ended question: "Tell me about your typical day on the unit." More targeted questions, such as "Some people say _____; is this how it is for you?" were based on participant responses, were useful in verifying and increasing the depth of these data. In some instances, for further validation, second interviews were conducted. More in-depth data were collected into factors guiding decision-making using the think-aloud technique (Lundgrén-Laine & Salanterä, 2010). By wearing a lapel microphone for periods up to 2 hours, three participants verbalized their thinking while performing patient care.

This unstructured data provided important details about the context affecting work and the nurses' perceived mood of the workday.

Last, de-identified records (from 12/2015 to 2/2016[3]) were examined for total admissions, transfers to- and from-the unit, and discharges. A total of 1,696 events were included in the dataset and analyzed for number of turnover events by month and time of day, offering a better understanding of the unpredictability and turbulence known to complicate care delivery (Browne & Braden, 2020; Jennings, 2021; Jennings et al., 2011, 2022; Salyer, 1995).

Data Analysis

Observations, recorded as fieldnotes and transcribed interviews were analyzed by one author from the early phases of data collection. Analytical notes and memos were embedded into transcripts linking insights with text, and a research journal and working audit trail was maintained throughout. Qualitative data analysis software, QDA-Miner® with WordStat® was used to manage transcripts, coding, and analysis. Conventional content analysis enabled classifying and coding text line-by-line, into broad, then more specific categories representing patterns. As such, descriptions of behaviors and developing patterns central to the concept of nurses' work were identified.

Sufficient data for in-depth analysis, redundancy of categories, and comprehension were collected (Morse, 2015; Morse et al., 2002). Objectivity during the collection and organization of observational data was carefully maintained, while credibility and fittingness were derived through validation of findings and reflexivity (Angrosino & Mays de Pérez, 2000). A continual process of reflection allowed us the opportunity to examine our own assumptions, precognitions, and bias, thus strengthening the overall integrity of the research (Finlay, 2002).

Findings

Primary participants were 25 licensed registered nurses (RN) and three licensed practical nurses (LPN) responsible for medication administration on the medical unit (20 female: 8 male) and worked in two shifts, day and night. The average age of the nurses was 36 years (ranging 20–59 years). All but three participants (11%) worked full-time; experience ranged from 5 months to 38 years; and 61% of the nurses had less than 5 years of experience. Data were collected from other administrative and ancillary employees (n = 9): Nursing Administrator, Director of Quality, Director of Pharmacy, Unit Director, Quality Staff RN, RN Staff Educator, House Supervisor, Physician, and two clinical pharmacists. The participants detailed demographics are provided in Table 1.

The following categories were constructed from the raw data: (1) *chasing a standard of care*, (2) *prioritizing practice*,

Table 1. Demographic Information on Participants [N = 37].

Characteristics	Participants numbers/total (%)	
	Staff Nurses on Unit (n = 28)	Ancillary and Other (n = 9)
Age in years		
20–29	11 (39.3)	—
30–39	6 (21.4)	3 (33.3)
40–49	7 (25.0)	5 (55.6)
50–59	4 (14.3)	1 (11.1)
Sex		
Males	8 (28.6)	5 (55.6)
Females	20 (71.4)	4 (44.4)
Race and ethnicity		
Asian	1 (3.6)	—
Non-Hispanic White	28 (96.4)	9 (100)
Licensure type		
Registered nurse	25 (89.3)	6 (66.7)
Licensed practical nurse	3 (10.7)	—
Doctor of pharmacy	—	2 (22.2)
Doctor of medicine	—	1 (11.1)
Experience in years		
<0.5	1 (3.6)	—
0.6–5.5	16 (57.1)	1 (11.1)
5.6–10.5	4 (14.3)	1 (11.1)
10.6–15.5	1 (3.6)	4 (44.4)
15.6–20.5	4 (14.3)	1 (11.1)
20.6–25.5	—	1 (11.1)
25.6–30.5	—	1 (11.1)
30.6–35.5	1 (3.6)	—
35.6–40.5	1 (3.6)	—
Employment on unit in years		
0.25–5.25	18 (64.3)	6 (66.7)
5.26–10.25	3 (10.7)	3 (33.3)
10.26–15.25	2 (7.1)	—
15.26–20.25	4 (14.3)	—
30.26–35.25	1 (3.6)	—

and (3) *renegotiating routines*. Chasing a standard of care, was described as organizational structure, attempting to meet both internal and external standards, but never quite achieving the desired changes. This appeared to be beyond the local control of hospital nursing administration, the hospital board, and larger corporate interests. Forced reorganization and shifting priorities, hallmarked by medication schedules and patient turnover, described prioritizing practice. Renegotiating routines included managing the cognitive overload and ambiguity, and contained the elements of sloppy practice, impotence and/or indifference. Last, a description of perceived moods of the day identified factors (pace of work, patient demands, and staffing levels) that could contribute to medication errors. The following analysis of each category with identification of its associated components portray the characteristic nature of nurses' work.

Chasing a Standard of Care

Aiming for zero preventable harm, this mid-size hospital focused significant resources to the development of systems and processes to prevent untoward patient outcomes. This drive toward zero harm had significant trickledown effect largely dependent on the realization of changed behaviors in nursing staff. Nurses were admonished to adjust practice ("if only nurses did this, then. . ."), but were not given the resources to do so. Even though some of these expected behaviors were the responsibilities of other departments such as pharmacy, these admonitions were placed squarely on the shoulders of nurses (see Hawkins et al., 2017). Participants from administration in this study spoke about this burden of responsibility in the context of organizational structures and standards and difficulties encountered, but were unable to effect change to assist nurses at the bedside.

Organizational Structure

Federal-level mandates, including value-based reimbursements, patient satisfaction and quality measures; corporate-level mandates surrounding budgetary constraints and productivity, surfaced frequently. These factors placed significant pressure on the nurses to achieve optimal patient care. Specific examples of organizational structure are shown in List 1 while detailed exemplars of internal and external standards are provided below.

Internal standards

Staffing. Staffing productivity quickly emerged as a prevailing internal standard which governed everyday activities. Staffing matrices were strictly adhered to, with strategies heavily geared toward compliance; they left little room for reserve and less opportunity for innovation and customization based on local values and norms within a facility, already feeling the sting from understaffing and declining recruitment. Nursing administration was aware:

List 1. Examples of Organizational Structure

Internal Standards
- Staffing Productivity
  - Patient load of 5–6 patients at the limit for safety
  - Cross trained unlicensed personnel
    - Poor communication and competency
- Policy
- Medication management system

External Standards
- Compliance measures
  - Patient satisfaction
- "Others can do it, why can't you?"
- Interactions across disciplines
  - Lack 10,000-foot view

The patients are very sick and somewhat demanding. Our productivity is pushed to the absolute limit. There's no extras, there's not a person that [sic] is not doing something that can help you. You understand there just physically aren't as many bodies around to be able to help backfill and help with the work.

As a subunit of a larger parent organization with accompanying corporate expectations, staffing matrices were established at the corporate level and were reported to compare like units across the network. The benchmark of "man hour per stat" was used to manage productivity, based on certain hours of care (man hour) per patient (the statistic); a model closely resembling those put in place during hospital restructuring of the 1990s (Rankin & Campbell, 2006; Weinberg, 2003). The assumption was that this comparison from facility to facility was based on the average time associated with caring for an average patient and likely, a comparable average census; hence volume driven.

This focus on the "average" might appear to allow for greater flexibility in staffing so that, when necessary, staff would have leeway to work within those contingencies. The reality expressed by nursing administrators, was that when comparison hospitals had a light season and could achieve a lower man hour per stat, the research hospital described here was held to the very same standard regardless of their actual census, and regardless of their actual patient acuity. In this way, the larger organization failed to acknowledge the irrelevance of the "averages" of their "gold standard" hospital when applied to other hospitals and patient populations. This approach to staffing failed to consider variations and complexities of patients, the extent of co-morbidities, and multiple medications at the local level, frequently leaving local staffing grossly underestimated. Consequently, nurses' budgeted workload calculation was based not on their average, but on the minimum capacity defined by the parent company.

Flex staffing was utilized to mitigate and accommodate fluctuations in patient census and patient status. Staff were either called in or expected to take higher patient loads when census trended upwards, when patients required one-on-one care, or when nurses called in sick. During less busy shifts, nurses were either placed on call, asked to voluntarily take the day off (with or without pay), or told to go home. Flexing up was not easy.

With sick calls and understaffing, the float pool is that buffer. Lately the float pool has been maxed out as well. We haven't been able to get a float pool nurse no matter what. We just did best with what we could—you see, that was what the PCC [patient care coordinator] was for, a buffer for when one of the nurses was just too busy hanging blood, or doing something like that. The PCC would say, 'Okay, I can give those medications.' Usually even just [someone] giving one patient a set of medications will give you enough steam that you can catch up.

Nurses were quick to reveal real and perceived inadequacies and ramifications of staffing. Notably, the charge nurses were confronted the most formidable tasks of making the best call regarding staffing during crisis moments of any given shift.

> *I called for a nurse when [productivity] didn't call for one, knowing darn well that I was going to get in trouble for over staffing—but you know sometimes—I don't care. You know [another charge nurse] was saying the same thing. That she'd been struggling all day with a patient. They were giving blood. They had admits coming up. They were overstaffed and the director comes up and says, 'You're overstaffed, you have to send two home—.' 'How do I send two home? We've got—'. 'Doesn't matter you're overstaffed, send two home.'*

Thus, the atmosphere surrounding productivity and staffing had ramifications for the way work was accomplished. Decisions about workload were left in the hands of those far removed from the front lines. As workload increased, anxiety heightened. Nurses found the fastest ways to get things done to save time and "*survive the shift*." Some felt less overwhelmed by creating work-arounds or through deconstructing the day, for example, viewing the 12-hour shift as three 4-hour shifts.

Policy. There were gaps in medication administration policies that put both patients and nurses at risk. Policies lacked clear definition of medication error and what constituted a reportable medication error. Safety practices were inconsistently incorporated into policy. For instance, one observed practice was developed following The Joint Commission (2014) release of a sentinel event alert on managing the risk of tubing misconnects. Nurses were required to trace intravenous (IV) lines from the bag to the pump and to the patient at each handoff to ensure the right fluids, rates, and connections. It was expected practice at this facility, and while formal competencies were developed, it was not formalized in policy. The lack of formalization was illustrated in the following described error experience.

> *An experienced nurse had set the [IV] lines up, while the novice nurse programed the pump. She programmed them backwards. This patient got big ol' [sic] dose of [medication]. When they got to the OR suite, they figured out what they'd done. They thought they were giving a bolus of saline which, instead, was a bolus of [medication] so it only made it worse. A root cause analysis was done and we talked about what went wrong. We didn't use the sticker to identify which line [was what]. We didn't trace [the lines]. We thought this had been taught and was part of our culture. We found it wasn't part of our culture at all. They didn't know what trace was. It was introduced to them in orientation but nobody had done—it wasn't part of our culture.*

External standards. Compliance to federal and other external regulatory standards were measured closely through the Department of Quality. Patient throughput (the efficiency of cycling patients through the hospital), hospital-acquired conditions, compliance with quality measures, readmission rates, and patient satisfaction among other things were reported as taking a substantial place of importance. Administrators told of efforts to increase staff member accountability to quality through use of "*accountability score cards*." There was an untold expectation that unit directors reviewed scorecards with their employees on a quarterly basis as a tool to increase awareness on hospital metrics and explore trends, providing a context for the nurses to better "*understand the why of what they do*."

This facility made it a goal to improve patient satisfaction and measures on the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS®) survey. Participants communicated that administration expected them to round hourly on their patients during day shift and every 2 hours during night shift to see if there were unmet patient needs. The clinical supervisors were expected to round on all patients every day.

> *The words they want us to use is 'I have time.' That is very difficult, very difficult when we're doing all the discharges, admissions and things like that. Those kinds of things are hard to accomplish but they [*administration*] keep saying that there are hospitals that are doing it. I have asked, 'Send me to those hospitals to see what they're doing that we're not.' Well, the answer is 'No.'*

The nurses perceived themselves as flexible and somewhat tolerant of the added pressures they faced. They expressed a desire to meet a high standard of care, to make real connections with their patients and improve patient satisfaction, but expressed great frustration and a lack of support in the reality of the outcomes, particularly in the face of the comparison to other facilities. "*Yeah, it's like we do everything you ask us to, we've done everything! And our [patient satisfaction] numbers aren't changing. . ..*" Hence, the impact of these expectations not only increased the complexity of the work environment, but it also contributed to added tension and sense of inadequacy. The unit director shared this conclusion:

> *It puts a lot of pressure and focus on the nurses to be amazing communicators, amazing coordinators, [and] amazing clinicians. There is a huge whirl wind of things that they are responsible for now. It's not enough to be just a good clinician anymore.*

Next, the implementation of a standardized electronic information systems has been widely adopted to reduce variation and improve practice in healthcare (Balka et al., 2008). The Health Information Technology for Economic and Clinical Health Act (HITECH), enacted in 2009, made implementation a matter of law. While standardized electronic records have been designed to perform certain functions (such as capture data regarding compliance measures), participants were candid as they expressed their frustration in

the counter-intuitive nature of the programs and their rigid designs. Respondents, particularly from administration and medical staff, saw the use of electronic health records (EHR) as contributing to an insular perspective and narrower, task-oriented focus among nurses. Medical staff described:

> [Nurses] *are so extremely task oriented, but that's the nature of the game nowadays. All they can do is focus on a computer and the EHR. Answering this screen and that screen. They lose that 10,000-foot view.*

Additionally, nearly all informants indicated the recent implementation of computerized provider order entry (CPOE) included problematic configurations that contributed to confusion and the facilitation of several missed orders and medication errors. To cite one example, toward the end of a day shift, great confusion about an order for blood administration was witnessed. At one point in time, four different nurses were observed standing around the computer reviewing the EHR order. Forty-five minutes into the ordeal, lab results were reviewed and the charge nurse made the call to "*transfuse the unit*." Simultaneously, the oncoming nurse had placed a call to the provider for clarification. The transfusion was started just as the intent of the order to only *hold* two units of blood was clarified.

Prioritizing Practice

Forced reorganization and shifting priorities were associated with medication schedules and patient turnover as shown in List 2. In response, nurses revealed how managing the added expectations to their daily work forced prioritizing cares and often placed patient needs secondary to completing tasks, causing the day to cascade out of control.

Forced Reorganization and Shifting Priorities

Thinking aloud, nurses conveyed the scope and strain of coordinating activities on a given day:

> *I can only be in one room at one time. I got this new patient—do I concentrate on this new guy and let the other four get ignored? Do I do a little bit and then do meds over here and then get back to this one and then back to these guys? It's tough. It's really tough.*

To negotiate this strain, nurses were forced to reorganize and shift priorities.

Medication schedules. One of the most striking features in this medical unit was the focused attention on the medication administration process. The automated medication dispensing unit sat in the main hallway directly across from the staff elevators and a pneumonic tube system was located adjacently as seen in Illustration 1. Over a period of 3 weeks, a total of 10,030 medications were dispensed and administered.

List 2. Examples of Forced Reorganization and Shifting Priorities

Medication Schedules
- Admission, discharge, & bridging orders
- Medication reconciliation
- Computerized provider order entry
- Distribution /packaging
- Waiting
- Scanning compliance & 5 rights
- Independent double checks
- Nurses' Taxonomy and Classification of Error

Patient Turnover
- Patterns of admissions & discharges different from day to day
- Hourly patient rounding
- Service recovery

Illustration 1. The main automated medication dispensing unit on the floor was in the main thoroughfare directly across from employee elevators. Nurses could be seen lining up four to five deep during peak hours of the shift. In instances when an inventoried med was absent, the nurses walked to other units for their patient's doses.[4]

This meant that nurses administered an average of 3,343 medications on any given week or 16 doses per patient per day. As per facility policy, nurses were expected to deliver medications within 30 minutes of the scheduled time and compliance with this measure was tracked closely.

With limited time to divide among all their patients, it was common for nurses to determine their daily routine in terms of patient assessment and interaction by the medication administration schedule.

> *I'll probably give at least 50 [medications] this shift, because I've got a guy that's on pain medicine every two hours and a couple of other people with lots of medications and lots of problems. I kind of like it [this way] because it gives me an excuse to check on [my patients] again. I feel like I'm not just checking on them for no reason, it's like, 'Oh hey, I've got your medicine.'*
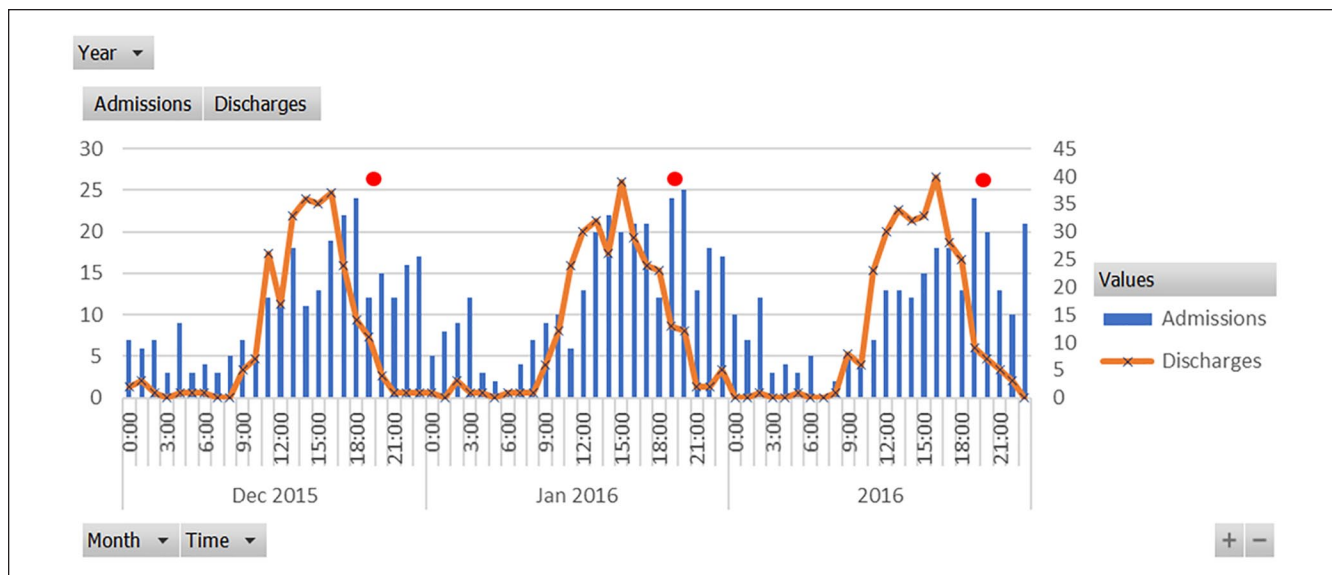
Figure 4. Display of patient admission, discharge, and transfer (ADT) events by time of day for December 2015, January 2016, and February 2016. The cognitive load associated with admissions and transfers to the unit is peaked from 1 PM to 8 PM. The cognitive load associated with discharges and transfers from the unit is consistently peaked between 1 PM and 5 PM. The red dot denotes the 7 PM change of shift.

Nurses used the time while pushing intravenous medications to ask the patient for information and to determine real concerns from those presented during handoff report. During these moments, immediate patient needs were met; perhaps assistance to the bathroom or repositioning, but seldom anything more. Thus, the inseparability of medication administration from other tasks became readily apparent. More than merely constituting the temporal workday for nurses (Jennings et al., 2011), medication administration became the catalyst for nurse-patient interaction. The nurse-patient relationship became victim to a rudimentary process of triage and the patient became secondary to the goal of staying "*caught up*" in the timely administration of medications.

I'm okay giving meds an hour early because more often than not, I'll be more than an hour late. If I start an hour early, my latest will be an hour late. Get all the meds done, all the assessments done by 1000. But today is not going to be like. Now it's 1015 and I'm late on my own routine. But sometimes it's like that. Sometimes you don't even get your 0800 assessments done until after shift change and then you finally sit down do it and you got to [chart] the whole day.

Not surprisingly, discussion of patient turnover and the hospital's system for cycling patients through the hospital quickly, frequently co-occurred with a discussion of medication administration demands.

Patient turnover. Patient turnover varied from day-to-day and created a high level of intensity and turbulence (Jennings et al., 2013; Salyer, 1995). Cases of admissions, discharges,

and transfers to the unit averaged 272 per month. The average length of stay was not calculated. Most of the turnovers occurred during the day shift (7 am–7 pm) occurring mainly in the hours leading up to and including change of shift as shown in Figure 4.

The charge nurses had access to real time electronic patient tracking which was intended to allow for the unit to control patient flow. The software updated which beds were available and when new patients could be admitted. This technology had little impact on the issue of patient stacking in the emergency department and tendency to send up admits right at change of shift. During these highly critical moments, communication and coping between all members of the team and the organization were strained. Feelings and expressions of frustration, discordance, and incivility were observed. Administration, while aware, seemed incapable of providing sufficient support, other than to state the need for better communication:

There are strategies, I mean we do talk about it. The ER has to meet [throughput metrics] and they look at throughput times. Their goal is to [transfer to] the inpatient unit within 30 minutes. [The ER staff] said, 'You know if you have your clinical supervisor call our clinical supervisor, we can try to stagger those, hold them, do what we can.' But depending on what the ER is like, they may not. They may just say, 'Too bad they're coming up.' There's not really a strict strategy to help that, I think it's more of just good communication, working together as departments. If we're able to say 'Listen, we're getting 5 admits in this hour and I don't even have staff to be able to settle them, it's right at shift change'—it should help.

A concomitant rise in requirements of the medication process associated with increased turnover was observed. The admission process required medication reconciliation, retrieval of home medications, as well as receipt and acknowledgment of new admission orders. Patients arriving from the emergency department at times were accompanied only with bridging orders, which expired in 24 hours. This led to disruption and delay in care as nurses waited for physicians to see patients and enter admission orders. In the interim, some newly admitted patients went mostly unseen by the nurse until new orders arrived.

Compounding the turbulence created by the number of admissions and discharges, was the clash of expectations between the patient and the process. Early in the study, a patient dressed in street clothes was observed holding personal belongings, standing at the nurses' station watching with intent eyes as the nurse worked. The patient did not speak, just stood and watched while the nurse completed the medication reconciliation process and discharge paperwork. The nurse quipped, "*We kind of ignore them, someone is always breathing down our neck*."

During a rare opportunity to join nursing staff during the lunch break, the nurses on the unit angrily recounted another patient encounter over a discharge plan. Mimicking the patient, a nurse commented, "*The doctor said we could go home*." This launched the group into a discussion on how patients expected discharges would happen in just moments.

> *I guess they think that's how it works. Which is all about communication, but how do you get in there to tell them. I mean the whole reason we don't have the discharge done is because we're busy! So how do you get in there to tell them that 'It's going to be a while, like this is a process.'*

From the standpoint of the facility, the goal was to discharge patients before noon. The nurses went on to say they planned for discharges to take a minimum of 2 hours to complete given the patient population. *"Rarely are we able to discharge patients before noon. When the docs round in the morning and discharge eight patients at one time, it's impossible to get everyone out by noon!"*

Renegotiating Routines

The reliance on predictable routine actions during daily practice functioned to guide the pre-requisites of care, the provision of care, and the response to care (Rytterström et al., 2011). Momentum created by internal and external standards of the organization, the turbulence of patient turnover and the medication management system exposed the inseparability of medication administration to nursing responsibilities. This dynamic created stress, cognitive overload and a perceived indifference surrounding medication safety. To meet workload expectations, nurses were forced to renegotiate their routines with nursing practice now guiding the routines.

List 3. Strategies to Combat Competing Obligations

Overt Strategies
- Sloppy practice
- Work arounds
- Social networks & support

Covert Strategies
- Underreporting
- Indifference
- Normalization of deviance

When medication errors occurred, they were recognized only when they reached the patient and reported when they were perceived to cause harm. The findings presented next, detail nurse's efforts to cope with cognitive overload and find their way through the uncertainty and ambiguity of the day by relying on overt and covert strategies as shown in List 3.

Overt Strategies

As nurses responded to needs of patients, families, colleagues, providers, and other ancillary staff, patterned routines, short cuts, and time saving strategies were noted. For instance, there were no designated medication preparation areas on the unit. This meant that medication preparation activities occurred at the bedside. Once scanned, injections were pulled from vials, pills were crushed, or antibiotics reconstituted in front of the patient. During more urgent situations, overrides from the automated dispensing unit were performed, bypassing the order verification process of the pharmacists. If an independent double-check for high alert medication was required, it was done with only with superficial acknowledgment of a second nurse, who was just as cognitively overloaded as the primary. If the nurse required a witness to waste medication, they often slipped the medication into their pocket and found someone to later witness the waste.

A second example provides insight into learned, but not always accepted, behavioral norms on the unit.

> *Whenever I have to give Humalog®, I always check their blood glucose on [the EHR] because when it's written up here [on the whiteboard]and it's timed at 2000 [hours]- that could have been from yesterday! Somebody had done that and they gave insulin for a blood sugar of like 170 and the person was only 96 that night. We had to give them a bunch of D-10 throughout the night. And so, I always check.*

White boards in patient rooms were intended to be used for patient-centric information—phone numbers, goals for the day, and upcoming therapies. In this case, communication that was in the EHR, was bypassed on the white board to save time and control the workday. While the nurse above always checked the EHR, the continued use of the

white board indicated that some nurses routinely used this workaround.

Covert Strategies

Underreporting of medication errors became a recognized strategy in dealing with the ambiguity of the definition of medication errors within the organization, as well as the bypassing of safeguards. A shared organizational definition for medication error was not formalized in any policy and many could offer only a technical definition. Administrators acknowledged the lack of clearly defined expectations, *"I don't think they know totally what to report. Do they have the structure around them to help? I think they do*." Hence, among some participants, there was an attitude of indifference to reporting. On the surface, it was not that reporting resulted in punitive responses from administration or a burdensome process. Nurses were open about administration's efforts to introduce standards: "*The powers that be use it as a teaching tool and really, we try to teach each other and learn a little bit. . .*." Yet nurses exhibited a level of indifference "*We are supposed to* [report], *but I am not going to*."

Nurses in the department of quality responsible for reviewing reported medication errors and attending root cause analyses, remarked that culture, or a "*normalization of deviance*," contributed to medication errors:

> *It's kind of like you get away with it and so then it just seems like it's okay. You've gotten away with it so many times. There are so many things, so many rules and so many people just trying to get by.*

Administrators articulated an open-awareness of problems faced by the organization in terms of physical environment (lack of dedicated medication preparation areas and an automated dispensing unit in the main thoroughfare), human resources (strict productivity and budgetary constraints; declining recruitment and retention of experienced nurses), and greater trends reshaping healthcare in the United States (the sweeping burden of healthcare reform). Yet, blame lay in the conflicting and unrestrained notion that nurses themselves were the obstacle to reducing medication errors. That nurses were task-focused; lacked education, training, and a 10,000-foot view, were repeatedly emphasized. Ultimately, these contextual factors affected the mood of the individual nurses which subsequently reflected on the mood of the day and proved consequential to patients.

The "Mood of the Day"

It was observed that as the day got busier and the expectations became untenable, problems began to outweigh solutions and the day quickly cycled from what the nurses self-described as a "*good day*" to a "*shit storm*." The busyness of the day; however, did not appear to directly correlate to the presence or absence of medication errors; errors were noted even on good days. Serious errors were a rare event during the period of participant observation. While they were not observed, the medication events included in the descriptions below did happen.

Good day. Overwhelmingly, a "*good day*" on the unit was measured by the amount of time nurses spent with patients. The opportunity to converse with the patients, build rapport, and provide individualize attention made the nurses feel positive that they had accomplished their best work.

> *It just takes a few minutes, doesn't have to be very long to make a connection with the patient. Whether a joke or tell a story or ask how they feel. . .just connect. Then that person feels that you care for them, which you do—you wouldn't be in this profession if you didn't care for them—and then because you have a connection they will tell you when they need something. They won't feel neglected because they'll know that you're busy.*

On a good day, nurses completed their documentation requirements throughout the day and could be done by end of shift. They were in control of their work and the atmosphere was calm.

Nurses described common examples of medication errors that occurred on good days: missed orders in the EHR, miscommunication on insulin sliding scales resulting in wrong doses, wrong medications resulting from sound-alike/look-alike (SALA) medications in the automated dispensing unit, and errors resulting from inexperience. For instance, at change of shift, the oncoming nurse discovered a continuous infusion of Protonix® was turned off. The previous nurse, a new graduate, did not "*recognize the need for the continuous drip*."

Bad day. As the day cycled to "*bad,*" workload interfered with the nurses' ability to exceed the standard of care and they felt badly about not spending enough time with their patients. On bad days, nurses had to wait, patients had to wait, and nurses were just "*not able to catch up*." Basic care, such as oral care or repositioning, were sacrificed. A high number of admission and discharges filled the day and explanations and apologies to patients were required. When patient admissions began to ramp up, nurses began to anticipate needs for added staff. On one occasion, during day shift with a patient census of 30 and four patients on 1:1 care, nurses were forced to reorganize and shift priorities as three direct admits were anticipated. Thinking aloud, the charge nurse stated: *"I have to take somebody off one on one so I can put them out on the floor."*

Nurses described medication errors on bad days as: missed doses due to "forgetting" to open the roller clamp on secondary infusions, wrong times due to late administration of medications, and administration of wrong doses when excess narcotic medications were not wasted in advance of administration.

Crazy day. Nurses used the term a "*crazy day*" as the "*bad day*" deteriorated. Less time was dedicated to patients; nurses necessarily stayed longer with more acutely ill patients. They would send messages with other staff to patients explaining why they were absent. There was constant problem solving and nurses barely remained in control, but there were still solutions. Nurses readily could recall crazy shifts. Competing obligations were evident:

> *I had two [patients]that were seizing, and had to run back and forth between those rooms and run and get my vitals on my blood patient. I got no charting done that whole shift. I didn't do a single bit of charting until after my shift was over. I think I was here until 10:30 or 11 charting. I'm sure I missed stuff, because I didn't remember it all by that point, I was too tired.*

Medication errors on a crazy day were observed and included: the transfer of a patient to the floor; poor communication and a failure to document medication administration by the transferring nurse. As a result, a duplicate dose was administered by the receiving nurse. Later, the transferring nurse returned to the floor having taken Dilaudid® home in her pocket. "*I forgot to waste*." She then asked the floor nurse to witness the waste of Dilaudid®; she did not want others in her own unit to know of her error or "get fired."

Shit storm. When the term "*shit storm*" was used, nurses described how the management of events became overwhelming. "*Patients are coming off the elevator from the emergency department and from doctor's offices and you [charge nurses] haven't even told the [staff] nurses they are getting new patients*." No immediate solutions were apparent and only minimum standards of care were given to patients. Medications were hours late; there was a palpable tension and element of panic.

> *You have five patients during the day. They all have typically five to fifteen medications that you have to check and make sure you know what they are and when you're giving them. A lot of times they [the patients] are full care—you know—they're two-assist, they're incontinent. They have a patient tonight that has cirrhosis of the liver. You give her 40 of Enulose® three times a day. She stands up and jumps out of bed and slips and skids on her own stool and she almost falls. And, she's having micro seizures that are constant until ten minutes ago, we finally got them in control. And that's just one patient, so then you've got four others that have their needs. Well, you spend an hour with a neurologist pushing medications titrating to effect. You don't have time to take care of those other four patients who are eating and needing help with their dentures and washing their face. You just can't do that.*

As seen, while in the patient room, usual routines were lost. Without routines, the storm became more powerful. Similar narratives (Burke, 2012) illustrate how this happens because once the nurse goes in a room, they seem to never come out.

During a "shit storm," all manner of medication errors were possible. And while the assumption may be that medication errors are more likely to be attributed to the busyness of the day and to happen more frequently in times of chaos, we do not have the data to support such a claim.

Discussion

In the analysis presented here, the experiences of nurses in their everyday work environment provided an awareness of environmental complexity, crucial for understanding contextual contingencies characteristic of a medical unit of an acute care hospital. Affiliation with a parent corporation brought in added insights and discourse centered on company fiscal restraints, policies, and other internal and external standards known to structure an organization.

Reflecting on these data, the characteristic of *chasing a standard of care* exposed an organizational arrangement that involved a shifting locus of control between the nurses and the organization within the constraints of time, human resources, and technology. Recognizing their own limitations when confronted by the pressure to exceed the average, nurses compensated by focusing on strategies to reduce workload and uncertainty. While they felt overwhelmed, stressed, and even incompetent; they suppressed those emotions, and responded by focusing on one small thing at a time. They did their work according to learned efficiencies, such as approaching patients according to medication times, clustering activities, delegating, and multi-tasking, which are well documented in the literature (Browne & Braden, 2020; Flaherty, 2003; Jennings et al., 2011; Kohtz et al., 2017).

There was consistent evidence that relentless negotiation with processes, patients and peers was integral to the nurses' work day. The ability to compensate for environmental conditions, generate solutions to rapid fire predicaments, and maintain character necessitated it. Preserving character when faced with the immediacy of understaffing, patient crises, or the immediacy of a medication error shaped the outcome for many nurses. The effects of steady stress, failure, and fatigue on productivity, attrition, and wellbeing have well been well documented in the literature and in poems and narratives (Bear, 2011; Gordon, 2005; McGibbon et al., 2010; Rankin, 2009; Weinberg, 2003).

More significant was the value placed on routines. Nurses heavily valued the routinization of care to effectively manage their time. Without routines in the day, the demands of the day were out of sync; problems exceeded solutions, errors occurred, and the nurse lost control. This phenomenon of losing our routine (losing control) is a common narrative in everyday nurses' work (Burke, 2012; Jennings et al., 2011; Weinberg, 2003).

This research uncovered how nurses used overt and covert strategies to regain a sense of control back in their work. Similar evidence of this conception is found in literature documenting efforts to reduce uncertainty and enhance

efficiencies in the workday (Berlinger, 2016; Rankin, 2009; Rankin & Campbell, 2006). Voluntary reporting of medication errors was a decision to be made, and was clearly linked to attitude and intention (Farag et al., 2017; Hung et al., 2016).

Highlighted here is an intentional social distance placed between administration and bedside nurses. This distancing is not new and has been précised in literature describing how leadership minimalizes nursing's attempts to adjust to rapidly changing environment by implying they are unwilling to adjust (Rankin & Campbell, 2006; Weinberg, 2003). Administration's passing the responsibility of errors onto nursing occurred despite an open-awareness within each discipline, and each department. As early as 1964, Glaser and Strauss (1964) described the interdependency of internal departments and the identity of the total organization. For the attainment of institutional safety and quality, every department must be responsive to the ramification of their actions and performance on other units. It is time for hospital administration (including nursing administration) to recognize and accept their responsibility for their role in the occurrence of medication errors.

This study applied Jennings et al.'s (2011) perspective of nurses' work as an orchestration of activities inseparable from medication administration. Findings from this study supported these perspectives. What differs and is significant; this research moved beyond the exploration of the narrative for nurses, and extended it to include the perspectives of administration, pharmacy, and medical staff, revealing that the context of medication errors was not just a breakdown of linear or local processes, but rather part of a chaotic and complex set of conditions. Consistent with the theories of Reason (2000) errors occurred in the breakdown of the system extending from corporate and from the pharmacy to the bedside. Study findings here, inform clinical practice and provide an emerging new model that challenges the prevailing theories and has the potential to support our understanding of why present efforts targeting the reduction of medication errors may be ineffective, in an innovative, new way.

The proposed theoretical model of nurses' work (see Figure 5) illustrates the nature of nurse's work and the tension between contextual contingencies and the temporal structure of a day. The increased workload from anticipated and unscheduled tasks, first forces nurses to work faster and faster until workload spins out-of-control and cycles into chaos. It is here in the chaos "storms" that errors occur at any phase of the spectrum. Workloads and nursing experience are not equal: these factors are compound on an individual nurse threatening competence to the extent that safe care becomes jeopardized.

This study provides greater understanding of why nurses remain at the "sharp end" of the responsibility for medication errors (American Nurses Association, 2022; Kellman, 2022; Reason, 2000, p. 768) and why there is no one to intercede. According to Reason (2000, p. 770), hospitals are still failing to meet the criteria of highly reliable organizations. For
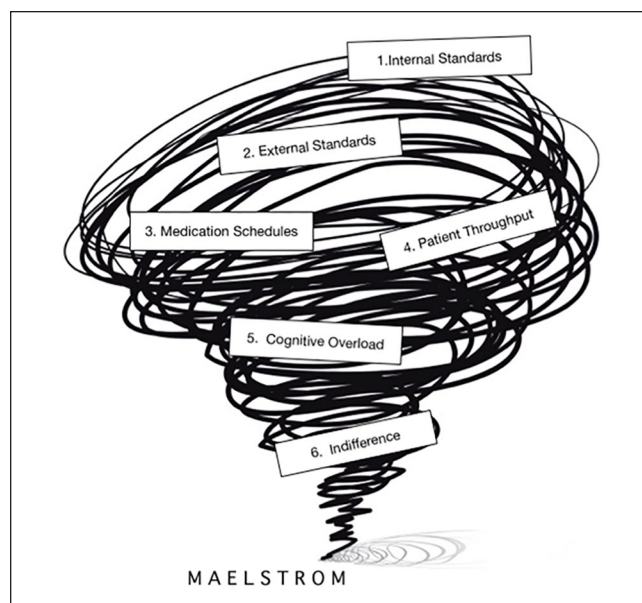

Figure 5. A Model for Nurses' Work within context. Irregular components of nurses' work cannot be accommodated within a timed schedule. Instead, the components cascade on the nurses' routine and impinge on their time so that their day just becomes entirely out of control.

example, in a response to nurse staffing, current hospital systems adapt by sending float nurses to the floor in need, a reaction that is inadequate in a time of crisis. Such help is not immediate; staff may be poorly qualified or not oriented to the unit or the patient.[5]

Nurses, now vulnerable to criminal conviction for unintentional errors, are left alone to protect their careers.[6] Brous (2022) recommends creating a personal portfolio of recognitions, awards, education and competencies. This emphasis removes organizational accountability and places the responsibility on the nurse to protect themselves, their careers and their patients. The impact that this emphasis will have on the nursing pipeline is damaging, potentially creating an environment of concealment as nurses seek to protect themselves from criminal investigation. As such, this study must inform policy and education, and reform corporate and administrative practices for the clinical setting.

Limitations

Consistent with ethnographic methods, data collection was primarily focused on one medical unit of a hospital, but extended to the overall hospital context and culture. The observational portion of this study consisted of 92 hours of formal observation, enabling the depth of data collected to provide an understanding of the mechanisms, conditions, and context that errors may occur. Future studies may replicate this research design using a more comprehensive site (more units/institutions) without compromising rigor, comparing of

nurses' work from a variety of unit perspectives to confirm the relationship of nurses' workload and medication errors. There is also an urgent need to examine the significant relationship between the risk of errors and the climate on the unit.

Conclusion

Prevailing studies explaining nurses' work as linear were shattered as observations and interviews with nurses, administrators, pharmacists, and medical staff provided data that enriched our understanding that nurses' work is cyclical and comprised of chaotic and complex characteristics. The emerging model illustrates the inseparability of context (particularly surrounding medication management) from other nurses' work and the cascading nature of the work that cycles the day to chaos and back again. These results, supported by the work of Jennings et al. (2011), have potential to enhance our understanding of why present efforts targeting the reduction of medication errors may be ineffective.

Current studies validate that chaos much more strongly correlates with risk to patient safety than workload alone, forcing nurses prioritize managing the chaos over patient care (Browne & Braden, 2020; Jennings, 2021). There is and should be concern for the future of nursing practice. New institutional strategies to promote high reliability within the organizations (Reason, 2000) and reinforce nursing practice, in terms of nurses' involvement and influence over hospital staffing, policies and patient care are urgently needed. If it is possible to predict the busy times of the day associated with patient admissions and discharges, why is it not possible to manage them better?

It begs the questions of who is ultimately responsible for medication safety and errors, and where is the prevention support? The present system of assigning a float nurse (frequently minimally qualified) does not alleviate acute chaos and risks. There is a need for alternative systems of support, for instance the instigation of a "Code Team" comprised of a group of expert nurses available for immediate support on a unit. To reduce medication errors and address the challenges inherent in nurses' work, we must respond proactively with critical reflection on ways to buoy and brace our nurses when "storms" hit.

Notes

1. The "5 Rights" (right patient, right drug, right dose, right route, and right time) represent a critical thinking exercise employed by nurses at the point of medication administration.
2. "Man on-the-street" interviews are rapid, informal, information-gathering conversations, used in participant observation.
3. These data from the original study were pre-COVID, but importantly, closely preceded the period that RaDonda Vaught's incident occurred, December 2017 (Kellman, 2020).
4. Implications for practice must extend beyond just current staffing systems. Building the principles of medication safety into the structural design of future healthcare facilities is needed, even as simple as adding dedicated medication rooms.
5. For example, the response to send FEMA nurses during COVID was only a partial solution to a staffing problem. There was no accountability to the host institution and no accountability to best practices for patient care. Untenable amounts of vacancies remain with the current nursing shortage.
6. Not all drug interactions are immediate and have immediate ramifications. The criminalization of medication errors will conceal nursing errors. Any reporting will require courage (Hawkins & Morse, 2014).

References

American Nurses Association. (2022, March 25). *Statement in response to the conviction of nurse Radonda Vaught*. Nursing World. https://www.nursingworld.org/news/news-releases/2022-news-releases/statement-in-response-to-the-conviction-of-nurse-radonda-vaught/

Angrosino, M. V., & Mays de Pérez, K. A. (2000). Rethinking observation: From method to context. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (pp. 673–702). SAGE Publications, Inc.

Ardern, R. (2021). Simulation: Engaging students with a different perspective. *Nursing*, *51*(5), 14–17. https://doi.org/10.1097/01.NURSE.0000743292.80756.06

Balka, E., Bjorn, P., & Wagner, I. (2008, November). *Steps toward a typology for health informatics* [Conference session]. Proceedings of the 2008 ACM Conference on Computer Supported Cooperative Work (pp. 515–524). ACM.

Barber, N., Rawlins, M., & Dean Franklin, B. (2003). Reducing prescribing error: Competence, control, and culture. *Quality & Safety in Health Care*, *12*(1), i29–i32. https://doi.org/10.1136/qhc.12.suppl *1*.i29

Bear, R. A. (2011). *Sorrows reward: A novel*. Kingsley Publishing.

Berlinger, N. (2016). *Are workarounds ethical? Managing moral problems in health care systems*. Oxford University Press.

Brous, E. (2022). Protect and defend: Edie Brous wants nurses to protect their livelihoods. *American Nurse Journal*, *17*(3), 38. https://www.myamericannurse.com/protect-and-defend-legalissues/

Browne, J., & Braden, C. J. (2020). Nursing turbulence in critical care: Relationships with nursing workload and patient safety. *American Journal of Critical Care*, *29*(3), 182–191. https://doi.org/10.4037/ajcc2020180

Bruyneel, A., Lucchini, A., & Hoogendoorn, M. (2022). Impact of COVID-19 on nursing workload as measured with the nursing activities score in intensive care. *Intensive and Critical Care Nursing*, *69*, 103170. https://doi.org/10.1016%2Fj.iccn.2021.103170

Burke, K. (2012). A day in the life of a nurse. In R. Koppel & S. Gordon (Eds.), *First, do less harm: Confronting the inconvenient problems of patient safety* (pp. 90–92). Cornell University Press.

Burke, T. A., McKee, J. R., Wilson, H. C., Donahue, R. M., Batenhorst, A. S., & Pathak, D. S. (2000). A comparison of time-and-motion and self-reporting methods of work measurement. *JONA The Journal of Nursing Administration*, *30*(3), 118–125.

Committee on Identifying and Preventing Medication Errors. (2007). *Preventing medication errors: Quality chasm series*. National Academies Press.

Davies, K. (1994). The tensions between process time and clock time in care-work. *Time & Society*, *3*(3), 277–303. https://doi.org/10.1177/0961463x94003003002

de Vries, E. N., Ramrattan, M. A., Smorenburg, S. M., Gouma, D. J., & Boermeester, M. A. (2008). The incidence and nature of in-hospital adverse events: A systematic review. *BMJ Quality & Safety in Health Care*, *17*(3), 216–223. https://doi.org/10.1136/qshc.2007.023622

Dykes, S., & Chu, C. H. (2021). Now more than ever, nurses need to be involved in technology design: Lessons from the COVID-19 pandemic. *Journal of Clinical Nursing*, *30*(7–8), e25–e28. https://doi.org/10.1111%2Fjocn.15581

Farag, A., Blegen, M., Gedney-Lose, A., Lose, D., & Perkhounkova, Y. (2017). Voluntary medication error reporting by ED nurses: Examining the association with work environment and social capital. *Journal of Emergency Nursing*, *43*(3), 246–254. https://doi.org/10.1016/j.jen.2016.10.015

Finlay, L. (2002). "Outing" the researcher: The provenance, process, and practice of reflexivity. *Qualitative Health Research*, *12*(4), 531–545. https://doi.org/10.1177/104973202129120052

Flaherty, M. G. (2003). Time work: Customizing temporal experience. *Social Psychology Quarterly*, *66*(1), 17–33. https://doi.org/10.2307/3090138

Germain, C. P. H. (1979). *The cancer unit: An ethnography*. Nursing Resources.

Glaser, B. G., & Strauss, A. L. (1964). Awareness contexts and social interaction. *American Sociological Review*, *29*(5), 669–679. https://doi.org/10.2307/2091417

Gordon, S. (2005). *Nursing against the odds: How health care cost cutting, media stereotypes, and medical hubris undermine nurses and patient care*. Cornell University Press.

Hanson, A., & Haddad, L. M. (2021). Nursing rights of medication administration. In *StatPearls [Internet]*. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK560654/

Hawkins, S. F. (2017). *Nurses' work in the context of medication administration, errors, and organizational safety* [Doctoral dissertation, The University of Utah].

Hawkins, S. F., & Morse, J. (2014). The praxis of courage as a foundation for care. *Journal of Nursing Scholarship*, *46*(4), 263–270. https://doi.org/10.1111/jnu.12077

Hawkins, S. F., Nickman, N. A., & Morse, J. M. (2017). The paradox of safety in medication management. *Qualitative Health Research*, *27*(13), 1910–1923. https://doi.org/10.1177/1049732317732968

Hines, S., Kynoch, K., & Khalil, H. (2018). Effectiveness of interventions to prevent medication errors: An umbrella systematic review protocol. *The JBI Database of Systematic Reviews and Implementation Reports*, *16*(2), 291–296. https://doi.org/10.11124/jbisrir-2017-003481

Hoogendoorn, M. E., Brinkman, S., Bosman, R. J., Haringman, J., de Keizer, N. F., & Spijkstra, J. J. (2021). The impact of COVID-19 on nursing workload and planning of nursing staff on the intensive care: A prospective descriptive multicenter study. *International Journal of Nursing Studies*, *121*, 104005. https://doi.org/10.1016/j.ijnurstu.2021.104005

Huckels-Baumgart, S., Baumgart, A., Buschmann, U., Schüpfer, G., & Manser, T. (2021). Separate medication preparation rooms reduce interruptions and medication errors in the hospital setting: A prospective observational study. *Journal of Patient Safety*, *17*(3), e161–e168. https://doi.org/10.1097/PTS.0000000000000335

Hung, C. C., Chu, T. P., Lee, B. O., & Hsiao, C. C. (2016). Nurses' attitude and intention of medication administration error reporting. *Journal of Clinical Nursing*, *25*, 445–453. https://doi.org/10.1111/jocn.13071

James, J. T. (2013). A new, evidence-based estimate of patient harms associated with hospital care. *Journal of Patient Safety*, *9*(3), 122–128. https://doi.org/10.1097/PTS.0b013e3182948a69

Jennings, B. M. (2021). Workflow, turbulence, and cognitive complexity. In M. Baernholdt, D. K. Boyle (Eds.), *Nurses contributions to quality health outcomes* (pp. 85–107). Springer. https://doi.org/10.1007/978-3-030-69063-2_5

Jennings, B. M., Baernholdt, M., & Hopkinson, S. G. (2022). Exploring the turbulent nature of nurses' workflow. *Nursing Outlook*, *70*, 440–450. https://doi.org/10.1016/j.outlook.2022.01.002

Jennings, B. M., Sandelowski, M., & Higgins, M. K. (2013). Turning over patient turnover: An ethnographic study of admissions, discharges, and transfers. *Research in Nursing & Health*, *36*(6), 554–566. https://doi.org/10.1002/nur.21565

Jennings, B. M., Sandelowski, M., & Mark, B. (2011). The nurses' medication day. *Qualitative Health Research*, *21*(10), 1441–1451. https://doi.org/10.1177/1049732311411927

Kakemam, E., Chegini, Z., Rouhi, A., Ahmadi, F., & Majidi, S. (2021). Burnout and its relationship to self-reported quality of patient care and adverse events during COVID-19: A cross-sectional online survey among nurses. *Journal of Nursing Management*, *29*(7), 1974–1982. https://doi.org/10.1111/jonm.13359

Kellman, B. (2020, March 2). *The RaDonda Vaught trial has ended. This timeline will help with the confusing case*. The Tennessean. https://www.tennessean.com/story/news/health/2020/03/03/vanderbilt-nurse-radonda-vaught-arrested-reckless-homicide-vecuronium-error/4826562002/

Kellman, B. (2022, March 25). *Former nurse found guilty in accidental injection death of 75-year-old patient*. NPR. https://www.npr.org/sections/health-shots/2022/03/25/1088902487/former-nurse-found-guilty-in-accidental-injection-death-of-75-year-old-patient#:~:text=RaDonda%20Vaught%2C%20a%20former%20nurse,gripped%20nurses%20across%20the%20country

Keohane, C. A., Bane, A. D., Featherstone, E., Hayes, J., Woolf, S., Hurley, A., Bates, D. W., Gandhi, T. K., & Poon, E. G. (2008). Quantifying nursing workflow in medication administration. *The Journal of Nursing Administration*, *38*(1), 19–26. https://doi.org/10.1097/01.nna.0000295628.87968.bc

Kohtz, C., Gowda, C., & Guede, P. (2017). Cognitive stacking: Strategies for the busy RN. *Nursing*, *47*(1), 18–20. https://doi.org/10.1097/01.NURSE.0000510758.31326.92

Leape, L., Berwick, D., Clancy, C., Conway, J., Gluck, P., Guest, J., Lawrence, D., Morath, J., O'Leary, D., O'Neill, P., Pinakiewicz, D., & Isaac, T.; Lucian Leape Institute at the National Patient Safety Foundation. (2009). Transforming healthcare: A safety imperative. *Quality & Safety in Health Care*, *18*(6), 424–428. https://doi.org/10.1136/qshc.2009.036954

Leeman, J., & Sandelowski, M. (2012). Practice-based evidence and qualitative inquiry. *Journal of Nursing Scholarship*, *44*(2), 171–179. https://doi.org/10.1111/j.1547-5069.2012.01449.x

Lundgrén-Laine, H., & Salanterä, S. (2010). Think-aloud technique and protocol analysis in clinical decision-making research. *Qualitative Health Research*, *20*(4), 565–575. https://doi.org/10.1177%2F1049732309354278

Machen, S., Jani, Y., Turner, S., Marshall, M., & Fulop, N. J. (2019). Erratum to: The role of organizational and professional cultures in medication safety: A scoping review of the literature. *International Journal for Quality in Health Care*, *31*(10), G146–G157. https://doi.org/10.1093/intqhc/mzz136

Mayo, A. M., & Duncan, D. (2004). Nurse perceptions of medication errors: What we need to know for patient safety. *Journal of Nursing Care Quality*, *19*(3), 209–217. https://doi.org/10.1097/00001786-200407000-00007

McGibbon, E., Peter, E., & Gallop, R. (2010). An institutional ethnography of nurses' stress. *Qualitative Health Research*, *20*(10), 1353–1378. https://doi.org/10.1177%2F1049732310375435

Morse, J. M. (2015). Critical analysis of strategies for determining rigor in qualitative inquiry. *Qualitative Health Research*, *25*(9), 1212–1222. https://doi.org/10.1177/1049732315588501

Morse, J. M., Barrett, M., Mayan, M., Olson, K., & Spiers, J. (2002). Verification strategies for establishing reliability and validity in qualitative research. *International Journal of Qualitative Methods*, *1*(2), 13–22. https://doi.org/10.1177%2F160940690200100202

Patterson, E. S., Cook, R. I., & Render, M. L. (2002). Improving patient safety by identifying side effects from introducing bar coding in medication administration. *Journal of the American Medical Informatics Association*, *9*(5), 540–553. https://doi.org/10.1197/jamia.M1061

Prothero, M. M. (2020). *The process of restoring personal integrity: Mitigating the emotional cost of medical errors* (Order No. 28029823) [Doctoral dissertation, University of Utah]. ProQuest Dissertations & Theses Global (2691834478).

Rangachari, P., & Woods, J. L. (2020). Preserving organizational resilience, patient safety, and staff retention during COVID-19 requires a holistic consideration of the psychological safety of healthcare workers. *International Journal of Environmental Research and Public Health*, *17*(12), 4267. https://doi.org/10.3390/ijerph17124267

Rankin, J. M. (2009). The nurse project: An analysis for nurses to take back our work. *Nursing Inquiry*, *16*, 275–286. https://doi.org/10.1111/j.1440-1800.2009.00458.x

Rankin, J. M., & Campbell, M. L. (2006). *Managing to nurse: Inside Canada's health care reform*. University of Toronto Press.

Reason, J. (2000). Human error: Models and management. *British Medical Journal*, *320*(7237), 768–770. https://doi.org/10.1136/bmj.320.7237.768

Rodziewicz, T. L., Houseman, B., & Hipskind, J. E. (2022). Medical error reduction and prevention. In *StatPearls*. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK499956/

Rytterström, P., Unosson, M., & Arman, M. (2011). The significance of routines in nursing practice. *Journal of Clinical Nursing*, *20*(23–24), 3513–3522. https://doi.org/10.1111/j.1365-2702.2010.03522.x

Salyer, J. (1995). Environmental turbulence: Impact on nurse performance. *The Journal of Nursing Administration*, *25*(4), 12–20. http://hdl.handle.net/10755/17019

Sarfati, L., Ranchon, F., Vantard, N., Schwiertz, V., Larbre, V., Parat, S., Faudel, A., & Rioufol, C. (2019). Human-simulation-based learning to prevent medication error: A systematic review. *Journal of Evaluation in Clinical Practice*, *25*(1), 11–20. https://doi.org/10.1111/jep.12883

Schroers, G., Ross, J. G., & Moriarty, H. (2020). Nurses' perceived causes of medication administration errors: A qualitative systematic review. *Joint Commission Journal on Quality and Patient Safety*, *47*(1), 38–53. https://doi.org/10.1016/j.jcjq.2020.09.010

Schütz, A. (1946). The well-informed citizen: An essay on the social distribution of knowledge. *Social Research*, *13*, 463–478. http://www.jstor.org/stable/40958880

Slight, S. P., Seger, D. L., Franz, C., Wong, A., & Bates, D. W. (2018). The national cost of adverse drug events resulting from inappropriate medication-related alert overrides in the United States. *Journal of the American Medical Informatics Association*, *25*(9), 1183–1188. https://doi.org/10.1093/jamia/ocy066

Spradley, J. P. (1979). *The ethnographic interview*. Harcourt Brace Jovanovich College Publishers.

The Joint Commission. (2014, August 20). *Sentinel event alert 53: Managing risk during transition to new ISO tubing connector standards*. https://www.jointcommission.org/sea_issue_53/

Van Scotter, J. R. (2000). Relationships of task performance and contextual performance with turnover, job satisfaction, and affective commitment. *Human Resource Management Review*, *10*(1), 79–95. https://doi.org/10.1016/s1053-4822(99)00040-6

Vitale, E., Lupo, R., Fortunato, S., Gualano, A., Giammarinaro, M. P., Bardone, L., Mea, R., Calabrò, A., D'Anna, G., Della Pietà, C., & Germini, F. (2022). Correlations between performance and shift work in the nursing activities: A pilot approach. *Acta Bio-medica: Atenei Parmensis*, *93*(3), e2022251. https://doi.org/10.23750/abm.v93i3.12403

Weinberg, D. B. (2003). *Code green: Money-driven hospitals and the dismantling of nursing*. Cornell University Press.

Author Biographies

Sara F. Hawkins PhD, RN is the Director of Patient Safety and Risk at Eastern Idaho Regional Medical Center in Idaho Falls, Idaho.

Janice M. Morse PhD (Nurs) PhD (Anthro), PhD (Hon) is a Distinguished Professor Emerita at the University of Utah, College of Nursing in Salt Lake City, Utah and Professor Emerita at the University of Alberta, Edmonton, Canada.