

RESEARCH ARTICLE

Work interruptions and missed nursing care: A necessary evil or an opportunity? The role of nurses' sense of controllability

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Abstract

Aim: To explore nurses' experiences with work interruptions (WIs) through the lens of missed nursing care (MNC).

Design: A qualitative descriptive design.

Methods: Eleven small focus groups involving 34 nurses (three nurses per group on average) from acute-care hospital wards were conducted. Nurses shared their experiences with WIs (sources, reactions and decisions) from the MNC perspective. Data analysis was conducted via content analysis.

Results: A preponderant theme emerged—*the dynamic of controllability*. Nurses who perceived a sense of controllability felt that they could decide whether to accept or reject the WI, regardless of WI type, and emotions of anger emerged. Conversely, nurses who did not perceive sense of controllability attended the secondary task: MNC occurred, and distress emotions emerged. Results emphasized that nurses are active agents prioritizing whether to omit or complete care in the face of WIs. Controllability, accompanied by active negative emotions, perpetuate a prioritization process that makes it less probable that MNC occurs.

KEYWORDS

care left undone, decision-making, focus groups, missed nursing care, nurses, qualitative design, rationing of care, work interruptions

1 | INTRODUCTION

Work interruptions (WIs)—breaks in the sequence of task performance of a human activity, causing a temporary pause of task continuity—are common in nurses' work environment and considered to contribute significantly to nurses' errors, delays and omissions of tasks (Getnet & Bifftu, 2017; Johnson et al., 2017; Schutijser et al., 2019). Recently, the nursing literature has demonstrated growing interest in the phenomenon of missed nursing care (MNC), defined as any omission, delay or failure to complete necessary patient care (Kalisch et al., 2009, 2013). This concept has, on other occasions, been termed care left undone (Jones et al., 2015) or implicit care rationing (Schubert et al., 2013). Although both WIs and MNC

refer to the delay or omission of tasks/care, they have been studied in parallel, and no study to date has explored their joint mechanism. Thus, the current study suggests illuminating the role of WI in MNC. Specifically, the study aims to understand those WIs that are more associated with MNC compared with those that are not.

1.1 | Background

1.1.1 | Missed nursing care

MNC usually occurs because of time scarcity and resource shortages that lead to harmful consequences for patients, nurses and

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organizations (Bragadóttir et al., 2020; Cho et al., 2020; Jones et al., 2015). Accordingly, empirical findings demonstrated associations between MNC and decreased quality of care and patient safety, resulting in increased rates of patient mortality, errors and dissatisfaction (Ball et al., 2018; Jones et al., 2015; Recio-Saucedo et al., 2017). MNC also has adverse consequences for nurses, including reduced job satisfaction, increased tendency to leave the profession and increased moral distress (Jones et al., 2015; Ogboenyi, 2019); and for organizations, including increased hospital costs of infections (Nelson & Flynn, 2015) and mortality (Ball et al., 2018).

Studies indicate that MNC occurs frequently, ranging from 45%–98% depending on the type of omitted task, the measurement method and other personal and situational characteristics (Jones et al., 2015). For example, tasks related to patients' emotional and psychological needs were missed more often than those related to patients' physiological needs (Ausserhofer et al., 2014). This may indicate that nurses prioritize care precisely in situations of time crunch and limited resources (Griffiths et al., 2018; Kirwan & Schubert, 2020).

1.1.2 | Antecedents of missed nursing care

Given the statistically significant consequences of MNC, scholars investigated patients', nurses' and organizational antecedents of MNC. MNC is more common among patients having poor health status or previous diagnosis of a psychiatric illness (Dabney & Kalisch, 2015). Nurses' personal characteristics, such as personality traits and values, clinical judgment and previous experience, were all related to MNC (Drach-Zahavy & Srulovici, 2019; Jones et al., 2015; Srulovici & Drach-Zahavy, 2017). However, nurses' sociodemographic characteristics were typically unrelated to MNC (Jones et al., 2015). Furthermore, several ward/hospital climate characteristics were associated with lower levels of MNC, including nurse–patient relationships (Barr, 2017; Kim & Bae, 2018); effective teamwork (Kalisch et al., 2013); magnet hospitals (Tubbs-Cooley et al., 2017); ethical climate, namely nurses' shared perception of what the correct behaviour is and how ethical issues should be handled in the unit (Vryonides et al., 2018); or unit's accountability, capturing nurses' perception of peers' and management's expectations for responsible, transparent and answerable behaviour (Srulovici & Drach-Zahavy, 2017). However, overload and resource shortages at the ward, such as too many non-nursing tasks, lower nurse-to-patient ratios or too many patients with comorbidities, are considered the most profound causes of MNC (Ausserhofer et al., 2014; Bragadóttir et al., 2017; Griffiths et al., 2018). Additionally, heavy admissions and discharges, which may be related to WIs of nurses' routine work, were also related to higher levels of MNC (Palese et al., 2015). Nevertheless, the role of WIs and their relationship to MNC remains relatively unsolved.

1.1.3 | Work interruptions

It is common for nurses to experience work interruptions to their routine work, ranging from 5.5–14 per hour (McLeod et al., 2015; Özkan et al., 2016). Several criteria have been suggested to categorize WIs. The first criterion is *the source of the interruption*, differentiating human from technical sources. Human sources include healthcare professionals, patients and their relatives, whereas technical sources include faulty equipment, (Hedberg & Larsson, 2004), operational failures, and shortages of services and supplies (Huckels-Baumgart et al., 2017). The second criterion refers to *the channel* through which WIs are conveyed, including face-to-face interactions or technical channels, such as telephones, pagers and monitoring devices (Chen et al., 2015). The third criterion, *the length of the interruption*, considers the time required to handle the interruption (Schutijser et al., 2019). *The nurse's physical location during the interruption* is the fourth criterion, including such locations as the patient's bedside or the medication room. Finally, *the type of primary tasks*, the type of task the nurse was performing when interrupted and *the type of secondary task*, the task the nurse was asked to perform instead of the primary task, were also regarded as criteria for categorizing work interruptions (Huckels-Baumgart et al., 2017; Schutijser et al., 2019).

Work interruptions may result in increased risk for adverse events, which may lead to patients' injury and mortality (Huckels-Baumgart et al., 2017; Schutijser et al., 2019), loss of patient's and family's trust, emotional costs to the healthcare provider who caused the adverse event (Institute for Safe Medication Practices, 2013; Institute of Medicine, 2000) and economic costs for the organization (Lin et al., 2013).

One way to address WIs is to prevent their occurrence in the first place via interventions such as signalization of interruption-free areas, staff education, motivation and cooperation in the team (Clark, 2013; Colligan & Bass, 2012; Rivera-Rodríguez & Karsh, 2010). Nurses use four strategies to handle WIs: suspending the primary task, thus prioritizing the second task; multitasking by dividing attention between the primary and secondary tasks; mediating the interruption with an action that supports the resumption of the primary task; and blocking the interruption, thus maintaining attention to the primary task (Johnson et al., 2017; Schroers, 2018). Interviews and observations of nurses revealed that nurses typically assess the primary and secondary (interrupting) tasks and then prioritize task execution based on their experience and their assessment of cost (e.g. risk) versus benefit (e.g. workflow efficiency) calculations (Colligan & Bass, 2012). Although these calculation processes are linked to MNC, research so far has investigated MNC and WIs in parallel. While MNC research hinted that WIs may cause MNC, as in cases of heavy discharges or admissions that interrupt nurses' routine (Palese et al., 2015), the study of WIs may provide insights on the prioritizing and decision-making processes that nurses employ when deciding whether, and under which circumstances, to delay, omit or postpone nursing care.

2 | THE STUDY

2.1 | Aims

To explore nurses' experiences with WIs in acute-care hospital environments and their perceptions of how these interruptions might affect MNC. Specifically, (a) to understand which WIs lead to MNC, and which lead nurses to stick to their primary tasks and complete them and (b) to explore nurses' strategies for handling WIs.

2.2 | Design

A qualitative descriptive design, using small-focus-group interviews.

2.3 | Methods

2.3.1 | Sample

Nurses from various hospitals throughout the country participated in the study; they were recruited using snowball and purposive sampling techniques, which are cost-effective and rapid methods for collecting data (Bhardwaj, 2019). The following sampling strategy was used. We first recruited a diverse sample of nurses from a variety of backgrounds, and who differed in age, tenure and gender. Participants had to work 75% of full-time equivalent (FTE) or more in a hospital ward, including anyone working in internal medicine, surgery or oncology. We then used the snowball technique, in which each respondent invited two colleagues who met the inclusion criteria to take part in the study. Because people tend to collaborate with others who are similar to themselves, using this sampling method results in a more diverse sample. Moreover, since we identified the inclusion criteria for inviting colleagues to participate, the risk of bias using this sampling method may be reduced (Bhardwaj, 2019).

The final sample included 34 Registered Nurses, participating in 11 three-participant focus groups. Participants were mainly females (88%), aged 36.37 years on average ($SD = 7.67$), and their mean seniority in the ward was 8.67 years ($SD = 6.89$). All participants held at least a bachelor's degree, and about half (56%) worked 100% of FTE (Table 1).

2.3.2 | Data collection

Data were collected by means of small focus groups. This design helped the authors to explore the phenomena through multiple contacts, where each contact augments another, thereby overcoming limitations associated with any single contact, and improving the rigour of the findings (Abro et al., 2015; Lee & Holroyd, 2009). Studies have demonstrated how small-group dynamics can shed light on participants' cognitive processes because they encourage participants to join in the discussion and express their thoughts. Consequently, a statistically significant number of different ideas can be generated

on the topic under discussion in a time limit (Masadeh, 2012). Furthermore, the small-focus-groups design provides a safe climate for discussing ethical issues (Hancock et al., 2016) and thus is appropriate for exploring how nurses experience work interruptions. A semi-structured interview guide, developed based on a literature review, steered the focus-group discussions. The guide aimed to encourage nurses to share their experiences with WIs, sources of WIs, how they experience WIs, and their reactions and decisions to accept or reject WIs from the perspective of MNC. The authors emphasized asking open-ended questions or prompt non-judgmentally: for example, "What do you consider to be WIs?," "How do you handle WIs?," "Please explain how you prioritize tasks in different situations," and "What motivates your decision?" Data collection was conducted in two phases: Phase 1 in 2019 and Phase 2 in 2020. In Phase 2, several participants from Phase 1 were contacted again in order to shed more light on the findings found in Phase 1.

To better understand the phenomenon of WIs and to determine the appropriateness of the interview questions, all three authors participated in the initial two focus groups. Afterwards, the first author continued moderating the focus groups and conducting the interviews. Each focus-group interview lasted approximately 2 hr and was digitally audio-recorded and transcribed.

2.4 | Ethical consideration

Research Ethics Committee approval was granted by the University of Haifa ethics committee (#142/18). Once participants were fully informed of the study's objectives, their right to quit and confidentiality assurances, they were contacted to schedule their focus groups. Because the interviews focused on issues such as unsafe practices, we used small focus groups. A design like this addresses participant distress more effectively, especially if a participant recalls difficult events from the past. Participants were encouraged to approach the first author if they felt they needed more support in managing difficult emotions.

2.5 | Data analysis

Thematic analysis was performed inductively (Peters & Halcomb, 2015), beginning with descriptive coding and identification of initial codes by each author, followed by comparing codes and discussing disparities. Next, interpretive coding was performed where the authors identified the relationships between the codes across transcripts and clustered them by content and context. Finally, overarching themes were identified to create a model conceptualizing the essence of the studied phenomenon.

2.6 | Rigour

Several rigour frameworks were used to ensure high reliability. First, the subject of the research was discussed in order to gain

TABLE 1 Demographic characteristics of focus-group participants

	Focus group											Total
	1	2	3	4	5	6	7	8	9	10	11	
Number of participants	3	3	3	3	3	3	4	3	3	3	3	34
Seniority (ward)												
Mean	9.66	10.66	2.66	5.66	8.33	4.66	15.50	8.66	4.66	9.66	15.33	8.67
SD	9.07	5.13	1.15	8.08	5.85	6.35	3.00	9.81	2.88	5.03	2.08	6.89
Professional seniority												
Mean	14.33	18.66	2.66	9.33	8.33	4.66	15.50	14.33	24.00	10.33	16.00	12.55
SD	7.37	3.78	1.15	4.93	5.85	6.35	3.00	9.81	1.73	6.11	1.00	7.70
Gender												
Male (n)	-	-	1	1	-	2	-	-	-	-	-	4
Female (n)	3	3	2	2	3	1	4	3	3	3	3	30
Age												
Mean	39.66	39.00	29.33	31.66	31.00	27.33	42.25	38.66	49.00	33.60	38.66	36.37
SD	11.50	3.60	1.15	2.88	6.08	5.77	5.31	9.29	2.64	4.72	1.53	7.67
Full-time equivalent												
100%	2	2	2	1	1	3	1	1	1	2	3	19
88%	1	1	-	-	-	-	1	-	-	-	-	3
75%	-	-	1	2	2	-	2	2	2	1	-	12

Abbreviation: SD, standard deviation.

insight into the authors' subjective views and avoid bias (Tufford & Newman, 2012). Second, the researchers conducted thematic analyses separately and clarified positions through reflection to confirm the study's credibility (Lincoln & Guba, 1985); Third, an interview guide was used to describe the phenomena in sufficient detail, which enabled accuracy of the study's conclusions (i.e. transferability); a researcher who was not involved in the project examined both the process and the results (i.e. dependability); and the process of the study was documented from beginning to end (i.e. confirmability) (Amankwaa, 2016; Lincoln & Guba, 1985). Finally, to prevent a-priori views that might affect the formation of themes, interpretive notes were kept separately from the descriptive narratives (Polit & Beck, 2010).

3 | RESULTS

The findings revealed a preponderant theme: *the dynamic of controllability*. Nurses perceive sense of controllability as control over their environment. Thus, in situations where they experienced a sense of controllability, presented by terms such as "choose," "prefer," "control" and "prioritize," they might not accept the WI—the primary task was completed; thus, MNC did not occur:

In my opinion, disruptions can be caused by phone calls, personal discussions, or family members who drive you crazy. Sometimes I choose to ignore these disruptions while working on a task. (Nursing experience of 17 years, Oncology)

Normally, I feel that I am in control and don't leave a patient in the middle of care. I finish a task and move on. Sometimes when she [the head nurse] asks to draw blood from another woman or to receive a new admission to the ward, I ask her to wait until I'm done. (Nursing experience of 5 years, Delivery Room)

Yet, when a nurse experienced poor sense of controllability caused by a WI they perceived as an obligation they must accept (presented by terms such as "require" or "must"), the nurse delayed the primary task—thus, MNC did occur:

Working with other wards and institutes also requires immediate response, which delays tasks you had planned. (Nursing experience of 9 years, Orthopedics)

If a patient needs to be sent for an X-ray and radiology calls, I respond promptly, finish with her [the patient], because she [the patient] must arrive on time. Work with other wards and institutes must be completed on time. (Nursing experience of 5 years, Gyneco-oncology)

The findings revealed how perceptions of controllability affected nurses' decision whether to complete or omit care across three types of WIs that are familiar in the literature. Accordingly, three dominant subthemes were revealed: (a) Technical work interruptions, (b) Interruptions by human agents and (c) Interruptions by patients and relatives (Table 2).

3.1 | Technical work interruptions

Nurses experienced technical WIs as prevalent in their work, such as system alarms, lacking/broken/insufficient equipment or supplies, computer system faults and asynchrony among co-workers. These technical WIs confronted nurses with the dilemma of whether to postpone the patient's care they were engaged in and attend to the technical WI, or to continue the patient's care despite the WI at the risk of scarifying the quality of the patient's care.

The most obvious technical interruptions are caused by various alarm systems embedded in the workplace to prevent risks (e.g. patient's bed-alarm button, intercom and phone alarms at nurses' station). Nurses reported not always attending to these calls, often "recogniz[ing] the room number, understand[ing] who is calling and why; thus, depending on the situation,... decid[ing] to miss care or not" (nursing experience of 15 years, Internal Medicine); or "reject[ing] interruptions when preparing medications, because it is a critical task" (nursing experience of 16 years, Internal Medicine). Yet, they agreed that such interruptions angered them. Thus, when confronted with bed alarms, nurses frequently chose to ignore them. Nurses described their decision-making process in dealing with alarm systems. They prioritize continuing the patient's care they were involved with according to the importance of the task as weighed against the alarm source. For example, medication administration demands concentration to avoid mistakes and thus should be prioritized over bed alarms, especially when the alarm comes from a patient or family member "known" to be a frequent user of the alarm button. In such cases, the nurse perceives the WI as unjust, gets annoyed and ignores it.

Another frequent source of technical WIs was interprofessional team asynchrony. For example, an inaccurate medication instruction or an unreported change in the physician's medical instruction occasionally emerges during routine medication administration. The understanding that a wrong treatment could have been delivered and was discovered only by chance increases the nurse's level of stress.

While treating a cancer patient, I noticed something was wrong. The doctor changed the care protocol, but I was not informed; suddenly I found a new instruction. I had to stop the procedure and treat the interruption because of the lack of coordination. I felt stressed and overwhelmed.

(Nursing experience of 5 years, Gyneco-oncology)

TABLE 2 Under the preponderant theme—the dynamic of controllability: A summary of types and subtypes of work interruptions, the main emotion triggered by the work interruption, the level of controllability and perceived impact on missed nursing care

Types of work interruptions	Subtypes of work interruptions	Main discrete emotion	Controllability to reject the interruption	Perceived impact on MNC of primary task
Technical	1. System alarms 2. Lacking/broken/insufficient equipment or supplies 3. Computer system faults	Anger	Sense of controllability, discretion and capability to bypass the interruption	Less MNC
	4. Asynchrony among co-workers	Overwhelmed; worry	Perceived poor controllability	More MNC
Human agents	1. Nurse colleagues	Anger	Sense of controllability	Less MNC
	2. Head nurse	Anger	Sense of controllability	Less MNC
	3. Novice nurse	Pity and high commitment	Sense of controllability, yet prioritizing the interruption	More MNC
	4. Interprofessional team members on the ward	Overwhelmed; worry	Perceived poor controllability	More MNC
	5. Interprofessional team members on other wards	Nurses felt monitored	Perceived poor controllability	More MNC
Patients and relatives	1. Patients	Anger	Sense of controllability, prioritizing according to severity	Depend on the severity: More MNC under high severity and less MNC under low severity
	2. Patient's relatives	Upset, disappointment, anger	Sense of controllability	Less MNC

Abbreviation: MNC, missed nursing care.

Apparently, in cases of technical WI stemming from the asynchrony of the electronic medical record, nurses felt that they were dependent on others to solve the WI, thus experiencing poor controllability over the interruption and having to delay patient care. Another frequent source of technical WIs was lacking/broken/insufficient equipment or supplies. In the following example, a nurse was confronted with a lack of available blood pressure monitors.

I might wait a while if both blood pressure monitors are busy, but a lot of the time I turn to engage with another patient during that time ... this interruption can delay obtaining the patient's vital signs, causing medication administration to be interrupted. In such cases, I feel an inner burden because the patient was not treated on time and was not receiving his medications.

(Nursing experience of 9 years, Orthopedics)

In such cases, nurses may decide to postpone care (medication administration) because they follow the procedure of taking vital signs before medication administration, at the cost of feelings of stress due to the delayed care. In other cases, as exemplified below, nurses assessed that it was time-consuming to address the WI or that the risk to patient care was statistically significant, thus deciding to “work around” it and improvise.

At the time, the woman was already in labor. I discovered that the backrest of the bed was broken. I held myself together and considered the situation. I asked her to start pressing. I held the baby's head together with the backrest.

(Nursing experience of 15 years, Delivery room)

A patient was admitted to the Gyneco-oncology ward with vaginal bleeding. I did a blood test, too, but the result was lost. I sent her to the operating room without it. I felt angry at the system since I always do the best for my patients. There is no solution. I succumbed to this situation.

(Nursing experience of 5 years, Gyneco-oncology)

In the above circumstances, nurses perceived themselves as the leading actors of the situation; thus, they felt that they were in control of the situation and could improvise and bypass the technical WI. While such improvisation promises that the nurse's primary task will proceed and be delivered on time, the bypass itself may put the patient at risk. In both cases, the nurses decided that the primary task must continue because, in their assessment, postponing it would have a worse outcome than bypassing the WI. Nevertheless, such incidents that lead nurses to pull themselves together and improvise were frequently accompanied by anger.

Another source of technical WIs was computer system failure. Nurses acknowledged that such interruptions can be prolonged, again raising the dilemma of whether to continue patient care by bypassing the interruption and working manually, acknowledging that they may not possess all the medical information needed to provide safe and good-quality care, or whether to postpone patient care and address the problem by contacting technical support.

In case of a computer system failure, I chose to work manually. Suddenly, I felt that I cannot handle the nursing care. I asked myself for a few seconds what I could do; I felt overwhelmed. At that moment I decided to perform manual documentation because I had no other choice.

(Nursing experience of 15 years, Delivery Room)

Apparently, under such circumstances, nurses more frequently decided to bypass the system failure and continue patient care despite the interruption. To sum up, confronting technical interruptions exemplified the decision-making processes that guided nurses in whether to delay or continue patient care despite the interruption. In all these cases, nurses acknowledged the importance of continuing patient care. Yet, apparently, the main consideration in deciding whether to continue or postpone care was the nurse's perceptions of discretion, controllability and capability to bypass the interruption. Decisions to postpone care were typically characterized by perceptions of poor sense of controllability and feelings of being overwhelmed and stressed, whereas decisions to complete care were characterized by perceptions of sense controllability and were more often accompanied by anger. Surprisingly, nurses did not report feelings of pride in bypassing the interruptions.

3.2 | Interruptions by human agents

The nurses noted that human agents have also interrupted their routine, including colleagues and interprofessional team members either on the ward or on other wards. As for interruptions stemming from colleague nurses and the head nurse, nurses admitted that they often prefer to ignore such interruptions and continue what they perceive as their primary task—providing care to their patients.

I felt angry when another nurse interrupted my treatment of a complex patient and asked me to treat a new patient. After I finished caring for my patient, I approached the new patient.

(Nursing experience of 25 years, Oncology)

I was in the middle of preparing medication when suddenly the head nurse turned to me and asked "Do you hear the alarms?" I was angry—I cannot stop drug preparation, so I ignored her.

(Nursing experience of 16 years, Internal Medicine)

Apparently, nurses felt that they had other options for handling interruptions from colleagues: "I may delegate the task to another nurse or explain that it is not urgent, and that I need to focus on more important matters" (nursing experience of 9 years, Orthopedics). In most cases, nurses felt anger at interruptions by colleagues. However, a different case emerged when nurses were interrupted by novice nurses. Perceiving that these colleagues require more help and direction in managing situations, nurses admitted that they more frequently address those disturbances, thereby delaying patients' care.

If there are new nurses on the shift ... nurses who cannot handle certain tasks alone ... usually I leave my primary tasks to help them, particularly in urgent and complex situations.

(Nursing experience of 6 years, Internal Medicine)

Thus, when managing interruptions by nurse colleagues, nurses were probably to employ professional judgment, as they felt they had sense of power to attend or deny the disturbance. In the case of colleagues or the head nurse, they most frequently ignored the disturbance and completed their patients' care; in the case of novices, they frequently postponed their own patients' care and attended the novice nurse, presumably because of their commitment to help or for fear that novice nurses might cause harm to patients.

Yet, nurses often attended to the interruptions of members of the interprofessional team (e.g. nutritionists, physiotherapists or physicians), even if they were engaged with complex patient care.

While I was writing a report, a consultant from another ward approached me. He asked if any changes happened with some patients, and if I could explain something to a patient. I felt worried about leaving documentation. On the other hand, I felt a commitment to respond immediately because he may be limited in time and move to other patients.

(Nursing experience of 9 years, Orthopedics)

Similarly, WIs by professionals from other wards were more probably to be addressed, thus causing omission or delay of the primary task. Nurses admitted, "No way will I send a patient to another ward when he is untidy" (nursing experience of 22 years, Recovery); "External wards depend on us and expect us to send the patient on time for the examination" (nursing experience of 16 years, Internal Medicine); and "I perceive the importance of sending the patient to dialysis on time" (nursing experience of 25 years, Internal Medicine). Nurses seem to perceive interruption by professionals of other wards as more urgent, requiring their immediate attention, and thus preferring to delay their primary task and address the interruption. Perhaps they perceived external wards as a source of monitoring and therefore addressed their requests.

Thus, it seems that whereas nurses often ignored interruptions by colleagues, they typically felt committed to adhering to

the requests of members of the interprofessional team, even at the expense of delaying their patients' care. Whereas the unaddressed interruptions of other nurses typically raised feelings of anger, the addressed interruptions of the interprofessional team members raised feelings of stress and overwhelm.

3.3 | Interruptions by patients and relatives

Other patients and/or patients' relatives are another source of human interruptions, requiring nurses to decide where to divert their time and efforts. Nurses typically consider the pros and cons in continuing a patient's care or addressing the interrupting patient's request, thus delaying the first patient's care.

If the patient calls screaming for pain medications, I will fulfill his request immediately, but if he asks for constipation medication, I feel anger—he can wait for me to finish treating the wound.

(Nursing experience of 9 years, Orthopedics)

Thus, interruptions by other patients triggered rationing processes about which task to prioritize given the relative severity of each patient's condition. Apparently, nurses felt they had professional discretion in making such decisions, a feeling typically accompanied by anger. Interruptions by relatives were often perceived as disruptive, unjust and upsetting; thus, nurses ignored them and continued their patient's care:

One patient's relative wanted me to help the patient now, not understanding why he had to wait. I decided to ignore him and didn't deal with him.

(Nursing experience of 6 years, Internal Medicine)

To summarize, when nurses faced interruptions by other patients or their relatives, they felt a sufficient degree of latitude and control in deciding whether to complete the treatment of their patient or to tend to the interrupting patient. Cognitively, nurses explained that other patients' interruptions usually trigger prioritization processes based on the relative urgency/risk of the primary task versus the interruption, and the time needed to handle the interruption. This prioritization process usually was accompanied by negative emotions of anger.

4 | DISCUSSION

The current study focused on nurses' experiences with WIs and the effects of these WIs on MNCs. By doing so, we were able to illuminate a somewhat understudied aspect of MNC. As it appears, nurses play a statistically significant role in determining when to omit or complete care in response to WIs. As our findings indicated, if nurses experience a sense of controllability, which is often accompanied by

negative emotions, they tend to weigh the pros and cons of attending the interruption against completing their primary task, thereby decreasing MNC; whereas when nurses experience that they do not have a sense of controllability, they tend to attend to the interruption, thereby making MNC more probably.

In line with previous research (Getnet & Biffittu, 2017; Johnson et al., 2017), the findings reveal several sources of WIs. Yet, they point to WIs that resulted in MNC versus those that led nurses to complete patients' care while ignoring the WI. Nurses responded to the different sources of interruptions using three main strategies: ignoring the interruption and continuing the patient's care; addressing the interruption and delaying or omitting the patient's care; or engaging with a rationing process, thus prioritizing either the primary or the secondary task (Reed et al., 2018).

The findings extend previous evidence (D'Antonio et al., 2014; Hayes et al., 2014, 2015; Sasaki et al., 2019) that it is not the interruption source per se that matters for MNC. For example, technical interruptions led, on several occasions, to omitted care, such as non-synchronization of work evident from a patient's electronic records (e.g. missing physician's order, new treatment); to completed care while improvising with the interruption in cases of technical breakdowns; or to considering whether to complete care or not in the case of bed alarms, given the relative urgency of primary versus secondary tasks. Rather, nurses' perceptions of job discretion, autonomy and controllability over interruptions emerged as a preponderant theme guiding strategies for managing WIs. Apparently, when nurses experienced sense of controllability, they often ignored the interruption (e.g. colleague nurses) or felt confident prioritizing (e.g. patients and bed alarms); when they felt bounded by interruptions (e.g. external professionals and missing medical orders in the electronic medical chart), MNC occurred. One exception, when nurses experienced controllability but decided to delay their primary task, occurred when the WI was by novice nurses. Apparently, nurses felt obliged to attend novice nurses' interruptions because they perceived these as justified and as requiring their aid to prevent patient harm.

By highlighting controllability as an important factor triggering the process of evaluating the pros and cons in attending or ignoring interruptions (and consequently whether to complete or omit care), the present findings respond to recent calls by Rafferty and Franklin (2017), arguing that not all interruptions should automatically be avoided. Surely, some WIs have merit in alerting nurses' attention to important tasks to address (Laustsen & Brahe, 2018; McCurdie et al., 2017). Yet, they may reduce the continuity of care (Cole et al., 2016; Laustsen & Brahe, 2018), triggering MNC. Therefore, scholars should consider further the appropriateness or preventability of interruptions. Assigning nurses autonomy and a sense of controllability may help give them the professional discretion to decide whether to ignore an interruption and complete a patient's care or to address the interruption and omit or postpone that care. Yet, notably, when facing interruptions of technical or human sources that involve the interprofessional team, nurses felt obliged to attend interruptions, without further explicit rationing, even at the expense of

MNC and potential harm to patients. To gain a deeper understanding of this issue, future studies should delve into this topic more deeply.

The findings further point to the importance of felt emotions in stimulating behaviours. When interruptions were accompanied by a poor sense of controllability, emotions of distress, overwhelm and moral distress were more prevalent. These findings extend previous findings on MNC, suggesting that MNC takes its toll on nurses, leaving them with emotions of guilt, regret, overwhelm and moral distress (Choe et al., 2015; Suhonen et al., 2018). Those passive negative emotions may trigger negative self-assessment (Strębska-Liszewska, 2020), an evaluation of wrongfulness (Miceli & Castelfranchi, 2019), and thus intrinsic distress validation processing instead of coping (Alicke, 2000). Our findings extend those in the MNC literature by demonstrating that, conversely, when WIs are accompanied by a sense of controllability (e.g. nurses felt they could choose or prioritize their actions), emotions of more active negative emotions, such as anger, were aroused, leading nurses to reject the WI and complete the primary task. It appears that anger contributed to coping with interruptions, leading to less MNC than did distress, which caused nurses to be self-focused instead of rejecting the interruption. Interestingly, all interruptions were accompanied by negative emotions. Even where nurses somewhat heroically completed care despite WIs, they did not express positive emotions, such as pride and a sense of accomplishment. They may have felt that the situation was a "lose-lose" one, as they recognized that neither postponing nor not postponing the primary task put the patient at risk.

Our findings also have important theoretical implications for the field of MNC. Scholars agree that MNC largely arises from scarce resources, thus interfering with a nurse's working memory, namely through a limited capacity to retain information for a brief period while performing mental operations (Harris & Wilkins, 1982; Koh et al., 2011; McDaniel & Einstein, 2000). These scholars argued that interfering with working memory may exceed nurses' capacity to address patients' needs, thus triggering MNC (Aiken et al., 2018; Palese et al., 2015). Because of failures in working memory, nurses may not recall tasks that were suspended because of an interruption and resume them soon after handling that interruption (Shum et al., 2013). The findings add to the literature by highlighting another potential cognition failure—to prioritize—resulting from nurses' perceptions of their primary task, and their primary client (Jones, 2014). Considering such additional cognition failures in prioritization of MNC might have important practical implications for administrators striving to decrease the MNC phenomenon.

These findings have important implications for managers and policymakers aspiring to limit MNC. Specifically, it is important to increase nurses' sense of controllability over interruptions, so that they can engage in professional prioritization processes for whether to address interruptions and risk postponing patients' care or not. Increasing job autonomy and empowerment may encourage nurses to refuse requests from interprofessional team members when they perceive that completing patient care is more important and urgent. Furthermore, as our findings indicated, a sense of controllability triggers more active emotions that facilitate nurses' actions, thereby

also decreasing feelings of guilt and moral distress, and contributing to nurses' health and well-being.

Technical aids such as whiteboards at the bedside could lessen the potential harm of interference with working memory and, consequently, with MNC (Goyal et al., 2020). Concomitantly, proactive team huddles during the shift can also help nurses discuss the tasks that were not completed and organize to complete them (Franklin et al., 2020). Finally, prioritization is a cognitive skill that can be trained and taught to facilitate better management of interruptions (Koh et al., 2011).

4.1 | Limitations

Several limitations should be noted. First, the small-focus-groups design was appropriate for understanding nurses' decision-making processes during WIs (Kalu & Bwalya, 2017); however, the findings might be biased by participants' motives, beliefs and values (Maxwell, 2013), and thus limited in their generalizability (Queirós et al., 2017). Second, the current study considered omission or delay of the primary task as MNC. As mentioned, however, it is not clear that interruption should be avoided automatically (Rafferty & Franklin, 2017). Thus, future studies should consider nurses' prioritization process, concluding under what circumstances MNC occurs for "good intentions or not." Third, while the emotional results of the WIs were discussed (anger, distress, etc.), the consequences of delaying either the primary or the secondary tasks were not. Thus, future studies should examine the consequences of MNC caused by WIs. Fourth, although the convenience sampling strategy is cost-effective, it might be at the expense of information and credibility. A multi-sampling strategy was used to reduce this potential bias, including purposive and snowball sampling strategies, which increased the representation of different participants and provided richer information (Creswell & Poth, 2016). Finally, WIs have previously been classified by several criteria, but this paper discussed only some of them, so future research should examine them in more detail.

5 | CONCLUSION

This is the first study to explore any potential relationship between MNC and WIs. When faced with work interruptions, nurses base their decision about whether to postpone the primary task on their perceived controllability of the situation. When they perceive poor sense of controllability of the situation, such as in cases of WI relating to out-of-ward staff, they address the WI at the expense of MNC. In contrast, when a perceived sense of controllability is present, such as when supporting a peer from the ward, they prioritize the primary task and the WI and are more efficient in non-urgent situations at completing the primary task.

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CONFLICT OF INTERESTS

No conflict of interest has been declared by the authors.

DATA AVAILABILITY STATEMENT

Due to ethical concerns, supporting data cannot be made openly available. Further information about the data and conditions for access are available by the corresponding author.

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