



# Information technology use and tasks left undone by nursing staff: A qualitative analysis

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## Abstract

Nursing staff perceive information technology (IT) as time-consuming and impinging on direct patient care time. Despite this, researchers have directed little attention toward the interplay between IT use and tasks left undone by nursing staff. In this paper, we analyze interview and focus group data on hospital nursing staff's experience working with IT to identify ways IT use interacts with tasks left undone. We found that tasks left undone by nursing staff can have IT-related antecedents and that IT-related tasks are also sometimes left undone. This analysis adds to the body of knowledge by showing that tasks related to the work environment and IT can be left undone and that nursing staff avoid certain IT-supported tasks because they do not know how to do them or why they ought to be done. These findings form the basis for our call for further research on the topic.

## Keywords

health information technology, hospitals, nursing assistants, nurses, care left undone, tasks left undone

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## Introduction

Healthcare organizations have implemented information technology (IT) systems to improve the efficiency and safety of care delivery.<sup>1</sup> Health IT use has reaped several benefits, including improved access to information<sup>2-4</sup> and reduced medication errors.<sup>5-7</sup> However, nursing staff have also been found to struggle to make things work following IT implementation.<sup>3</sup> They are facing technical, cognitive, and organizational challenges, such as dysfunctional hardware,<sup>3,8</sup> the need to learn how to operate new IT systems,<sup>9</sup> and increasing data entry requirements.<sup>10</sup> Nursing staff perceive IT use as time-consuming<sup>5</sup> and impinging on direct patient care time.<sup>3,7,11,12</sup> Some studies report that IT-supported nursing tasks may be rushed or left undone during a shift.<sup>3,6,10</sup> Examples of tasks left undone include entering data into electronic health records (EHR),<sup>3,10</sup> double-checking physician orders,<sup>6</sup> and reviewing/accessing patient information in the EHR.<sup>10</sup> Inaccessible EHR modules<sup>10</sup> and lack of time<sup>6,10</sup> appear to be the reasons nurses sometimes leave these IT-supported tasks undone.

Nursing tasks left undone, by both registered nurses (RNs) and nurse assistants (NAs), is an established topic in the nursing literature.<sup>13</sup> Multiple studies<sup>13,14</sup> have looked at the concepts of care left undone,<sup>15</sup> missed nursing care,<sup>16-18</sup> and implicit rationing of nursing care.<sup>19</sup> Despite some differences in conceptual definitions and their operationalization,<sup>13,14</sup> these studies all describe how nursing staff omit tasks within the nursing process, either in part or in whole.<sup>16</sup> Unlike non-nursing activities, activities within the nursing process require nursing-specific training.<sup>14</sup> Such nursing tasks include washing, feeding, mobilizing, educating, and monitoring patients, administering medications, providing emotional and psychological support to patients and their relatives, attending interdisciplinary care meetings, and documenting care.<sup>19,20</sup> Among these tasks, those most frequently left undone include emotional support, education, care coordination, discharge planning, and general tasks related to mobility and surveillance.<sup>13</sup> Inadequate staffing,<sup>18</sup> lack of time<sup>13,17,19</sup> or equipment,<sup>18</sup> and systemic dysfunctions (e.g., communication breakdowns between staff, malfunctioning equipment<sup>18</sup>) are some of the reasons these tasks are left undone.<sup>13,17</sup>

Multiple tasks within the nursing process—such as reviewing patient records,<sup>19</sup> updating care plans,<sup>15,19</sup> and documenting care<sup>15,18,19</sup>—can nowadays be assumed to be supported by IT applications in most settings. Thus, both health informatics and nursing studies point to an interplay between nursing tasks left undone and nursing staff's IT use. More specifically, previous findings suggest that IT-supported nursing tasks can be left undone and that IT-related factors can lead to nursing tasks being left undone.

Despite this, we found no previous studies that examine the interplay between IT use and nursing tasks left undone in detail. Considering the negative impact of uncompleted nursing tasks on nurses, patients, and organizational outcomes,<sup>13</sup> we believe that the relationship between this problem and IT use merits closer analysis. For example, RNs have been found to experience moral distress<sup>21</sup> and feelings of frustration, worry, and dissatisfaction in connection with tasks left undone.<sup>13</sup> RNs and NAs have been found to feel regret, guilt, and frustration due to being unable to complete their nursing tasks.<sup>17</sup> Hence, missed nursing tasks are a work well-being issue and a care quality issue.<sup>13,21</sup>

Against this background, this paper examines how IT use interacts with tasks left undone by nursing staff. However, in contrast to previous research, our study does not exclusively focus on missed *nursing* tasks; rather, we seek to identify the full scope of tasks that hospital nursing staff can miss connected with IT use. This broader approach to tasks left undone by nursing staff recognizes that, in practice, RNs and NAs are called to carry out a broad variety of tasks in their daily work, including non-nursing tasks (e.g., shift scheduling),<sup>22</sup> and that all of these tasks are potentially

**Table 1.** Data collection episodes, participants, and hospital units included in the study.

Data collection episodes	Participants (RNs and NAs)	Hospital units
<b>Structured interviews</b>	3 RNs (2 OR, 1 post-anesthesia care unit, PACU) 3 NAs (OR)	Pediatric OR
<b>Group interview</b>	3 RNs (2 OR, 1 nurse anesthetist)	Pediatric OR
<b>FG 1</b>	6 NAs	Surgery ward
<b>FG 2</b>	6 RNs	Surgery ward
<b>FG 3</b>	3 RNs (1 OR, 1 PACU, 1 nurse anesthetist) 2 NAs	Pediatric OR
<b>FG 4</b>	3 RNs	Pediatric oncology ward
<b>FG 5</b>	2 NAs	Pediatric oncology ward Neonatal ward
	31 participants (18 RNs and 13 NAs)	

affected by IT use. We thus believe that it is necessary to approach hospital nursing staff's experience of daily work with IT in its entirety to fully understand the interplay between work-related IT use and tasks left undone by hospital nursing staff and the consequences of missed IT-related tasks on nursing practice and hospital nursing staff's work environment.

## Research settings and methods

### Research setting

Our research was conducted at the University Hospital in Uppsala (UUH), Sweden. The hospital has 850 beds and employs 2650 RNs (including midwives) and 1970 NAs. UUH is highly digitalized, though its IT infrastructure encompasses many systems from different vendors that often lack interoperability. As a consequence of this fragmented IT infrastructure, both RNs and NAs must use several systems to carry out their daily tasks, including the hospital-wide EHR and its integrated digital provider order entry module, the operation planning system, and, for operating room (OR) staff, the patient vitals monitoring system. Furthermore, because different units are responsible for managing different systems, changes in IT infrastructure are not always coordinated. Consequently, different systems can be changed simultaneously or within a short period of time. Hospital staff continuously cope with both minor and major changes to one system.

In Swedish hospitals, RNs and NAs work as a team to provide nursing care to patients. NAs are required to have training in nursing and perform most of the patient care, including some medical care. Both RNs and NAs use largely the same IT systems (such as the EHR), while some systems (such as ordering food for the patients, which NAs do, or communicating with the receiving municipality on patient discharge, which RNs do) are mainly used by one category.

### Data collection

The participants came from four different hospital units at UUH: the surgery ward, the pediatric OR (including both operation rooms and a post-anesthesia care unit, PACU), the pediatric oncology ward, and the neonatal ward (see Table 1). While we did not collect personal work histories, our participants' statements showed that their experience levels varied from less than 1 year to over 20 years.

The first author conducted structured, one-on-one interviews at the pediatric OR in March 2017, approximately 5 months after a new operation planning system was implemented. They aimed to assess staff's experience with the new system and its implementation, and to compare staff's current experience with that recorded several months before. The interview script addressed four themes: time spent planning and documenting operations, interaction with the system, changes to the work process, and an overview of the patient flow. Each interview lasted 10-15 min and was documented through handwritten notes.

The first author conducted a group interview at the pediatric OR about 9 months after the structured individual interviews. The aim was to understand OR staff's experiences with the IT systems in use during operations, particularly those that resulted in dissatisfaction: the EHR, the operation planning system, and the vitals monitoring system. Six clinicians participated in the interview, including two physicians, three RNs working clinically, and one nurse manager. The 45-min interview was audio-recorded and then transcribed verbatim. This paper only analyzed the data from the three RNs working clinically.

The first and third authors carried out five 90-min focus group sessions. Participants were RNs and NAs from the surgery, pediatric oncology, and neonatal wards, and from the OR unit (see [Table 1](#)). The focus groups aimed to gather as many positive and negative experiences of nursing staff's work-related IT as possible and to discuss the consequences of these experiences on their work. The focus groups were audio-recorded and transcribed verbatim. The Swedish Ethical Review Authority approved data collection before the recruitment of participants (EPN 2017/XXX).

Although our different data collection episodes were conducted for slightly different purposes, they all shared a focus on hospital nursing staff's experience of daily work-related IT use.

## Data analysis

The first author selected all segments from the dataset where participants mentioned a task or part of a task being left undone at the end of their shift (the dataset consisted of notes and transcripts from the data collection episodes). The analysis did not include mentions of reduced time for patient care without reference to any concrete task left undone or mentions of tasks completed later than desired but still completed within the work shift (e.g., delayed review of patients' records). The reason for not including delayed tasks during the work shift was the difficulty in defining 'delayed' and identifying delayed tasks reliably and consistently throughout the data. The first author discussed these exclusion criteria and uncertainties with the second author.

Before the analysis, each selected segment was coded with the speaker's role (RN or NA). The analysis followed the principles of inductive qualitative content analysis.<sup>23</sup> The first author conducted the analysis in two phases. The first phase focused on the nature of the tasks left undone by nursing staff, and the second phase on the antecedents of these tasks left undone. The first author conducted several iterations of these two phases and ensured the consistency of their analysis through extensive memo writing.

In the first phase, each segment was first labeled with a short description of the task left undone that it mentioned (e.g., "care not documented at the end of the shift," "no care provided to some patients," "upcoming shifts not scheduled"). Each task was then sorted into one of two categories: IT-supported tasks left undone and non-IT-supported tasks left undone. Finally, each task was coded based on what it was about, for example, "about patient care" or "about the work environment," or "about IT."

In the second phase of the analysis, the antecedents of the tasks left undone were first coded with a short label describing the nature of the antecedent (e.g., "lack of time", "slow system response").

Then, segments with similar antecedents were grouped into categories with more general labels (e.g., “technical issues”). Finally, the author sorted the antecedents of each category of tasks left undone into two groups: IT-related antecedents and non-IT-related antecedents.

## Results

We found that IT interacted with tasks left undone by hospital nursing staff in two ways. The first was *tasks related to IT left undone*: these tasks included IT-supported patient care tasks, IT-supported work environment tasks (including IT), and non-IT-supported tasks related to IT.

The second was *antecedents of tasks left undone related to IT*. Functional or technical issues could prevent nursing staff from carrying out some tasks, and nursing staff sometimes skipped or avoided certain IT-supported tasks because they did not know how to do them or why they were done, or because they felt these tasks took too much time.

### *IT-related tasks left undone*

The IT-supported tasks that nursing staff left undone concerned either patient care or the work environment—including IT. IT-related patient care tasks left undone included retrieving information from the EHR, documenting care, and other types of data entry. EHR information retrieval tasks that were left undone including not reviewing parts of patient records (ward NAs) or not retrieving patient-related information (e.g., whether a patient needed insulin or not) from the EHR (ward NAs). With respect to documenting care in the EHR, participants reported not entering comments about medication administration (ward RNs) or patient weight measurements (ward NA). This means that some aspects of care—including medication administrations (ward RNs) and use of surgical instruments during operations (OR RN)—had been left undocumented on occasion. Participants reported not correcting errors in prescriptions (ward RNs). Nursing staff also described needing to work overtime to complete documentation (ward RN, OR RN), indicating that at least some of the documentation was sometimes undone when they ended their shift.

Finally, other types of data entry (i.e., not documentation) related to patient care were also left undone on occasion. For example, one ward RN explained that many clinical incidents were not reported. Both ward NAs and one OR RN reported failing to create electronic referrals (on the ward, this was a failure to order patient transportation, and in the OR it was a failure to order lab analyses). Additionally, one ward RN described how they were unable to communicate with the municipality where the patient was discharged when the system used for this purpose was unavailable. Ward NAs also reported being unable to order patient meals via the meal ordering system during their shift.

Uncompleted IT-supported tasks related to the work environment included submitting reports on system errors or damaged equipment (including IT devices) and other administrative tasks. Indeed, ward RNs reported that they sometimes chose not to submit system-generated error reports and were sometimes unable to report problems with the EHR, and both ward RNs and NAs mentioned sometimes not reporting malfunctioning equipment:

*And then, when something breaks, you need to report it in [the system]. [...] And it is also a lot of clicks—and you need to find the number, and it doesn't work, and so instead someone puts a note on it on which they've written: “broken.”*

Leo, ward RN (FG 2)

*In our unit, it's like, "those who find it, have to solve it," and then it's a little bit like, "I haven't seen anything."*

Sanna, ward NA (FG 2)

Ward NAs also indicated that they didn't check their work emails some days and were sometimes unable to schedule their shifts in the planning system. Finally, parts of IT training were also sometimes left undone: one ward NA reported having skipped parts of the video tutorial introducing the updated EHR.

In addition to the IT-supported reporting of system errors, EHR problems, and malfunctioning IT devices (and equipment in general), some non-IT-supported tasks—here, phone calls—related to IT were also sometimes left undone. For instance, one ward RN explained that they usually did not take the time to call physicians to ask them to activate medication lists in the EHR, and one OR RN explained that she had forgotten to call IT support to report a system bug:

*I thought I'd call [ITsupport], but things got in the way. And every time I got thrown out [of the system], I realized, "right, I said I would call someone." And then I forgot. [Laughs]*

Matilda, OR RN (FG 3)

### ***IT-related antecedents of tasks left undone***

Participants cited IT-related antecedents as the reason for failing to complete both IT-supported tasks and non-IT-supported tasks. Interestingly, not all uncompleted IT-related tasks were left undone for reasons that had to do with IT. In our data, sometimes IT-supported tasks and non-IT-supported tasks related to IT were left undone because nursing staff had too much to do in general and did not have time to complete the tasks. Here, however, we focus on the IT-related antecedents of tasks left undone.

Nursing staff sometimes could not complete IT-supported tasks due to technical or functional problems. Ward NAs reported that the meal ordering system was slow and sometimes froze, which means that sometimes they had not ordered patients' meals by the end of the afternoon shift. Ward RNs were sometimes also unable to complete tasks when systems (e.g. the system to communicate with the municipality) or Wi-Fi connectivity were unavailable. They also reported that prescription information was sometimes unavailable in the EHR because physicians had prescribed medications verbally but had not entered them into the EHR. One ward NA also complained about the lack of a comment field when entering patient data (in this case, a patient's weight) in the EHR. Finally, ward NAs reported that they were sometimes unable to schedule their shifts because the system was locked, because the next scheduling period had not yet opened in the system, or because they were unable to log into the scheduling system.

Nursing staff not knowing how or why to do something was another IT-related factor that sometimes led to uncompleted IT-supported tasks, and in one case, an uncompleted non-IT-supported task. For example, ward RNs reported that they did not understand why a comment field popped up for some medication administrations, and so they instead worked around it. Both ward RNs and NAs mentioned that the process of reporting damaged equipment and clinical incidents was unclear: for example, that it was hard to know which system to use to report damaged equipment, what information to enter in forms, or how to classify a clinical incident. As a result, they sometimes avoided reporting clinical incidents and damaged equipment. Finally, one ward RN

mentioned a lack of knowledge about the IT infrastructure as the reason they failed to give pre-operative medication to a patient.

*Only the Children's Hospital uses [the operation planning system]. But we get help from other OR units [...] which use a completely different system that we're not used to. So I forgot to give the premedication, because they documented it [...] in a physician's note, where we don't usually look. It's one of the drawbacks, that there are so many IT systems, they are used to different extents in different places [...]. And I am somehow expected to know, "the people in the neurology unit, they use that system."*

Anders, ward RN (FG 4)

The time it took to use IT systems was another antecedent that affected both IT-supported and non-IT-supported tasks. For RNs and NAs in both ward and OR settings, slow system response and the need to log in and out of multiple systems to document patient care meant that some documentation was left undone at the end of the shift. In addition, OR RNs also reported not being able to go check on their patients because of the amount of time required for documentation:

*When I'm in the PACU unit, I don't have time to go and talk to patients at all. I have to write in three IT systems, and have five patients at the same time. It's a NA who needs to go and talk to the patients and see how they're feeling. I never have time.*

Matilda, OR RN (FG 3)

The number of clicks it takes to accomplish things within the EHR, correcting mistakes in medication orders, and retrieving patient information could also result in these tasks being left undone. Finally, sometimes clinical incidents and damaged equipment were not reported and system-generated error reports were not submitted due to slow system response times, the need to log out of one system so they could log into another one and vice versa, and the general impression that these processes took a lot of (i.e., too much) time.

## Discussion

Our study examined the interplay between work-related IT use and tasks left undone by hospital nursing staff. In accordance with previous research, we found that hospital RNs and NAs could leave IT-supported tasks related to patient care undone and that IT-related factors, especially technical issues, were among the antecedents for tasks left undone by nursing staff. Indeed, the nursing literature mentions malfunctioning and inaccessible equipment as reasons for nursing tasks left undone,<sup>19</sup> and the health informatics literature explicitly mentions inaccessible IT systems (or system modules<sup>13</sup>) and time-consuming IT-supported tasks.<sup>6</sup> However, in contrast to previous health informatics<sup>2,3,6-8,10</sup> and nursing research,<sup>13,17-19</sup> we did not limit our analysis to missed *nursing* tasks; instead, we included any task that nursing staff reported having missed. Through this broader approach, we have found that nursing staff can leave tasks related to the work environment and IT undone. These tasks include both IT-supported tasks concerning the work environment, such as electronic reporting of damaged equipment, and non-IT-supported tasks (in our data, phone calls) related to IT.

We believe that these missed tasks concerning the work environment and IT deserve attention from the health informatics and nursing communities. Indeed, our findings raise several important questions. For instance, what consequences do these missed tasks have on nursing staff's work? Put

another way, how does nursing staff leaving these tasks undone affect their work routines (including their ability to carry out their nursing tasks in a timely and correct way)? In our study, we found that nursing staff skip parts of their IT training and, at the same time, can abstain from carrying out IT-supported tasks because they don't know how to execute them. This suggests that some missed tasks related to IT might result in other missed tasks, including nursing ones. Furthermore, nursing staff missing to report IT-related issues may lead to delays in addressing bugs related to IT and other equipment and, consequently, might negatively affect patient safety.

Another question that our findings raise concerns IT managers' knowledge of the issues that nursing staff encounter related to IT use: what consequences does nursing staff missing IT-related tasks have on IT managers' perception of how well their hospital's IT environment is working out for nursing staff on the floor? Nursing staff missing to report IT-related issues and bugs is likely to affect the visibility of work-life issues connected with IT use, that is, to make these issues invisible to IT managers. From an IT management perspective, this is particularly problematic. Indeed, it might cause IT managers to underestimate the level of strain that IT creates for nursing staff on the floor, and thus lead to a disconnect between IT managers' perception of nursing staff's work environment and nursing staff's own experience of their working conditions. Such a disconnect between IT managers and nursing staff can be a source of alienation and decreased work well-being for nursing staff.<sup>21</sup> Hence, there might be a connection between IT-related tasks left undone by nursing staff and nursing staff's decreased work well-being.

On this basis, we call for future research to examine more closely the tasks related to the work environment and IT that hospital nursing staff leave undone as well as the effects of these tasks' omission on the relationship between IT managers and nursing staff, nursing staff's work well-being, and patient safety. When examining these questions, special attention should be paid to differences between different nursing settings. For instance, in our data set, no OR nursing staff member mentioned failing to complete any IT-supported tasks related to the work environment. It may be that reporting damaged equipment and scheduling shifts is not part of their responsibilities in the OR, or it may be that these tasks simply did not come to mind during the interviews and focus groups. More research is needed to ascertain whether both OR and ward nursing staff sometimes leave IT-supported tasks concerning the work environment undone. In addition, in our data, IT-supported documentation seemed to impinge more on direct patient contact in the OR than on the wards. Indeed, two OR RNs reported not checking on their patients due to the time required for documentation in multiple systems. In contrast, ward nursing staff seemed to choose to postpone documentation until after the end of their shift so they could focus on direct patient care. One likely explanation is that in the OR and PACU, documentation needed to be completed in order for patients to be transferred to and from the OR. Indeed, one OR RN explained that patients needed a certain paper in order to be admitted into the unit, and so the information had to be entered into the system without delay. Further research is needed to establish whether OR nursing staff are more prone to leaving direct patient contact tasks undone than ward nursing staff.

### *Limitations*

Our data collection episodes were not specifically oriented towards examining tasks left undone, as we were collecting data on hospital nursing staff's experience of working with IT in general. In this context, it is particularly interesting that tasks left undone were brought up in all our data collection episodes, without any specific prompting from the researcher(s). Tasks left undone were thus an unexpected recurrent theme across our dataset. Since we did not explicitly ask participants about tasks left undone, just because participants did not mention leaving some types of tasks undone does

not mean this never happened. In addition, since our study was qualitative, we cannot say anything about the frequency at which different types of tasks were left undone. Finally, we chose not to collect socio demographic information from our participants due to anonymity and time constraints. Therefore, we cannot claim that our sample was representative.

### **Future research**

Further qualitative and quantitative research is needed. Future qualitative research could investigate potential associations between nursing staff's IT use and tasks left undone—that is, associations that did not emerge from our data. In addition, future qualitative studies could also examine the consequences of failing to complete IT-supported tasks related to the work environment and non-IT-supported tasks related to IT. Although nursing staff have been found to experience negative emotions when nursing tasks are left undone,<sup>13,17</sup> the consequences for nursing staff of failing to complete non-nursing tasks and its impact on their work have not been examined. Future quantitative studies could measure the frequency at which each identified type of task is left undone and compare the prevalence of non-completion for each type across ward and OR units. In addition, differences in missed tasks connected with IT use between RNs and NAs could be explored.

### **Conclusions**

In this paper, we analyzed interview and focus group data on hospital nursing staff's experience working with IT in order to examine associations between IT and tasks that nursing staff left undone. Our findings expand the body of knowledge on tasks left undone in relation to IT use. We found that RNs and NAs sometimes left IT-supported tasks related to the work environment and non-IT-supported tasks related to IT undone, and that when nursing staff did not know how or why to perform an IT-supported task, they could avoid doing these tasks. Because electronic reporting of damaged equipment was among the tasks that nursing staff avoided, health care organizations might need to consider other roles and channels for reporting damaged equipment and IT-related issues on the floor.

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