

RESEARCH ARTICLE

Information systems in nurses' work: Technical rationality versus an ethic of care

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Abstract

Nurses increasingly interact with health information systems (HIS) in their daily work. This article examines how the problems that they confront in that interaction can be understood through the theoretical concepts of technical rationality and an ethic of care. The findings are based on a qualitative study of nurses in one Swedish hospital. They suggest that HIS did not support the holistic care of patients, and were not adapted to the varied and often urgent situations that nurses faced in their daily work, leaving them feeling isolated with their problems. In summary, HIS were found to serve the administrative aims of a hospital organisation, based on technical rationality, rather than supporting patients' needs as seen from an ethics of care perspective. The contribution of the study is to show how the use of these two conceptual tools connects nurses' daily problems with HIS to more fundamental issues about the values upon which healthcare is grounded.

KEYWORDS

electronic patient record, ethic of care, health information systems, IT providers, new public management, nursing, technical rationality

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INTRODUCTION

New digital information systems are continually being implemented in healthcare. They are expected to increase efficiency, reduce costs and facilitate the monitoring of healthcare, as well as increase patient safety, satisfaction and empowerment (Fagerström et al., 2017; Nguyen et al., 2017). These health information systems (HIS) are systems where healthcare staff document information, and yet also gather information about their patients or about different processes in their work. The electronic health record is a prime example. All nurses interact with their patients' electronic health records, both documenting and looking for information. In addition to the electronic health records, there are systems for recording patient and process data (e.g., during surgery) and systems for planning (such as allocating staff), record keeping (such as showing what material/medications can be found, where) and information retrieval (such as providing guidelines for different situations). HIS are only one aspect of all the digital technology that nurses use, which pervades all their work. The societal discourse on the digitalisation of healthcare tends to be overwhelmingly positive, seeing increased digitalisation as both a necessity and a societal, as well as economic good (Weiss, 2019). Vosman and Niemeijer (2017) point out another reason to accelerate the digitalisation of healthcare: in the current society, change is valorised, and thus, even hospital managers need to produce change.

The implementation of HIS has met with problems, however: the healthcare staff who are the intended users do not always welcome them; the expected benefits may fail to appear; and, sometimes, productivity, communication between staff, and patient safety may actually be reduced (Fagerström et al., 2017; Staggers et al., 2018). Furthermore, HIS often appear to be poorly adapted to everyday clinical practices (Blijleven et al., 2019).

Much of the research about HIS and other IT tools in healthcare, their acceptance and consequences, has been done with physicians (Gephart et al., 2015; Vitari & Ologeanu-Taddei, 2018). Doctors' work tasks are fundamentally different from those of nurses, however. In a hospital setting, doctors specialise in certain illnesses and conditions, while nurses are responsible for the overall care of the patient, and thus, the two categories of staff use digital tools differently. More research is therefore required on how new digital tools impact nurses' work, specifically (Fagerström et al., 2017; Gephart et al., 2015; Vitari & Ologeanu-Taddei, 2018).

The International Council of Nurses borrows a definition of care from Henderson (1966): 'caring for individuals, sick or well, is to assess their responses to their health status and to assist them in the performance of those activities contributing to health or recovery or to dignified death that they would perform unaided if they had the necessary strength, will, or knowledge and to do this in such a way as to help them gain full of partial independence as rapidly as possible'. Whichever definition is used, it is clear that nursing is about caring for people. The definition of the International Council of Nurses also makes it clear that it is the needs of the people cared for that are the focus of the relationship.

Emslie and Watts (2017) regard present-day healthcare, however, as governed by a new managerialism and a regime in which productivity is fetishised. The task of healthcare is seen as the production of cures by means of distribution of medical interventions and care. Care is seen as a prepackaged commodity, not as something that evolves in individual relationships (Choiniere, 2011). According to Emslie and Watts, this kind of healthcare governance is based on technical rationality (Schön, 1983). Health information systems and other digital tools are part of this transformation of healthcare, in that they enable the regulation and steering of the care that is given.

Introducing digital tools in a hospital setting changes the work organisation, and nurses' relations to each other, to other staff groups and to the patients (Fagerström et al., 2017). To the extent that nurses identify themselves as caring persons, the requirement to devote their time to technical tools may impact their professional identity (Nilsson et al., 2016). Vosman and Niemeijer (2017) use the concept of an ethic of care (Tronto, 1993, 2010) to show both how work—according to this ethic—has become more and more difficult in a modern hospital, and yet how the ethic of care continues to still be alive, in different forms, within the complex organisation of a hospital. Several researchers have shown, however, that the work that nurses do and the ethic of care that they base their actions on are less valued in the hospital environment (Wilson, 2004; Galbany-Estragues & Comas-d'Argemir, 2017).

Neither Emslie and Watts (2017) nor Vosman and Niemeijer (2017) discuss the introduction of HIS to a hospital context in particular, but the concepts of technical rationality and ethic of care are highly relevant in the digital transformation taking place in hospital care. Hence, *this study uses the concepts of ethics of care* (Tronto, 1993, 2010) *and technical rationality* (Schön, 1983) *to analyse nurses' experiences with HIS in a large university hospital in Sweden.*

The article continues as follows: first, the concepts of ethics of care and technical rationality are introduced. Previous research on nurses' work and HIS in hospital settings are then related to these concepts. After a description of the context and methods of the study, the findings are presented. Finally, findings relating, first, to the organisational aspects, and then to the system design and deployment aspects, are discussed in relation to the two theoretical concepts. The article concludes by offering some suggestions for further research inspired by those concepts.

The ethics of care

'Ethics of care' is a concept of moral philosophy and has been developed in two stages; first by Carol Gilligan in 1982 and later by Joan Tronto (1993; 2010). Gilligan presented her alternative theory of moral reasoning in opposition to Kohlberg's (1981) theory of moral development stages. Kohlberg used a male sample in formulating his theory, which was based on ethics of rights, particularly autonomous individuals' respect of other autonomous individuals' rights. Gilligan, meanwhile, made a study based on a female sample and came up with partly different moral development stages. She put forward ethics of responsibility, where individuals are always interconnected and responsible for each other's wellbeing.

Joan Tronto (1993, 2010) developed this theory beyond individual caring, closely tied to women's lives. She saw the ethic of care as having a basis in both individual and political ethics, in that care entails taking on responsibility for both interrelatedness between individuals and also humans' interconnectedness with the 'world'. Even in Tronto's reasoning, the concept is gendered, but Tronto also argues that the ethics of care is universal and applies not only to individuals but also to institutions. Sweeney and Rhinesmith (2017) argue that an ethic of care—until now mainly found in women's invisible or little valued labour—should have the potential to change society. Overall, the 'ethic of care' could also be called 'care rationality' (and was so in Scandinavia in the 1990s; Ve, 1994). This 'rationality' would differ from the technical rationality, in that it is firmly based on (reflective) practices of care (Schatzki, 1996).

According to the ethics of care, the bottom line for caring is the realisation that vulnerability is a fundamental human condition and that all individuals are interwoven in caring nets. The basic task of an individual, and a basic human need, is to contribute to keeping up these

networks and through that to take up her responsibility for the wellbeing of other people. In caring, the focus is on the needs of the other.

The basic values driving an ethic of care are those normally associated with women—intuition, emotionality and co-operation, the relational, local and particular (Vosman & Niemeijer, 2017; Wilson, 2004). These values are generally not held in high esteem in the neoliberal society, which rather valorises objectivity, productivity and competition. This is also the case among both those in leadership echelons in healthcare and those who develop HIS, who also value productivity and generalisability when it comes to both the organisation of work and technical tools.

Healthcare is an excellent example of an area where the ethics of care is both gendered and situated in a power structure. The two main professions in healthcare—physician and nurse—are differently gendered (even though the medical profession is becoming more female) and also seem to follow different logics. For medicine, the aim is cure, and the work is based on scientific findings, which are seen as generalisable. The illness rather than the person in question is the focus of interest in many medical specialisations (Galbany-Estragues & Comas-d'Argemir, 2017). For nurses, however, the aim is to see to the patients' needs so as to support their recovery and wellbeing. The theoretical knowledge of the doctor is acknowledged and revered, while much of nurses' care work, which combines theoretical and practical knowledge, often goes unrecognised.

Technical rationality

Technical rationality is closely connected to techno-optimism, the idea that both technical and societal problems can be solved by technology or technical thinking. Technical rationality believes in a delimitation of human problems to find generalisable solutions. Donald Schön (1983) saw technical rationality as restricting one to the use of a single type of knowledge, preferably scientific, to solve problems, instead of using that knowledge as one component in a reflective practice. Thirty years later, Goodman (2016) conceptualised technical rationality in late modern society, not as decision-making, but as rule-following, without asking for the aim of the rules. He argued that technical rationality in our society requires 'thoughtlessness', that is, that the space for individual, creative decision-making has declined. According to Emslie and Watts (2017), the neoliberal society and its governance by new public management are based on technical rationality.

A prime example of technical rationality is scientific management, or Taylorism; an organisation of production where tasks are divided into small units to be performed by different employees, for example in an assembly line. In Taylorism, thinking is separated from doing, in that those who plan the production are separated from those who do the actual work (Kelly, 2016), with the former being seen as more worthy (Wears & Hunte, 2014). In such a system, the workers should not make judgements of their own and variations in processes and results are undesirable.

An assembly line is very different from nurses' work, where knowledge work is combined with practical work, and decisions are made on the basis of professional discretion. Both Wears (2015) and Wise et al. (2017), however, argue that Taylorism is gaining ground in caring professions. As an example, Wears and Hunte (2014) discuss clinical practice guidelines or care plans. These are increasingly put forward as substitutes for nurses' personal judgements based on their knowledge and experience. Care plans follow the ideology of Taylorism by dividing

medical and care processes into a number of steps that are completed in a linear way, and often in a certain timeframe. Care plans also follow a Taylorist ideology in that they are created outside the sphere of practical work. From an ethics of care perspective, however, when focusing on a patient's needs, unforeseen tasks, not visible in the care plans, are often likely to emerge. Hence, the care plans that nurses follow and register their work in do not provide a complete or accurate picture of what nurses and patients actually do in the caring relationship. This also explains why there is a strong resistance to standardisation of care. In Wears' (2015) words: 'Thus, at least some of the resistance of front-line workers to standardisation is explicable, because the models of work inscribed in standardised routines clash too strongly with their actual work' (p. 91).

While care plans do not intrinsically require digitalisation, HIS facilitate the Taylorist monitoring of care workers, structuring their work and limiting the space for professional judgement. With the introduction of artificial intelligence, the next step in the digitalisation of healthcare, digital tools will curtail the space for professional judgement even more, as a number of decisions will be made, or will be strongly advised, by computers.

Ethics of care, technical rationality and IT in nurses' work environments

Research on how nurses' work is becoming increasingly tightly governed, and what role HIS play in this can be viewed in light of the two rationalities.

HIS are normally acquired and implemented by a decision of the management and handed down to the staff to use. Often, predesigned tools are acquired without an attempt to adapt them to the needs of the local users (Gulliksen, 2015). The process of implementation thence follows a technical rationality enforcing generalised processes which often do not fit the local, relational and particular work processes that nurses actually perform. Nurses' knowledge and practices are often invisible in these acquisition and implementation processes (Mair et al., 2012).

Time is an acutely significant aspect of nurses' work (Gephart et al., 2015) and one where the differences between technical rationality and ethics of care clearly manifest themselves. The concept of time is perceived differently in these two logics. Technical rationality presupposes autonomous individuals who can predict their time use. HIS are built on the assumption that nurses' time use can be predicted, and that it can be planned to be as effective as possible. From the nurses' perspective, however, HIS do not make their work more effective. The benefit of simplifying work tasks often does not happen, instead, new tasks are introduced or tasks need to be conducted in a more time-consuming way (Gephart et al., 2015; Sockolow et al., 2014).

Hierarchically, nurses are in a position between doctors and assistant nurses, and how these two categories, in particular doctors, relate to HIS, has an impact on nurses' work. As the rationality that doctors' work is based on is easier to adapt to an IT system, nurses' needs are more often left without attention when HIS are designed and implemented (Gephart et al., 2015; Vitari & Ologeanu-Taddei, 2018).

If nurses' basic work ethic is in opposition with what is inherent in the hospital structures and cultures advocated by the management, tensions and conflicts are bound to emerge. HIS codify and materialise other rationalities and force nurses to comply with them. Nurses can either adapt to the overall rationalities of the hospital, or they can try to add the requirements posed by technical rationality to what they perceive as the core of their work. According to Goodman (2016), nurses may feel uncomfortable when their basic professional ethics conflict

with the organisational ethos, but they are normally not able to articulate the root of the problem. Instead, there is general dissatisfaction and sometimes subtle noncompliance with the organisational regulations (Dupret, 2017).

CONTEXT AND METHOD

Swedish public healthcare suffers from a constant shortage of nurses (Blombergh & Stier, 2016; Rudman et al., 2010), as many nurses prefer to work in the private sector, or outside their basic profession altogether. It is in that context that, over the past fifteen years, Sweden has introduced a range of HIS and other e-health tools for both professionals and patients, in an effort to make nurses' work more efficient or substitute it with digital tools. As public healthcare in Sweden is organised regionally, the tools and services provided to staff and patients vary across the country. A general phenomenon, however, is that new tools are being introduced with increasing speed (Blix & Levay, 2018; Larsson & Teigland, 2020).

The context of this study is a large hospital in Sweden (with around 8500 employees, of whom around 2500 were nurses and around 2000 assistant nurses). Hundreds of IT systems were in use in the hospital, most of which were used only locally in different wards. The most important system was the electronic patient record, in which all relevant information concerning the patient was recorded. This system was provided by an international company and consisted of a number of modules, not all of which were in use at this particular hospital. During the first phase of the fieldwork, an old version of the system was in use, but a new release had been in use for a number of weeks before the second phase of the fieldwork. In addition to the electronic patient record, nurses working in operation rooms related to two systems which were in use all the time. This article considers these three systems. In addition, nurses had several other systems in use, and they also caused problems at least occasionally.

The hospital had an IT unit of around 70 people with responsibility for designing, training, support and adaptation of global systems to local needs. In addition, there were local nurses who were trained to give first-line support in IT problems, in addition to their work as nurses.

The hardware in the wards consisted of both stationary computers and laptops. The laptops were not normally carried around, however, but functioned more like stationary computers. The hardware equipment varied between wards, as purchase decisions were delegated to different divisions of the hospital.

The data this paper is based on 8 days of observations by four researchers in two wards (phase one), and four workshops/group interviews with nurses and assistant nurses (17 participants altogether) from seven wards (phase two). One of the observed wards was a surgical ward, for the care of the patients before and after surgery. This ward had a relatively fast turnover of patients. The other observed ward was oncology, where the patients stayed for longer periods. The workshops also had participants from other surgical wards and nurses working in surgery. Access to participants was given through ward managers and the like, and our impression was that they wanted a scientific confirmation and nuancing of the problems that their staff was experiencing. The study was approved by the regional ethical review board.

The purpose of the observations was to familiarise the researchers with the environment (Tjora, 2006). When learning that the purpose of the research project was to investigate hospital IT from nurses' perspectives, however, the nurses often engaged the researchers in discussions on such issues. While closely following nurses' work on screen did not in itself allow systematic observations of the usability of the systems, a crude version of the 'think aloud' method

(Bucknall & Aitken, 2015) was used when the researchers were sitting with the nurses at the screens. The nurses were happy to demonstrate and discuss particular issues as they were working when time allowed. Detailed notes were taken during the observations.

The workshops/group interviews aimed to explore the different ways that HIS influenced nurses' work. We chose to use groups rather than individual interviews because of our expectation that the group setting would inspire the participants, stimulate more recollections and provide different viewpoints on the issues brought up. Because the aim was exploratory, the workshops/group interviews were unstructured (Goodman & Evans, 2015). They started with two warm-up questions: 'What is the most satisfying aspect in your work?' And, 'What would you be if you were not a nurse?' These warm-up questions actually proved to be revealing, in that most nurses in different ways related to ethics of care (i.e., the wellbeing of patients) when talking about their work satisfaction. After that, the participants were asked to share incidents, positive and negative, involving IT during the near past. These incidents were then discussed in terms of the consequences they had, for the nurses personally and for their work. Finally, general perceptions about the influence of IT in healthcare were asked for.

The workshop participants recounted negative incidents and it was mostly only after prompts that they also came up with positive sides of IT introduction. Similar attitudes were encountered during the observations: many nurses regarded them as a possibility to talk about their problems with IT with somebody who might possibly be able to bring messages forward to a higher level. That is why the focus group discussions might have become overly negative. The negative features which increased nurses' workload and stress and made it more difficult for them to care for patients were obviously real, however, as they were both observed and reported, with different examples.

The analysis was thematic (Braun & Clarke, 2012). The workshops were transcribed, and both observation notes and workshop transcriptions were coded in Atlas.ti. The first coding was open and resulted in 74 codes, of which 18 appeared frequently in the material. These 18 were grouped into seven themes: IT design and functionality; documentation and information retrieval; communication and collaboration; organisation, including distribution of tasks; management; patients and patient safety; time and stress. Additional codes out of the 74 were aligned with these themes. Quotations carrying these codes form the empirical material of this paper. The concepts of ethics of care and technical rationality were employed after these quotations had been read and reread, as these concepts captured an understanding of 'what is going on here'.

FINDINGS—IT OBSTRUCTS CARE

The main clashes between electronic patient recording and the daily work and responsibilities of nurses were that the information retained, although extensive, was not adapted to nurses' needs; that the documentation work required a different time regime than the nurses had; and that patient safety, a core value in nursing care, could be set aside for the sake of electronic documentation. These problems—which caused stress, including ethical stress—were exacerbated by the nurses' impression that nobody really cared about the problems. Those nurses who were less technologically aware could be stressed by all the new software that was constantly introduced, while those who were more well-versed technically could become frustrated by having to use software that was much less user-friendly than what they would use at home.

The problems experienced by the nurses created a work environment in which they felt that their work ethic to provide holistic care to the patients was obstructed, because (1) the computer systems focused on medical conditions rather than patients' wellbeing and (2) because of need to devote time to excessive documentation requirements. Generally, (3) they felt that their ethic of care weighed less in the minds of management than management's pursuit of efficiency and its belief in technology.

Systems constructed without a focus on the idea of holistic care

The electronic record system that was used throughout the hospital structured nurses' work through care plans. That is, for each condition there was a defined set of procedures, measurements and other data that should be recorded, either by ticking in boxes or choosing in menus. Furthermore, as the hospital was organised into wards according to medical specialties, individual wards used some care plans more regularly than others. Patients often have multiple problems, however. This meant that nurses also needed to access care plans that were not common in their ward and find boxes where they could record things that belonged to other medical specialities. Much of the recording time was spent scrolling in the program to find the right box or menu. The system also allowed users to enter free text, and this gave nurses some more room to explain deviations from the normal course of events, and to give a little more holistic description of the patient's situation. Different wards and different individuals had different routines for how much should be recorded in this way, however.

Nurses' situation was exacerbated by their hierarchical position between doctors and assistant nurses. They were dependent on doctors' orders, for example concerning medication, registered in the system, and they were responsible that all the care activities were recorded. Assistant nurses agreed that nurses had it worse with the electronic recording system and recounted that when the system did not work, they left their information with the nurse, to be recorded by her. Doctors did less recording than nurses and, both during the observations and on the basis of statements made in the workshops, nurses appeared to be more proficient in the system, helping doctors to do their recording. As Larry said:

It's part of our problem that we are, as they say to us during the education, we are the cogs in the wheel. The nurse is the one that makes sure that everything works and the one who knows the most shortcuts and quick fixes [...] If my assistant nurse does not document, I will document for her, if a doctor doesn't document, I document for them. (Focus Group 2)

Documentation and time

To complete the documentation as intended, nurses would have needed stretches of uninterrupted time. The system seemed to expect, first, that care work could be divided into small units that could be recorded separately, such that, when assembled, the record would provide an adequate image of the development of the patient's condition. Second, that nurses making the data entry were autonomous individuals with a command of their time. In everyday nursing, based on an ethic of care, neither of these assumptions was true. Arthur explained how

the demands for documentation caused a mental burden, as it was impossible to fulfil them the way the designers had expected:

We can't just sit down on a chair at a keyboard and tap away for an hour because you hardly have five minutes. Then you get a call from a patient and you have to interrupt yourself in the middle of a sentence, and then you will come back twenty minutes later, when this patient is back from the toilet. And so, 'What was I doing?', 'What was I trying to record?' (Focus group 3)

The problems with the electronic recording system combined with nurses' hierarchical position, tied nurses to the computers for much of their working time. Often, the documentation that was supposed to happen during nurses' work shift was left until the end of the shift, and it was not uncommon for nurses to stay at the computer to finish the documentation even after their shift had ended (cf. Hayes & Moore, 2017).

The system often took a long time to respond to data entry attempts, and it was common for nurses to be logged out unexpectedly. These long response times were particularly stressful for nurses, who usually had only short slots of time in which to do their documenting, never knowing when they would be called on by patients. In such a situation staring at the screen without knowing whether it would react at all was extremely frustrating, as Anna explains:

When you know that you have a lot to do and you just need to go in and do a couple of things and you get this updating symbol that just spans and you stand there and gnash your teeth because nothing happens. You have maybe learnt many of the ways you can solve it, often it's about restarting the shit, so it starts again, but it takes some precious seconds from what you are doing, and you don't always have those. (Focus group 2)

Some of the hardware was quite outdated, resulting in functionality problems when the software was upgraded. Hardware was also the root of another problem: as computers could not be carried around all the time, nurses could spend quite a lot of shuttling physically between patients and computers (cf. Halford et al., 2010). This occurred both when patient needs interrupted computer documentation tasks, and vice versa, when nurses needed to return to the computer to consult the electronic record to verify the treatment regime for a patient. The end result was multiple walks back and forth through the corridor, amounting sometimes to several kilometres a day. In the discussions, the nurses compared the situation to earlier times, when paper documentation was stored and readily available by the patient's bed. They also pointed out that the safety of the care was suffering, when they or the doctor sometimes needed to leave the patient in an acute situation, to have a look at the patient record.

One of the wards had introduced tablets for the nurses to use. These were not very popular, however, as nurses found them too heavy to be carried around in a pocket, and the Wi-Fi net was not very good everywhere where the nurses needed to move. Thus, giving the nurses individual tablets was not the solution. In another ward the nurses would have preferred to have tablets at patients' bedsides, just like the paper documentation had been, that is, they would gladly have shared a tablet with others who cared for the same patient.

Nurses walked around with small notebooks, where they jotted down information to be documented in the computer later, and to-do lists and reminders for themselves. The notebooks

were quick to use, gave a quick overall view and the information could be designed according to each nurse's personal preferences. Hence, most of the nurses did not regard tablets as an adequate substitution (cf. Dupret, 2017; Iversen et al., 2015). It seems, however, that the creators of the documentation software had no idea about these notebooks, but believed that the ordinary workflow was for the nurses to do checks and take measurements and then sit down and document them. Arthur again:

In the old version of [the program], the first thing you did when you documented a control was to choose at what time you had made it—it was a checkbox you had to tick. I have a paper with the controls and the time I took them and then, maybe, two hours later I have time to sit down and document them. And now, when I have written them down, I realise that I wrote them as if they were made now, because this checkbox about when they were made is kind of hidden now. And then I have to cancel and write everything again, and you have to cancel every control, one at a time, seven controls—you can't just cancel everything at once. (Focus group 3)

The difficulty of cancelling actions was mentioned several times. Mistakes could be made, such as the one above. A nurse might enter a record in an incorrect care plan, or against the wrong patient's record. This was easily done, in particular in the operation theatre or recovery ward, where nurses used three different documenting programs and had several patients each, in the same computer. Rather than letting false data stay in the program, nurses sometimes closed down the whole program, and started their documentation again from the beginning, but sometimes incorrect data was left in the records when it was deemed as not being important.

The electronic patient journal replaced the traditional practice of the oral transfer of information between shifts in a designated time period at shift changeovers. This electronic substitute did not work as well as intended, however, as it was sometimes difficult to record clear alerts, in particular for the benefit of night nurses who had to read the records of a large number of patients. Using the electronic records as a means of communication, instead of talking to each other, meant that the information was structured according to the record template, not always according to nurses' needs. It could happen that a new shift came in while the previous shift was still working. In such cases, the nurses starting their shift could read the documentation in the electronic records while the nurses on the previous shift were just starting to sit down to finish their documentation. These embedded communication gaps that had the potential to cause delay, duplication of resources and less good patient care. Sanna referred to the patient safety implications arising from this overlap in documentation timeframes, giving an example; and both Maria and Sanna agreed that this could be costly:

Sanna: For example, if you haven't had time to document during the day, and maybe it's been decided that this patient should fast now, before an examination or something, and then you don't have time—if you have a lot to do—you don't have time to talk to the evening staff and say anything. They just read and go round to the patients... And the patient says, 'Can I get a glass of water?' or 'I'm hungry, can I get a sandwich?' and 'Sure, I'll get you one, you can eat'.

Maria: 'So they have to stay another day because you don't...'

Sanna: 'If you have to postpone the examination till the day after, for example'.
(Focus group 3)

Patient first or IT first

Using valuable time to report IT problems was not seen as a rational option by the nurses, as they had experienced that it did not amount to anything. Their impression was that the management responsible for their digital tools had little understanding of their needs and work situation. The nurses experienced a clash of values, when what they valued the most, patient safety, seemed to have no importance for the IT staff. An example was a serious bug in the operation program that was discovered soon after the program was implemented: if somebody closed the program by clicking the cross in the upper right corner, as is customary in most programs, all computers using the same program lost contact with the server. Kajsa and Mimmi from children's operation explained how utterly unsafe the situation was, as all planning happened through the system.

Mimmi: You must not close the [program] by clicking the cross, like you do in all other programs. It will never be possible to make all not do that. There are new people all the time, so it's impossible. And it is very scary [...] They think that this will be solved in February, and I think it's far too long for a serious patient safety issue.

Karin: Definitely. This is a patient safety issue. It can mean that a patient doesn't come down to the theatre, or it can mean that a patient comes down too early.

Malin: And you think that I will have the patient that's on your screen, so you prepare drugs for that one and fix the theatre for somebody weighing 20 kilos, and then you will get somebody weighing 5 kilos because I have moved that one in another computer and put in another one instead. And it's exactly what we have signalled.

Kajsa: We are very serious about this here. We don't feel that [system administrators] care, though now they have woken up and say that they are worried. But it's not good at all. (Focus group 4)

The nurses were utterly frustrated that the IT staff responsible for the program seemed to have no understanding for the seriousness of the problem, or seemed to assume that, until the bug was fixed—the timeframe the nurses were given was a few weeks—nobody would make the mistake of reacting the way people instinctively do. An indicator of the contribution of nurses' hierarchical position was the fact that action only seemed to be taken once the surgeon general had talked to the IT unit. In a Taylorist way, nurses seemed to be seen as machine-like extensions easily able to program themselves to react in another way.

Generally, the nurses reported that there were often a number of bugs when new software or new releases were implemented, leaving them feeling like they were used as testers. Because

of time constraints, however, many of them did not report problems if they could use work-arounds instead—such as going back to paper documentation. They commented scornfully on the fact that the hospital managers and IT people had the impression that implementing the recent major new release of the electronic patient software had been successful with few problems, when, in fact, they could have reported tens of problems if they had had the time. Larry was eagerly supported by the group when he explained how the nurses felt that they were left on their own by the management:

Now we have a new version of [electronic record brand name]. Before, they said to all the problems we reported that we would get the new release, so they did not do any updating. And then it took two years longer than planned, and now we have got x number of new problems, and maybe they'll fix it in the next release instead, after five years. [...] And they write on the first page of the intranet that the implementation has worked really well, not many complaints at all [laugh in the group]. And I could sit and write a thesis of fifty pages about what I think does not work. It doesn't feel like they would listen to that. (Focus group 2)

The impression that the management had not cared to find out how the system really worked, while priding themselves for a successful implementation, increased nurses' sense of alienation from them. The developers and the organisation provided problem reporting systems but these systems expected nurses to have the time to point out all the individual issues in the programs, and not to engage in an analysis of more deep-set problems.

In the operation theatre and recovery ward, nurses recorded the same facts in three different programs. This meant that they had less time to do their other tasks, which made them stressed and insecure, as they were afraid of making mistakes under the time pressure. Overall, the IT approach seemed ineffective to them. Nurses in the recovery ward reported how the IT systems influenced their identity as professional carers: they felt 'like a bad nurse who hasn't time to look after her patient' because 'it's less hands-on and more data-on'.

None of the nurses working in the operation theatre felt that they had a satisfactory explanation for why they should record the same actions three times in different systems: it was something imposed on them from above. Some of their colleagues had reacted by moving to other hospitals, where they only needed to deal with one system. Even following technical rationality, this practice of three different systems seems inefficient, and even more so from an ethic of care perspective, where the excess documentation was done instead of taking care of the patient. The participants had a long discussion about priorities, and the inefficiency of using their special nurse competence for secretarial tasks, and agreed with Roger when he said:

Documentation, when it is about statistics, is far down on my priority list. What is vital for the patient's wellbeing in the future and now comes an awful lot higher. But that does not show in the way we work. Often it's 'this figure must be right, this number must be right' though it has nothing to do with the care of the patient, it's just a number. (Focus group 5)

For the hospital management, however, such issues obviously were not a concern, and the nurses were aware of that. They did not plainly say that the management was not interested in patients, but they talked about how care had become less and less important in the hospital, and how their professional identity as carers was being devalued. Increasingly, they were tied to

the computers in time and place, and that development was carried out by the management. Kajsa, who explained the problem of management and system administrators reacting too slowly to a patient safety issue, later expressed the overall conflict regarding IT between nurses and management, and how it affected, not only nurses' daily work, including patient safety, but how it also was a conflict of values between technology and care.

Every upgrading of a program means that we will need to use more time on it. [...] And they say very clearly that these upgrades are not there to make it faster or simpler for us, but there is some other reason; they are supposed to be better in some way. So every new release means that we have to use more time, even when they are up and running. For the daily work with the computers. [...] So instead of being healthcare people, we are becoming computer operating people. (Focus group 4)

DISCUSSION

The contribution of this study lies in its interpretation of the troublesome relationship between nurses and the digital tools they use through the concepts of ethics of care and technical rationality. While previous research studying problems caused by IT systems in nurses' work has found similar problems as this one, the use of the two conceptual tools opens new perspectives which connect nurses' daily moments of vexation to fundamental issues around what values healthcare is built on today and will be built on in the future. Such issues emerge when looking at nurses' relationships to two groups of actors, both representing technical rationality, though in different ways. Neither of these groups was present in nurses' daily environment, but both had a decisive influence on their work.

The problems that nurses described with their use of HIS show how technology disrupts what they understand as their main task: to provide patients with holistic care. This is due both to management's constant introduction of new digital tools and to the lack of understanding of nurses' work on the part of those who design these tools. Both the management and HIS designers work according to technical rationality: belief in technology solving problems in care delivery, and belief in generalisable solutions. It is also in line with technical rationality that managers use technology for governance, and that HIS designers have little knowledge of nurses' daily work. The ethic of care that nurses apply in their daily work, with its basis on the local, situational and relational, clashes fundamentally with technical rationality. Consequently, when technical rationality materialises in HIS that nurses are obliged to use, problems appear.

The ethics of care and technical rationality in the hospital hierarchy

The first group whose rationality clashed with the nurses' ethic of care was hospital management, that is, those responsible for implementing the digital tools. HIS are introduced to enhance productivity, a value cherished by technical rationality, and are imposed on a professional group, nurses, whose work demands an ethic of care. This happens in a context that is both gendered and hierarchical.

The concept of ethics of care has its roots in feminist ethics. For example, Scandinavian research in the 1990s presented care rationality and technical rationality as feminine and masculine, respectively (Ve, 1994). From that perspective, two professions with opposite gender compositions—nurses and IT designers—meet in the context of HIS, with nurses, with their ethic of care, being the profession that has to change its practices.

Technical rationality seeks to standardise care activities that are very difficult to treat that way, and this causes problems for nurses, whose task is to care. Following a Taylorist ideology, in HIS, care is packaged into tasks that the nurses need to conduct (Wise et al., 2017), and this packaging is centralised with nurses having very little say in the process. Although this re-shaping of personal relationships with patients into defined steps and packages had started even before the wave of digitalisation (Choiniere, 2011; Emslie & Watts, 2017; Wise et al., 2017), enforcing it through digital tools has made it much more pervasive. HIS were also influencing the professional identity of the nurses (Nilsson et al., 2016): nurses felt that they were becoming computer people rather than caring people—being forced to work not according to a care rationality, but according to a technical rationality that has shown to be inadequate in work where interpersonal relations are important (Schön, 1983).

The problems nurses faced in delivering good care while at the same time complying with the demands of the computer systems were attributed, with notable irritation and even anger, to ‘those up there’, that is, hospital management, who did not seem to have an idea of what their decisions actually entailed for those care workers who were working on the floor. That nurses should become computer people has not been stated by the management: HIS have just been added to nurses’ workload. This implies that management prefers nurses who do not abandon care ethics; probably understanding that really making nurses work according to the ideals of Taylorism would rapidly dismantle hospital care.

Hence, nurses were expected to combine both the care ethic and technical rationality in their work. The nurses in the study were not intrinsically unwilling to do this; indeed, they exhibited a technical means-to-ends approach, rational planning of work and an appreciation of the systems, and they knew that well-functioning HIS can simplify work. Nurses were negative to HIS to the extent that the systems reduced their opportunities to be reflective practitioners, and overrode the demands of their care ethic by steering their judgements and actions to those that were desirable from the financial and managerial point of view (Dupret, 2017; Petrakaki & Kornelakis, 2016). This happened partly because the systems took time to use and partly because they directed what nurses and other professional groups should and should not do. The technical rationality that nurses were expected to engage in was not only independent means-to-ends thinking, but often following processes that were built in the computer systems in a Tayloristic manner (cf. Goodman, 2016). The systems also facilitated the surveillance of the nurses.

The different perceptions of time between technical rationality and the ethic of care came out clearly in the nurses’ complaints about the systems. Nurses are able to plan only a small proportion of their own time as their work is about answering others’ needs, and these needs can appear almost at any time. The idea of not being able to follow a process because of the intervening needs of other people is, however, fundamentally foreign to technical rationality. This also means that ‘efficiency’ in the context of nurses’ work is often different from what technically seems to be the least time-consuming way of action.

Vosman and Niemeijer (2017) argue that there is a risk that nurses change their care orientation under the increasing neoliberal governance and demands for efficiency that HIS are a symptom of. The nurses in the study tried to hold on to their ethic of care but felt that it was increasingly difficult to do so; although they reacted to this with resilience rather than with resistance. As Goodman (2016)

suggests, they did not formulate their problems by articulating the different interests of the management, the IT providers and themselves, in a way that would have served as a platform for action. Rather, they seemed to comply unwillingly to the realisation that working according to ethics of care was becoming less and less valued (Wilson, 2004).

The ethics of care ethic and technical rationality in the design of HIS

The second group whose rationales were foreign to nurses' ethics of care was IT designers, that is, those responsible for the functionality of the programs that nurses used. Many of the nurses' problems were related to the fact that the HIS were cumbersome to use due to poor design and a lack of adaptation to nurses' real work situations. These problems were related to the different rationalities of nurses and system developers. Although user influence on the design of IT systems is a cherished value, it is not often realised in practice. Staggars et al. (2018) point out that user-based design is used more in other critical industries, such as nuclear power or air traffic, where developers acquaint themselves with the work that is performed. Yet this is not the case with nursing, even though nursing, with its basis on a care ethic, is even more distant from the way IT developers are trained. There may also be a gender aspect, in that the female-dominated profession of nurses is more foreign to the male profession of system developers than the more male-dominated work areas of traffic and power plants. Developers and vendors of HIS seldom spend enough time in the hospital to be able to see how the work is actually done. Conversely, it may be difficult for a nurse to articulate the particular circumstances of care work, and their importance, so that it is understandable for an IT developer. It is difficult to try to bring about a shift of perspective, from the medical treatment of single conditions, which is much more understandable for computer engineers and others who work according to technical rationality, to an understanding of the situated interaction between nurses and patients, based on patients' needs.

There are concepts that are important and relevant in the care ethic of nurses, but hardly exist, or are understood differently in the technical rationality of IT designers. One of them is personal responsibility towards other people, which is not a concept frequently used or well understood in the technical rationality of engineering and systems design.

In technical rationality, possible human error is a primary risk factor that can be mitigated by standardisation (Wears & Hunte, 2014). In other words, making sure that all users behave the same way mitigates the human responsibility to find and use the best possible solution in each situation, for the benefit of the person cared for. The introduction of care plans is a prime example: a care plan reifies what evidence-based practice has found to be the optimal way to treat a certain condition. Each patient's needs are also individual, however; and while slavishly following care plans mitigates a number of possible errors in individual nurses' judgements, it also reduces the individualisation of care that could further recovery. In some instances, strictly holding on to a care plan may introduce new problems, when the patient's condition does not correspond well enough to the average treatment path.

Technical rationality as rule-following also does not allow for quick adaptation to changing conditions. For example, an essential part of nursing is the ability to prioritise quickly in the context of a need to estimate and integrate several unknown aspects. Even if HIS were to function flawlessly, when they are built on technical rationality, they are likely still to prove to be inadequate.

Some of the nurses felt that they were seen as just being negative to technology and that their complaints and problems were not taken seriously by the IT support (cf. Halford et al., 2010). Both their gender and their care ethic may have been factors in these perceptions.

For IT support and system designers, who work with technical rationality, the ethic of care is a foreign concept, and consequently, it is difficult for them to see that people who find fault in technology are actually trying to put forward something else.

To be continued...

Even though research has brought forward problems with HIS implementation for several decades, new IT systems, designed according to engineering principles, are continually pushed into healthcare. Viewing the digitalisation of healthcare from the perspective of two different underpinning rationalities opens up for new avenues for future studies, but also reinterpretations of previous findings. There are a number of new research questions that emerge.

One is about the interface of the two rationalities: design of HIS and the possible influence of nurses in that process. As ever more sophisticated tools, including artificial intelligence, are designed and introduced, such questions are vital. For example, what happens when care meets technology in projects; when computer specialists design software for healthcare? When and how do ethics of care surface in HIS design processes or among management?

Another question is about nurses' ethics and rationality and how these may shift from care to technology, both when it comes to the development of individual nurses, and when it comes to the nursing profession as a whole. For example, do younger nurses reason differently than older ones in relation to HIS, in a way that can be understood by the two rationalities?

The gender aspect also needs to be studied. For example, to what extent is the ethic of care perceived as a 'feminine' ethic in today's society and what are the implications of this? Are there gendered aspects in how the relationship between nurses and information systems is interpreted and formed by IT staff, management and nurses themselves?

Some such questions have been touched on from other theoretical perspectives. Looking at the issues with an understanding that two fundamentally different views on nurses' motivations, tasks and responsibilities are at play will help us understand and ameliorate the often problematic introduction of computer systems in healthcare.

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CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

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