

# Hospital nurse leaders' experiences with digital technologies: A qualitative descriptive study

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## Abstract

**Aim:** To describe hospital nurse leaders' experiences with digital technologies.

**Design:** A qualitative descriptive study.

**Methods:** Semi-structured focus group interviews in one university-affiliated hospital in Finland. Data were collected from October to November 2021 and analysed using content analysis an e-leadership framework.

**Results:** A total of 20 frontline nurse leaders and middle-managers participated. Leaders had different kinds of experiences that concerned their traits, cognition, affect and behaviour with digital technologies. Leaders experienced that they needed to be open-minded towards digitalization, which sometimes eased their work by making it more efficient. Occasionally, they also got frustrated with digitalization, which caused them stress. Leading digital technologies required collaboration with several different stakeholders, and leaders were especially responsible for ensuring nurses' digital competence. Also, leaders own digital capability was highlighted, although some leaders experienced that their digital capability was low.

**Conclusion:** The e-leadership framework is useful for describing the conduct of leadership roles in the context of digital services. Digitalization has transformed leadership, yet nurse leaders' education and training do not seem to have been sufficiently modified to these rapid changes. In addition, more attention should be given to how nurse leaders can be distressed by digitalization.

**Impact:** This study provides insight into leadership in the context of digitalized specialized medical care based on nurse leaders' direct statements. Furthermore, the results highlight nurse leaders' educational needs concerning digitalization. Adequately educating nurse leaders to become e-leaders is crucial to successful digitalization in the nursing domain.

**Patient or Public Contribution:** The study focused on nurse leaders' experiences.

## KEYWORDS

focus groups, information technology, leadership, qualitative research

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## 1 | INTRODUCTION

Globally, digital technologies are revolutionizing the way health-care is delivered in hospitals. The rapid rise of advanced information technologies (AIT) such as the Internet, e-mail, video conferencing, clinical documentation systems and patient portals have transformed how hospitals organize their work (Avolio et al., 2000, 2014). Nurse leaders (e.g. chief nurses, head nurses and unit managers) typically have responsibility over multiple units or programs within a hospital or health system and must stay in continuous communication with frontline clinical staff, administrative support persons and other leaders. As the healthcare industry evolves, the physical location for where hospital care is delivered is also changing and now includes virtual teams or clinics. Since nurse leaders cannot always be physically present in the clinical environment to lead their teams, they increasingly rely on virtual modes of digital communication (email, instant message, video conferencing, blogs and web chats). This has given rise to the term 'e-leadership', which is defined as the leader "participating with the followers through technology in order to inform them and to be informed" (Avolio & Kahai, 2000).

The continuing expansion of digital technology has created new opportunities and challenges for how hospitals and nursing leaders function (Gjellebæk et al., 2020). Decision-making now involves accessing and interpreting 'data' from clinical and administrative information systems as well as digital communication provided by individuals and teams. Communicating service issues and decision through technologies will be inherently different from in-person communication. Technologies will undoubtedly influence how clinical teams perceive nurse leaders and how those leaders effectively support their clinical teams. However, healthcare organizations have yet to fully appreciate the unique challenges associated with leading teams through digital technologies. More than ever, nurse leaders are faced with managing some aspects of AIT that require a new way of leading (Sharpp et al., 2019).

As the hospital industry continues to evolve and become more digitalized, nurse leaders will need to have the skills to lead differently. Notwithstanding the rapid increase in technologies in the work hospital environment, nursing leadership in this new digital context has not been extensively researched and it has been suggested that more research should concern leadership that has been transformed by digital technologies (Van Wart et al., 2019).

## 2 | BACKGROUND

The increasing expansion of AIT has changed the context in which hospital leaders operate (Avolio et al., 2000). The nursing domain has also been significantly transformed during the last decade due to the rapid introduction of digitalization in healthcare. This trend of rapid digitalization has not only changed clinical nursing work and processes but has also affected healthcare leadership. Nurse leaders, have complex role profiles and include direct

responsibility for leading nursing units or a team of staff nurses (Gunawan et al., 2018), executing daily information technology coordination tasks (e.g. emails communication, data review and decision-making) (Cowan, 2014) and seem to be more involved in implementing and managing digital health services than physician leaders (Keijser et al., 2016). Thus, they are becoming 'e-leaders', meaning that they are using numerous AITs for different purposes. E-leadership is considered a powerful means of social influence whereby AIT can alter attitudes, feelings, thinking, behaviour and performance.

Organizational structures, including leadership, may transform due to the implementation and routine use of AIT (Avolio et al., 2000). This aligns with the idea that leadership develops over time and across different contexts, thus warranting consideration of how e-leadership is developed (Day, 2000). Earlier research has revealed that nurse leaders seem to obtain their e-leadership skills from "on-the-job" education instead of formal training (Sharpp et al., 2019). This might be because formal training does yet exist in some jurisdictions or hospitals do not recognize that nurse leaders now commonly work in a highly demanding digital context. For example, today's nurse leaders may lead remote or dispersed teams and, as such, require various communication skills for leadership purposes (Kiljunen et al., 2021; Lammintakanen et al., 2010). Insufficient leadership education and training may explain why the implementation of digital health solutions is currently associated with a high risk of failure (Sharpp et al., 2019). However, the previously presented studies only represent some aspects of leadership in the context of digital healthcare.

A previous review showed that only a small set of studies referred to a specific theoretical framework when exploring the impact of digital transformation on leadership (Cortellazzo et al., 2019). As is the case with traditional face-to-face leadership, e-leadership may also be transmitted through traits (i.e. who one is), cognition (i.e. what and how one thinks), affects (i.e. what one feels) and behaviours (i.e. what one does) (Avolio et al., 2014; Hernandez et al., 2011). Each of these mechanisms provides a possibility for understanding how leadership influences other workers and can be considered on the individual, dyad or group level (Avolio et al., 2014). In terms of *traits*, Avolio et al. (2014) refer to a leader's demographic and personal attributes, which enable e-leadership to be transmitted and received. For example, self-efficacy values may influence the leader's use of AIT. As *cognition* concerns the thinking process, a certain leader may understand the expectations of employees and use this knowledge to communicate a clear vision. It should be noted that AIT may both positively and negatively influence the cognition of users, for example, through multitasking. *Affect* represents the feelings of virtual team members, and this component may be influenced by e-leaders' messages and behaviours about how technology is appropriated. Finally, *behaviours* represent the primary mechanism for transmitting e-leadership, and this aspect is concerned with the leader's actions, for example, influence on social interactions through the choice of technology.

The lack of understanding about leadership in the context of digitalized health services means that nurse leaders may be ill-prepared to handle or lead digitalization and its implementation. The e-leadership framework presented by Avolio et al., (2014) was selected for this study since it allows researchers to examine leadership and information technology together. Thus, this study aims to provide a more comprehensive picture of leadership in the context of digitized digitalized hospital services by describing nurse leaders' experiences of leadership in the mentioned context using the e-leadership framework presented by Avolio et al. (2014).

### 3 | THE STUDY

#### 3.1 | Aim

This study aims to describe hospital nurse leaders' experiences with digital technologies using the e-leadership framework presented by Avolio et al. (2014). The research was guided by the following research question: Which traits, cognitions, affects and behaviours do nurse leaders adopt to convey leadership in the hospital context?

#### 3.2 | Design and study setting

We employed a descriptive qualitative design that employed focus group interviews (Doyle et al., 2020). This study design allowed us to explore the experiences of nurse leaders in a real-world setting, as well as research a phenomenon that is currently poorly understood. The focus group interviews were conducted in one Finnish university hospital that included 828 hospital beds and a total of 7117 personnel of which the number of administration and controller personnel (including nurse leaders) was 379. The focus group interview methodology was selected for data collection since it enables conversation, encouragement and support between study participants, which may uncover themes and perceptions that would not arise otherwise (Silverman, 2020).

Generally, Finland has been ahead of most countries in the digitalization of healthcare (European Commission, 2021). In addition to acute care services, the selected university hospital arranges specialized medical care services for adult and paediatric patients and is a pioneer in Finland in the development and implementation of digital services (e.g. Virtual Hospital, Health Village, remote clinics, robotics, digital pathways and other innovative health technology solutions). During the interviews, the university hospital was under a reform and it was announced that the facility would become a technically intelligent hospital upon completion. Thus, we purposefully chose this hospital, which has a long history of digitalization, along with the current, ambitious reform, as an appropriate setting in which to explore nurse leaders' experiences with digital technologies. The research followed the Consolidated Criteria for Reporting Qualitative Research (COREQ) (Tong et al., 2007).

TABLE 1 Participants' demographics ( $n = 20$ )

Variable	f
Gender	
Female	20
Male	-
Educational level	
Master's university degree or higher	11
Bachelor's degree or lower	9
Work task (current)	
Head nurse	9
Assistant head nurse	8
Nurse middle manager	3
	Mean
Age (years)	51.2 <sup>a</sup>
Work experience (years)	
in current work	6.3 <sup>b</sup>
in leader position in healthcare	10.2 <sup>c</sup>

<sup>a</sup>SD: 7.1; min - max: 39.0–61.0.

<sup>b</sup>SD: 4.5; min - max: 0.7–21.2.

<sup>c</sup>SD: 5.3; min - max: 9.0–25.0.

#### 3.3 | Participants and recruitment

The participants ( $n = 20$ ) were frontline nurse leaders (i.e. assistant head nurses and head nurses) and middle managers who were responsible for leading clinical staff. An eligible interviewee had to work as a frontline nurse leader or nurse middle manager and have experience in the provision of digital health services (e.g. electronic health records, patient portals and online communication platforms). We recruited participants using two different forms of purposeful sampling depending on how the hospital department wished for us to recruit interviewees. Of the participating departments, half (2/4) provided a list of five nurse leaders who should be contacted about the focus groups. The remaining two areas provided a full list of the nursing directors, head nurses and assistant head nurses. We sent e-mails to all of these employees ( $n = 141$ ) and were able to recruit 22 interviewees. However, only 20 nurse leaders participated in the focus group interviews due to scheduling challenges. The interviewees' informed consent and background information were collected using a Webropol survey, with the background information analysed using IBM SPSS statistics software (version 28.01.1, SPSS Inc.) (Table 1).

#### 3.4 | Data collection

A semi-structured interview guide was used for data collection since it allows for content to emerge directly from the participants. The semi-structured interview guide, which was based on earlier studies concerning e-leadership and leadership in the context of digital health services (Avolio et al., 2014; Ingebrigtsen

et al., 2014; Kiljunen et al., 2021; Laukka et al., 2020), was developed in a research team that included three experienced researchers who were familiar with leadership, healthcare digitalization and qualitative research. The interview guide included four common themes (leadership competence in digital health services, leadership in digital health services, work wellbeing and artificial intelligence), and this current study used the data concerning the two first themes (Table 2).

The interview guide was pretested with one individual and in a test group that included four participants. The interviewees told the researchers that all of the questions were understandable, after which the researchers evaluated the interview guide, participants' reactions to questions, group size and the time that it took to complete the questionnaire. According to the test interviews, the interview guide was understandable and no changes were required.

The data were collected using six focus groups that each included three to four participants. Literature concerning focus group interviews stated that the number of interviewees and focus groups was appropriate for qualitative research (Guest et al., 2017). The frontline leaders and middle managers were interviewed in separate groups to promote a comfortable group dynamic. Data were collected between October and November 2021 using the Microsoft Teams communication platform (Microsoft Inc.).

Data were collected by the first author (MSc, PhD-student, female), who is experienced with qualitative research and focus group interviews. A research assistant (MSc-student, male) assisted the first author with data collection. Both the first author and research assistant have a background in nursing and health management. The first author asked the interview questions, and both interviewers made field notes. The interviewer asked questions relevant to the topic of interest and encouraged interviewees to talk and interact with each other. At the end of each focus group, the participants were offered the possibility to comment on anything relating to discussed topics. With the permission of the participants, the interviews were audio recorded. No repeat interviews were carried out.

The transcription of the audio recordings generated 333 pages of text (12-point Calibri font with a line spacing of 1.15). The interviews lasted from 73 to 106 min, and the total duration of all the interviews was 500 min.

TABLE 2 Part of the semi-structured interview guide

<p>Theme 1. Leadership competence in digital health services Which competences does digitalization require from leadership?</p> <ul style="list-style-type: none"> <li>• What kind of knowledge does a leader need?</li> <li>• How do you evaluate your own skills when leading digitalization?</li> <li>• What kinds of attitudes do you have towards digital services as a leader?</li> </ul>
<p>Theme 2. Leadership in digital health services What is leadership in digital health services?</p> <ul style="list-style-type: none"> <li>• Strategic and operative perspective, remote leadership, change, and implementation leadership</li> </ul>

### 3.5 | Data analysis

Data were analysed using deductive-inductive content analysis, which allows researchers to use an existing framework, in this case, the e-leadership framework presented by Avolio et al. (2014), in a new context (Kyngäs & Kaakinen, 2020). To begin the process, the first author (EL) and another researcher (MH) read through all of the transcribed interviews several times to gain a preliminary understanding of the data. Meanings were chosen as the analytical unit; thus, meanings that corresponded to the research question were coded ( $n = 393$ ) by the first author using Nvivo (1.5 version, QRS International Pty Ltd., Hawthorn East, Australia); another researcher confirmed the codes or complemented them as necessary.

After the coding was complete, the deductive method, which employed the e-leadership framework presented by Avolio et al. (2014), was applied. Using an unstructured analysis matrix, the codes were: leader's traits; cognition; affect; and behaviour. At first, two researchers recorded 20% ( $n = 80$ ) of the open codes and compared the coding to calculate a kappa value. The calculated value, 0.833 (95% confidence interval from 0.737 to 0.929), reflected a strong level of agreement (McHugh, 2012). The researchers discussed any discrepancies in their analyses and confirmed the final analysis. Next, the first author recorded the rest of the open codes using the same logic and discussed any uncertainties with the other researcher if necessary. Once all of the open codes were recorded into the unstructured analysis matrix, the inductive content analysis phase was started by the first author. Based on similarities, the open codes were grouped to form sub-categories and categories (Table 3). Further two researchers (MH and OK) went through the work to confirm the inductive phase.

### 3.6 | Rigour

To ensure the dependability of the analysis, two researchers participated in the analytical process (Lincoln & Guba, 1985). The credibility of this study was improved by making sure that the interviewees were relevant to the study aim, and that data saturation was reached. The researchers determined that data saturation was achieved after the sixth focus group interview. Data saturation means that no new information related to the research aim can be obtained by having further interviews with additional participants (Polit & Beck, 2017). The first author was familiar with the research topic because she had performed the systematic literature search; however, she stayed objective during the study process so that any preconceptions would not influence the analysis or reporting of results. The choice of deductive-inductive analysis enabled the first author to scrutinize data from the perspective of an already existing framework, which also decreased the risk of allowing preconceptions to influence the analytical process. Several direct quotations, originally in Finnish, were translated into English to increase the authenticity of the results.

TABLE 3 Hospital nurse leaders' experiences with digital technologies

Transmission of E-leadership; RQ: Which traits, cognitions, affects and behaviours do nurse leaders adopt to conduct leadership in the hospital context?			
Traits	Cognition	Affect	Behaviours
<ul style="list-style-type: none"> <li>• Openness to digitalization               <ul style="list-style-type: none"> <li>• Reformist</li> </ul> </li> <li>• Interested in digitalization</li> <li>• Positive attitude</li> <li>• Digital self-efficacy</li> <li>• Confidence in using digital services</li> <li>• Uncertainty with own digital skills</li> <li>• Frustration towards digitalization               <ul style="list-style-type: none"> <li>• Getting frustrated with digitalization</li> <li>• Believing in digitalization despite difficulties</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Digital capability               <ul style="list-style-type: none"> <li>• Education or training</li> </ul> </li> <li>• Knowledge of what happens and is possible               <ul style="list-style-type: none"> <li>• Leader is not an IT expert</li> </ul> </li> <li>• Learning through experience               <ul style="list-style-type: none"> <li>• Need to know how to lead people</li> </ul> </li> <li>• Sufficient capability               <ul style="list-style-type: none"> <li>• Willingness for active participation</li> </ul> </li> <li>• Digital services causing distress for the leader               <ul style="list-style-type: none"> <li>• Insufficient education or training</li> <li>• Not possible to participate in development of digital services</li> <li>• Online communication difficulties</li> <li>• Insufficient time for learning</li> <li>• Loneliness and more computer-oriented work</li> <li>• Digital services have bad user interface or functionality</li> <li>• Massive number of digital services</li> <li>• Rapid implementation or changes</li> <li>• Decreased number of breaks</li> <li>• Digital services ease a leader's work                   <ul style="list-style-type: none"> <li>• Digital services are useful for strategic and operative leadership</li> <li>• Remote work enables working from home</li> <li>• More efficient work</li> </ul> </li> <li>• Ability to create and communicate a clear vision of digitalization                   <ul style="list-style-type: none"> <li>• Justifying the use of, and vision for, digital services</li> <li>• Understanding the organization's digital strategy</li> <li>• Understanding the potential benefits and threats of digital services</li> </ul> </li> <li>• Understanding end-users' expectations for digital services                   <ul style="list-style-type: none"> <li>• Understanding clinical work</li> <li>• Exploring end-users' perceptions</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Working as a part of multi-professional digital development groups               <ul style="list-style-type: none"> <li>• Ability to learn in multi-professional groups</li> </ul> </li> <li>• Collaboration with different stakeholders               <ul style="list-style-type: none"> <li>• Facilitating multi-professional groups</li> </ul> </li> <li>• Affecting nurses' perceptions towards digitalization               <ul style="list-style-type: none"> <li>• Providing information about digital services</li> <li>• Ensuring nurses' involvement in digital services</li> <li>• Affecting nurses' experience of digital services</li> <li>• Creating a new culture for digital services</li> </ul> </li> <li>• Ensuring nurses' training in digital services               <ul style="list-style-type: none"> <li>• Ensuring training</li> <li>• Enabling resources for learning</li> </ul> </li> <li>• Understanding nurses' competence in using digital services               <ul style="list-style-type: none"> <li>• Recognizing IT-savvy nurses</li> <li>• Recognizing nurses who struggle with digital services</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Leading transformational digital change               <ul style="list-style-type: none"> <li>• Leading constant change</li> <li>• Interactive leadership</li> <li>• Acting as an example</li> <li>• Supporting, encouraging and motivating</li> </ul> </li> <li>• Building relationships with employees via AIT               <ul style="list-style-type: none"> <li>• Leading remotely</li> <li>• Using online communication platforms</li> <li>• Social presence via AIT</li> <li>• Requirement of face-to-face leadership</li> </ul> </li> <li>• Building trust in the context of digital services</li> </ul>

### 3.7 | Ethical considerations

The participating organization granted research permission for this study and considered ethicalness of the study. According to Finnish legislation, the presented research does not require Research Ethics Committee approval (Ministry of Social Affairs and Health, 1999) since the interviews did not concern patients or minors, and the interviews did not intervene in physical or mental impunity (World Medical Association Declaration of Helsinki, 2013). Participation in the study was voluntary. Prior to the interviews, the participants received oral and written information about the study and research aims, along with data protection; written consent was obtained from each participant electronically.

All personal data were removed from the transcripts to ensure participant anonymity.

## 4 | FINDINGS

The study findings are based on 20 nurse leaders' experiences with digital technologies in hospital context and their insights on leadership conduct related to these technologies. The study participants ranged in age from 39 to 61 years (mean value: 51 years). All of the study participants were females, and their work experience ranged from 8 months to 21 years (mean value: 6 years). We identified the conduct of e-leadership through traits, cognitions, affect and behaviours.

## 4.1 | Traits

The main category of traits included the following three categories: openness to digitalization; digital self-efficacy; and feelings of frustration towards digitalization.

All of the participating nurse leaders agreed that a leader must demonstrate *openness to digitalization*. Based on the leaders' experiences, they were interested in and excited about, the prospect of digital health services and their development. The analysis also revealed that leaders' enthusiasm towards digitalization is important; this is because leaders with a positive attitude towards digitalization also perceived that nurses are more likely to support digitalization. Nurse leaders were especially open-minded towards digital services when they understood the potential benefits for their own work, for colleagues, and/or for patients. Leaders also expressed that sufficient training and the implementation of usable software increased their positive attitude towards digital services. Leaders were highly supportive of digital services and did not easily object to new software. However, based on the analysis, leaders felt that they required sufficient resources and the possibility to see the benefits of digitalization if they were to successfully foster an open attitude towards digital services:

"I am excited to try the digital services that are available and forthcoming, and want to keep up with the times."

Head nurse/Group 4

"...we, as a group, are well acquainted with, and have a positive attitude towards, new software that may ease our work..."

Assistant head nurse/Group 5.

Nurse leaders demonstrated different views of their *digital self-efficacy* when utilizing digital services. The analysis revealed that some of the leaders felt that they had a low capability for using digital services, whereas others were more confident in their skills. For example, some of the leaders reported an average level of readiness to use digital solutions and remote leadership skills, as well as that they were poorly prepared to lead digital services or remotely working teams. However, some of the leaders expressed that they find using digital services to be easy and that remote leadership is a great opportunity. Based on the leaders' experiences, it seems that they would be able to effectively use digital services if they had enough time to learn their functionality:

"And yes, I think...that we have average skills [of digitalization]."

Nurse middle manager/Group 6

"One can get by with them [digital services], as long as there is enough training."

Head nurse/Group 3

"I feel that we use all these [digital] tools, and it is easy for me..."

Assistant head nurse/Group 5.

The leaders occasionally expressed *feelings of frustration towards digitalization*. For example, leaders experienced frustration when the software did not function well or when they did not see the benefits of digital services. However, despite difficulties with digitalization, leaders felt that they had to believe in the utility and benefits of digital services and – for this reason – solve problems concerning the usability of digital services:

"...one must quickly see the benefit of it [digital service] or at least I get frustrated with such software that does not operate with the used information systems."

Head nurse/Group 1

"...everything does not succeed all the time; however, the leader must believe in them [digital services] and solve problems..."

Head nurse/Group 1.

## 4.2 | Cognition

The concept of cognition was described by five categories: digital capability; digital services easing the work of leader; digital services causing distress for the leader; leader's ability to create and communicate a clear vision of digitalization; and understanding end-users' expectations for digital services.

Using digital services required *digital capability* from the leaders, even though they are not IT experts. As such, the participants felt that leaders need sufficient digital capability and knowledge of data protection to steer digitalization in the organization. Leaders obtained their knowledge of digitalization either from education or training, or by gaining experience at work. Based on the leaders' experiences, they seemed to actively participate in the development of digital services, which offered them the possibility to learn about the service and digitalization in general. The leaders also participated in trainings arranged by the service provider and learned from their colleagues. The participants expressed that leaders need to be aware of the possibilities that digitalization offers organizations, patients or professionals. For example, the participants specified that a senior manager is responsible for providing knowledge to their subordinates. In addition, leaders need to be aware of how to lead people in a way that will foster a positive attitude towards digital services:

"...I think that the frontline leaders need sufficient digital skills and understanding of what we are working with..."

Assistant head nurse/Group 2

"...this healthcare digitalization is my passion, so I need it, that when services are being developed, I should participate more..."

Head nurse/Group 4

"...digitalization has not been taught in the trainings in which I have participated. It probably requires the employer to demonstrate readiness and trainings to explain what possibilities it [digitalization] offers, how to lead employees to use these services, and what services can be implemented." – "...yes, and that kind of attitude and capability one must be able to find by herself."

Assistant head nurses / Group 2.

Digitalization both eased the work of nurse leaders and caused distress. Based on the leaders' experiences, *digital services eased leaders' work* since these services could improve efficiency, enable useful tools for strategic and operative leadership, and provide time that could be used for other tasks. For example, Teams-meetings made leaders more efficient because they were able to take part in a meeting from any location. Digital services also enabled leaders to work remotely, since some tasks were possible to do from home. For example, frontline leaders were able to schedule nurses' work shifts completely remotely. Leaders also utilized several digital solutions for daily operative leadership and, according to their experiences, several digital solutions had a remarkable effect on their work:

"...I like these [Teams-meetings], since it feels like they release time, when you can really participate from any location..."

Head nurse/Group 4.

However, occasionally *digital services caused distress* for leaders. Although Teams-meetings enabled participation from any location, they also decreased the number of breaks and free time, both of which serve as innovation possibilities for leaders. Leaders even experienced that digitalization made their work lonelier, and they more commonly worked with a computer than with humans. Leaders received a massive number of e-mails, which was also a source of distress. Digital services with a bad user interface or functionality caused leaders to get stressed, as they were not always aware who could help them with these problems. Leaders expressed that they did not have sufficient time or training to get familiarized with digital services, and they had access to various digital services that they were supposed to use in their work. In addition, the services were implemented and changed rapidly. For this reason, leaders often learned to use digital services at the minimum level. In addition, although leaders wanted to participate in development of digital health services, it was not always possible due to a general lack of time or resources. Based on the leaders' experiences, online communication occasionally caused stress; for example, certain participants felt that writing an appropriate e-mail was difficult since there was always a risk that employees would incorrectly understand the meaning:

"Healthcare education does not really give transferable skills for this kind of leadership..."

Assistant head nurse/Group 2

"...sending a message or delivering written information in a way that people understand it as you intended is extremely difficult, or at least I think it is." – "I agree... that communicating via e-mail is very difficult, but it is also vice versa... When you are away for two days, there are 100 unread e-mails."

Head nurses/Group 3.

To successfully lead employees, leaders need to *create and communicate a clear vision of digitalization*. Moreover, leaders need to understand the potential benefits and threats of digital services to provide information and justify their use to other stakeholders. To do this, they must be aware of the organization's strategy for digitalization. Their role requires leaders to be strategic thinkers, who can transfer the benefits of a strategy to their employees and, subsequently, to patients:

"...when I think if from the viewpoint of change management...one must have knowledge of the benefits, as well as the ability to describe what we are aiming for and why."

Head nurse/Group 2.

Leaders had to *understand end-users' expectations for digitalization*. Based on the leaders' experiences, they need to collect and explore data concerning nurses' and patients' perceptions of digital health services. To obtain this information, leaders reported creating questionnaires that would gauge end-users' perceptions of digital services. Leaders also utilized questionnaire feedback and experiences collected from other hospitals to form a view of end-users' thoughts and concerns of digital services. Moreover, leaders need to understand how any proposed digital services will affect clinical work. They utilized this knowledge when developing digital services and to implementing them in a bottom-up approach:

"...He/she [leader] should carefully listen about whether the implementation has been done poorly or whether the change is unnecessary, ..., the leader should listen to the voice of end-users more."

Head nurse/Group 1.

### 4.3 | Affect

The main category of affect included four categories, namely, working as a part of multi-professional digital development groups, affecting nurses' perceptions towards digitalization, ensuring nurses' training in digital services, and understanding nurses' competence in using digital services.

Leaders *worked as part of multi-professional digital development groups*. In these groups, leaders affected different stakeholders, for example, healthcare professionals and AIT providers. However, it is important to note that not only the leader affected the stakeholder, but - as the affect was bidirectional - other professionals and AIT providers were also able to provide support to the leaders. The participants

reported that multi-professional groups are a place where the leader is able to ask for advice about digital health services to deepen their understanding of the topic. In these groups, the leader was not an AIT professional, but rather a facilitator between different individuals who needed to understand both “clinical and AIT language”:

“...if we are thinking about leadership, ..., there is a multi-professional group that develops, and that it is not solely a health professional but there is AIT-knowledge and one must think that all of the actors take part...”

Head nurse/Group 3

“...one must know from whom to ask.” – “Yes, exactly, should you ask the professional or a colleague.”

Head nurses/Group 1.

Leaders aimed were focused on *affecting nurses' perception towards digitalization*. Leaders also ensured that nurses were involved in the development of digital services. By involving nurses, leaders were able to engage and motivate them to use digital services. The participating leaders also felt that involving nurses also improved the employees' competence. Based on the leaders' experience, their task is to influence nurses' experiences of digital services. As such, leaders have to justify the need for digital services and should explain this to nurses in a positive way. Leaders are also pivotal to creating a new culture towards digital services. For example, the participants stated that they aim to create a culture that is positive towards digitalization, and - through these actions - hope to affect nurses' attitudes. When attempting to affect nurses' perceptions, the leaders shared that they focus on providing information about digital services. For example, leaders organized a briefing about digital services; this was especially relevant when a new digital solution was about to be implemented:

“...I think that we should involve these health professionals in development, because they have the expertise of what kinds of services are good and serve their needs.”

Head nurse/Group 4

“And then the leader has the role of an informer, ..., this includes a lot of information sharing.”

Head nurse/Group 4

“...creating a positive atmosphere for it [digitalization] and providing antecedents so that this [digitalization] is possible.” Middle manager/Group 6.

When new digital services were implemented, leaders *ensured that nurses got training concerning digital services*. They either arranged training or provided nurses enough time to become familiarized with the digital service. Leaders also had to *understand nurses' competence in using digital services*. As such, leaders are tasked with evaluating how

well nurses use digital services, or whether they struggle with these solutions. For example, leaders recognized which nurses were AIT-savvy as well as which nurses had difficulties using digital services; this practice allowed them to concentrate their efforts on the right individuals. Based on the leaders' perceptions, nurses' AIT-skills seemed to be related to their age, that is, younger nurses tended to be more comfortable with digital services, whereas aging nurse struggled with the solutions. Leaders recruited AIT-savvy personnel to work as digital coordinators, or agents, who assisted the employees who had difficulties with digitalization:

“...that one [leader] takes care that professionals, our employees, have enough time to somehow familiarize and learn these things.” Assistant head nurse/Group 5

“And then what I think as a leader, is that I could detect those employees who are innovators to take this thing further...”

Nurse middle manager/Group 6.

#### 4.4 | Behaviours

The main category of behaviours comprised two categories: leading transformational digital change and building relationships with employees via AIT.

When *leading transformational digital change*, leaders pursued constant communication and coaching-oriented actions. In other words, leaders had to listen to their employees and solve problems together with them. Based on the leaders' views, it seemed that older nurses seemed to struggle with digital services, and that leaders supported, encouraged and motivated them with the use of AIT. Leaders even occasionally acted as teachers by first studying how the software works and later assisting those nurses who needed encouragement or support. To encourage and motivate nurses, leaders also demonstrated examples of how to use AIT. This considerably increased the workload of nurse managers, as digitalization is rapidly changing and has a large effect on leaders' change management practices

“...just to encourage older employees that it [digital service] will work and let's do it together. And just like it was said, the younger employee adopts it [digital service] independently after just one training session, but older employees need assistance.”

Head nurse/Group 4

“...change management, because it requires changing thoughts, that you give up on what you have done earlier and you believe the new approach will work from now on, ..., a lot of change, that now we are doing things differently.”

Head nurse/Group 3.



The COVID-19 pandemic has increased remote work within health-care and forced leaders to concentrate their efforts on *building relationships with employees using AIT*. Leaders used online communication platforms, such as Microsoft Teams, e-mail and intranet, when leading nurses. Remote leadership was also observed within hospital premises, as leaders often had to lead dispersed teams or wards. According to the interviewed leaders, they did not think about where their employees were when leading a remote team, but rather about the employees who they were leading. When leading dispersed teams, leaders experienced that they had to ask how employees were doing but were not completely sure about how often they should contact employees. Based on the leaders' experiences, their social presence was required in AIT-mediated teams. Leaders felt that it was important for their employees to be available via e-mail or some online communication platform. To do this, leaders had to be aware of which communication platforms employees utilized or preferred. Leaders also had to be aware of how to communicate online, and occasionally they were available even outside working hours:

"...I probably should arrange some kind of contact with those people who are working remotely and ask how they are doing."

Nurse middle manager/Group 6.

"The most important thing for the employees and for myself is being available somehow. Whether it is Teams or e-mail, but the employee is able to be contacted, and ensure others that things are being taken care of."

Head nurse/Group 1

Leaders also experienced that even though it is possible to lead via AIT, there was occasionally a need for face-to-face leadership. Thus, the leaders felt that remote leadership was not enough in their teams and that face-to-face leadership was required from time to time. Frontline leaders were particularly adamant that face-to-face meetings are occasionally required since the workload in their units includes many aspects which necessitate discussion. In addition, nurse leaders seemed to find face-to-face meetings with their own superior to be pleasurable:

"...especially in larger units with a lot of staff, people have so much to discuss about, and thus face-to-face interaction is clearly important."

Assistant head nurse/Group 5

"...my superior has visited here to see me...which has been a nice thing... when she marched inside from that door, I noticed that is something I should occasionally do also..."

Head nurse/Group 1.

Based on the leaders' experiences, building trust in the context of digital services was also crucial. For example, the leaders trusted employees when they were working remotely, but—in some

instances—wondered whether their employees were multitasking while attending meetings:

"...I have not once thought that they [employees] would do anything but work tasks [while working remotely]."

Assistant head nurse/Group 5

"...when I am having a staff meeting remotely to the outpatient clinic, I am wondering how many of those fifteen people are multitasking while I am explaining something."

Assistant head nurse/Group 2.

## 5 | DISCUSSION

In this study, we have described nurse leaders' experiences of leadership in the context of a highly digitalized hospital setting through a previously published e-leadership framework. This approach enabled us to recognize leaders' traits, cognitions, affects and behaviours related to leadership in the digital healthcare setting. The presented results can be used to improve both leadership and nursing practices, and the evidence strengthens the utility of the e-leadership framework in healthcare research.

Based on the results, a leader's traits impact e-leadership conduct in the nursing domain. Our results showed that leaders have various views of their self-efficacy concerning digital services. This might be explained by the diverse educational and training backgrounds of the leaders. As noted in both the current study and an American study from Sharpp et al. (2019), nurse leaders do not always receive formal AIT training during their education; instead, they obtain their IT-related skills through self-training. Moreover, in a Norwegian-Swedish study, it was noted that leaders are challenged by a lack of competence in innovation processes and organizational development in the digital context (Gjellebæk et al., 2020). Based on the current study and previous studies, it seems that lacking AIT training and other digital-oriented competence seem to be a challenge for nurse leaders internationally. Thus, we would recommend providing nurse leaders with basic knowledge of AIT, data protection and digital service implementation processes to ensure an adequate level of AIT-savviness. This education or training should not be solely technical, but should also increase leaders' knowledge of how to foster innovations, lead remote teams and promote digital change.

Our study showed that although leaders were open-minded towards digitalization, they occasionally were frustrated by digital services; for example, when the solution did not function well or did not operate with other information systems. Also, leaders' AIT-related distress and digital capabilities were particularly emphasized within the cognition category. Another Finnish study also revealed that nurse leaders experience distress when working with information systems, for example, the system is not always easily accessible, and thus, do not fully support leaders' work (Lammintakanen

et al., 2010). The results presented by Kaihlanen et al. (2021) suggested that poorly functioning, and constantly changing, information systems may cause substantial distress among nurses. Thus, it seems likely that digital services can also cause distress among nurse leaders. However, our results revealed that nurse leaders are enthusiastic about developing digital services. Thus, we would also suggest that nurse leaders are involved in the development of digital services so that the resulting system closely serves their needs, eases their work, enables learning and decreases distress.

Our study demonstrated several cognition-related mechanisms for transmitting e-leadership. Based on our study, leaders need to understand end-users' expectations for digital services and nurses' competence in using them. Understanding health professionals' competence was also emphasized in a scoping review by Laukka et al. (2020), who suggested that leaders should be able to recognize those employees who might be implementation champions due to above-average AIT skills. Our affect-related results suggested that leaders should ensure that nurses have proper training, as well as provide them with sufficient time to learn how to use digital services. The review by Konttila et al. (2019) enforced these findings by stating that healthcare professionals require proper training. Our results concerning leaders' affects suggested that leaders should ensure nurses' involvement in the development of digital services. Cortellazzo et al. (2019) adopted a similar view by stating that leaders are expected to adopt an inclusive style of leadership to consider employees' ideas. These previous considerations lead to our third implication: we recommend that nurse leaders should promote nurses' participation and involvement in the development of digital services to create services that better support nurses' work and the provided quality of care. Since our results also highlighted the importance of understanding patients as end-users of digital services, nurse leaders should promote patient participation to ensure that the developed digital services are patient-centred. As nurse leaders have adopted information technology coordination tasks (Cowan, 2014), their role in connecting different stakeholders provides a great opportunity for facilitating interdisciplinary participation. Our study showed that nurse leaders have opportunities to meet stakeholders, such as AIT-providers, in multi-professional groups; thus, they are in a good position to enhance the collaboration between end-users and AIT-providers.

Several previous studies have corroborated our findings by suggesting that leaders working in the context of digital services need to adopt transformational and supportive leadership practices (e.g. Avolio et al., 2014; Cortellazzo et al., 2019). However, in our study, we identified two remote leadership activities, namely, building relationship with employees via AIT and need for leaders' social presence via AIT, that might be less scrutinized in the existing knowledge base. For example, a recent scoping review by Kiljunen et al. (2021) only identified nine articles that were relevant to remote leadership within healthcare. Thus, we suggest that nurse leaders should be aware of how to lead either remotely working or dispersed teams. Our results showed that leaders need to be aware of digital communication platforms and understand the importance of being socially

present, even via virtual channels. The increasing number of remote or dispersed teams may motivate organizations to draft guidance on remote leadership so that both nurse leaders and nurses recognize how to work remotely. For example, our results revealed that leaders are unsure of how often they should be in contact with remotely working employees and what communication channels should be used.

Although healthcare and nursing are undergoing a strong shift towards digitalization, the results of our focus group interviews demonstrated that both leaders and employees still appreciate face-to-face leadership. As stated by Cortellazzo et al. (2019), the leaders of virtual teams cannot physically observe team members' behaviour or rely on non-verbal communication to understand their subordinates' thoughts, feelings or moods. Also, Ristolainen et al. (2020) suggest that face-to-face meetings may be essential for employees who would otherwise avoid using digital communication channels to contact their leaders. They also stated that communicating through digital channels lacks true interaction. Thus, we suggest that nurse leaders should not fully abandon face-to-face leadership practices even though the number of digital communication platforms is constantly increasing.

When comparing our findings to what was reported by Cortellazzo et al. (2019), we did not recognize leaders' ethical behaviour in the context of hospital services. However, in a review of nurse leaders' informatics competencies, Strudwick et al. (2019) stated that leaders need to be aware of the ethical collection and use of clinical data. In the previously mentioned review, only a few studies were recognized concerning leaders' ethical behaviour; thus, nurse leaders might not sufficiently recognize the ethical aspects of leadership in the context of digital services since also the number of studies concerning it is relatively low. However, based on our results, nurse leaders need to be aware of data protection, that is, ethical data collection and processing.

## 5.1 | Limitations

This study was subject to certain limitations. Notably, the fact that all of the focus group participants were female might have impacted the transferability of results, as Avolio et al. (2014) have previously stated that the appropriation of AIT seems to differ based on gender. However, in that study, only nine of the recruited 140 participants were male, which is a relatively small share of the overall research population. This should be considered when transferring the presented results to organizations with a higher share (i.e. >10%) of male nursing leaders. Moreover, this study was a single-centre study at one Finnish university hospital; therefore, the results might not be transferable to other contexts (e.g. primary care or other countries), although they were in line with previous studies (Gjellebæk et al., 2020; Sharpp et al., 2019). Third, the transcripts of interviews were not returned to interviewees. However, all of the interviewees confirmed their statements at the end of each interview by affirming that they had nothing to add on the subject; this suggests that

they had given complete and detailed information. Finally, due to the COVID-19 pandemic, all of the focus group interviews were conducted using Microsoft Teams, which may have impacted the quality of the data; for example, the conversation might have lacked the natural rhythm of conversation that occurs in face-to-face settings. However, this could be expected to have had a minor influence on the presented results, as all of the participating leaders stated that they were familiar with Microsoft Teams.

## 6 | CONCLUSION

We investigated Finnish nurse leaders' experiences with digital technologies in the hospital context. The results demonstrated that the e-leadership framework is useful for describing the conduct of leadership in the digital services context. Our results also revealed that the digitalization of healthcare has transformed leadership; however, it seems as though nurse leaders' education and training have not been sufficiently modified to meet these rapid changes. Hence, we highlight this as a challenge for today's leaders, and an issue that should be taken into account when educating and training leaders. Furthermore, our results showed that digitalization occasionally leads to stress among leaders, but—at the same time—can also ease their work. Future studies should thoroughly explore leadership in the context of digital services, AIT educational intervention studies and outcomes of digitalization on leaders' stress levels.

### AUTHOR CONTRIBUTIONS

All authors have agreed on the final version and meet at least one of the following criteria (recommended by the ICMJE\*): (1) substantial contributions to conception and design, acquisition of data or analysis and interpretation of data; (2) drafting the article or revising it critically for important intellectual content. No conflict of interest has been declared by the authors.

### ACKNOWLEDGMENTS

We would like to thank the nurse leaders and digital service developers from University Hospital who participated in focus groups and individual interviews. We would also like to acknowledge Sees-Editing Ltd for improving the language (and helping us communicate our findings to readers of the journal).

### FUNDING INFORMATION

No funding was received for this study.

### CONFLICT OF INTEREST

No conflict of interest has been declared by the authors.

### PEER REVIEW

The peer review history for this article is available at <https://publons.com/publon/10.1111/jan.15481>.

## DATA AVAILABILITY STATEMENT

We wish not to share the data.

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**How to cite this article:** Laukka, E., Hammarén, M., Pölkki, T., & Kanste, O. (2023). Hospital nurse leaders' experiences with digital technologies: A qualitative descriptive study. *Journal of Advanced Nursing*, 79, 297–308. <https://doi.org/10.1111/jan.15481>

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