

# Aspects associated with health care professionals' digital health competence development – a qualitative study

Erika Jarva<sup>1</sup>, Kristina Mikkonen<sup>1</sup>, Janicke Andersson<sup>2</sup>, Anna-Maria Tuomikoski<sup>3,4</sup>, Maria Kääriäinen<sup>1,4,5</sup>, Merja Meriläinen<sup>5,6</sup>, Anne Oikarinen<sup>1</sup>

<sup>1</sup> Research Unit of Nursing Science and Health Management, University of Oulu, Oulu, Finland; <sup>2</sup> Center for Research on Welfare, Health and Sports, Academy of Health and Welfare, Halmstad University, Halmstad, Sweden; <sup>3</sup> Oulu University of Applied Sciences, Oulu, Finland; <sup>4</sup> The Finnish Centre for Evidence-Based Health Care: A Joanna Briggs Institute Centre of Excellence; <sup>5</sup> Medical Research Center Oulu, Oulu University Hospital and University of Oulu, Oulu, Finland; <sup>6</sup> Oulu University Hospital, Oulu, Finland

**Erika Jarva, Research Unit of Nursing Science and Health Management, Faculty of Medicine, University of Oulu, P.O. Box 5000, FI-90014 University of Oulu, FINLAND. Email: [erika.jarva@oulu.fi](mailto:erika.jarva@oulu.fi)**

## Abstract

Health care professionals need continuous education to maintain the competencies required to provide high-quality care; in today's world, this means an understanding of digital health services. Insight into health care professionals' experiences of which aspects influence their digital health competence development is therefore highly relevant.

The objective of the study was to examine which aspects influence the digital health competence development of health care professionals (nursing workforce and allied health professionals).

In-depth, semi-structured interviews were conducted with 20 health care professionals (Finland n=15, Sweden n=5) from various health care settings between May 2019 and July 2020. Interviews were audio-recorded, translated verbatim and analysed with inductive content analysis.

Health care professionals perceive that digital health competence development is influenced by aspects related to digital health adoption, co-workers and the work community, their manager, and opportunities for continuous education and orientation.

The participants agreed that digital health competence is an important part of a health care professional's overall clinical competence. Continuous education geared towards digital health competence should be systematically designed, and potentially integrate the resources available on social media platforms. Additionally, managers and supervisors should take a stronger stance towards learning about digital

*Published under a CC BY 4.0 license (<https://creativecommons.org/licenses/by/4.0/>).*

health services so they can serve as role models to their employees and genuinely promote digital health competence development.

**Keywords:** capacity building, health personnel, professional competence, qualitative research, telemedicine

## Introduction

Digital health services hold the potential to support universal access to equitable care, strengthen disease prevention, diagnostics and rehabilitation [1]. On the other hand, digital health might amplify existing inequalities unless systematic governance is implemented [2]. The digital health era has increased the demand for continuous professional development of health care professionals (HCP), such as the nursing workforce and allied health professionals [3]. HCPs' competence building does not only include digital health knowledge transfer, literacy, and information processing [3-5], but also ensuring that they know how to respond to the needs of democratized care and participate in shared decision-making [6].

The World Health Organisation (WHO) has defined digital health as "the use of digital technologies for health", with this concept including the implementation of technologies such as virtual care, remote monitoring, smart wearables, artificial intelligence (AI), and tools that enable data exchange and sharing across the health ecosystem [1,7]. Health care professionals are in an important position to guide patients in using digital health technologies because patients are increasingly becoming agents in their own care [3,6]. Nordic countries, including Finland and Sweden, are open to utilising the possibilities provided by digitalisation in health care, and have developed their own digital strategies and online platforms to systemically implement digital health in health care and strengthen the role of nurses and other HCPs in developing and

implementing digital services as a part of their work [8,9].

Health care professionals' digital health competence has been suggested to consist of domains related to knowledge of digital technology, the digital skills necessary to provide high-quality care (basic information technology literacy), social and communication skills (health information management and digital communication), ethical considerations (ethics, legal and regulations), and data privacy and security [10,11]. Furthermore, HCPs must be motivated and willing to use digital health services and participate in the digital society [10,12,13]. Previous research has identified that HCPs in the Nordic countries possess sufficient or good digital skills and are regular users of digital health at work [9,14,15] but globally, health care professionals suffer from digital skill shortages [13,16,17]. HCPs, in general, require more training to use different digital health technologies and raise awareness of information and communication technologies (ICT) and their use in patient interaction [13,15,18,19].

HCPs perceptions of digital health competence development would be crucial to determining which types of interventions should be used in digital competence development [12]. Health care professionals' digital health competence can be improved by encouragement, empathy, and user-centred changes in the work environment, yet competence development has mostly focused on improving HCPs' skills rather than their motivation [4,12]. Policymakers, managers, colleagues, and professional networks have been found to play an

important role in creating a supportive environment for HCPs' competence development [10,18,20].

Although HCPs' competence in digital health has been found to be important, qualitative research has not yet comprehensively addressed HCPs' experiences and perspectives of which aspects are crucial to digital health competence development. This study seeks to answer the research question: which aspects are associated with health care professionals' (specifically nurses' and allied health professionals') digital health competence development?

## **Material and methods**

### ***Study design and setting***

The presented research applied a qualitative descriptive approach. The study setting was the Northern Ostrobothnia region in Finland and a county in southern Sweden, with the participants recruited from various health care settings. Standards for Reporting Qualitative Research (SRQR) [21] guided the research and reporting of results. This study is part of a larger project with the objective of investigating HCPs' digital health competence. As such, parts of the interview data had previously been used in another study to describe HCPs' perceptions of digital health competence. The abstract of this study was published in autumn 2021 [22].

### ***Participants***

Participants were recruited through a combination of purposive and convenience sampling to reach a sample of willing and knowledgeable candidates from a heterogeneous group of HCPs [23]. The inclusion criteria for participation were: 1) license to work in health care (nurses and allied health

professionals); 2) minimum of one year of work experience as a HCP; 3) consenting to participate; and 4) knowledge of the English language (only relevant for the interviews conducted in Sweden). In Sweden, the participants were recruited from a pool of candidates after information about the study had been distributed to the public and private sectors. In Finland, information about the study was distributed via email to a group of HCPs from various health care settings. Due to the global pandemic situation, only HCPs on study leave could participate in the study.

### ***Data collection***

Individual face-to-face interviews were conducted at two distinct time points in Finland and Sweden by one researcher (first author's initials). The face-to-face interviews in Sweden were conducted in May 2019. The interviews with Finnish HCPs were conducted between April-July 2020 via Zoom video meetings due to the global pandemic situation. The interview guide consisted of questions covering participants' demographic factors and the following themes related to digital competence [10]: 1) professional knowledge and skills; 2) specific attitudes; and 3) psychosocial and organisational predictors. The interviews lasted between 29-83 minutes (mean 52 min) and were audio-recorded and transcribed verbatim.

### ***Data analysis***

Inductive content analysis was used as the method of data analysis to explore and describe the multifaceted, and relatively unknown, phenomenon of HCP perceptions of digital competence development [24]. During the preparation phase, transcribed data were transferred to NVivo software (V.12) to assist the analytical process. Interview transcripts were read thoroughly several times, after which the unit of analysis was established as

any sentence expressing professionals' perceptions of digital health competence development [23]. During the organisation phase, data related to the research question were broken into open codes (n=307). During data abstraction, the open codes were organised to form sub-categories (n=53), categories (n=14), and main categories (n=4), which were named according to their contents [24].

### **Ethical considerations**

The study process was guided by the ethical principles of Responsible Conduct of Research [25]. Research permission was granted in Sweden and Finland according to the corresponding data legislation [26]. Ethical approval was not required since the study does not involve minors, direct or indirect physical or physiological harm to the participants, or clinical trials [27]. Written informed consent was obtained from each participant prior to

the interview as per GDPR requirements [28]. All direct and indirect personal data were removed from the transcripts. The data will be stored for 10 years in password-protected archive folders as per GDPR requirements [26,28].

### **Results**

Demographic characteristics of the twenty professionals who participated in the interviews are presented in Table 1. The results of the content analysis of the interviews is presented in Figure 1. The main categories described aspects associated with the development of digital health competence, namely, digital health adoption, colleagues and work community, the manager, and continuous education and orientation.

**Table 1.** Demographic characteristics of the interviewed health care professionals.

		All (n=20)	Finland (n=15)	Sweden (n=5)
Age (years)	Average (Range)	40.4(27-57)	40.8(27-57)	39.2(33-48)
Gender	Female	17 (85%)	13	4
	Male	3 (15%)	2	1
Profession	Registered nurse	10 (50%)	9	1
	Physiotherapist	6 (30%)	5	1
	Occupational therapist	2 (10%)	1	1
	Ambulance nurse	1 (5%)	-	1
	Practical nurse	1 (5%)	-	1
Health care setting	Specialised health care	10 (50%)	7	3
	Primary health care	7 (35%)	6	1
	Private health care providers	2 (10%)	1	1
	Other public institution	1 (5%)	1	-
Work experience (years)	Average (Range)	12.8 (1-33)	13.6(1-33)	10.4(3-17)

### ***Influence of digital health adoption***

Attitudes towards digital health solutions, experience in using digital health tools, and digital health acceptance were found to be associated with professionals' digital competence development. Professionals' acceptance of digital health in practice requires functioning systems, an easy implementation process, and adjusting to the fact that health care is transforming. Professionals who have grown up with various digital solutions might have a completely different point of view towards adopting digitalisation in their work than professionals from previous generations:

*"It could be that nurses in the future immediately understand their [digital solutions] benefits? [...] It could be that this social media generation adopts all equipment in a totally different way than earlier generations."*  
-Registered nurse, 28

The interviewed professionals felt that changes in clinical practice brought about by digitalisation reflect the acceptance of digital health care as well as the fact that their professional roles are in turmoil; both of these aspects increase the need of HCPs to develop their digital competence. One participant emphasised that competence development is a necessity:

*"Habitual methods are definitely changing to a more digital form. [...] All of these changes are increasing over time, so nursing staff need to stay up-to-date with the development."* -Registered nurse, 27

According to the participants, a positive attitude towards digital solutions can be the result of positive digital health experiences, a gentle approach in service implementation, and participation in digital health service design or its implementation;

all of these aspects reinforce professionals' positive perception of digital competence development. Positive experiences of trying a certain digital solution were reported to be particularly effective in helping HCPs understand the advantages of digital health:

*"Previously it was just my own experiences and views at the local level. But I have had good experiences [of these solutions], [...] my attitude has become more positive over time."* -Registered nurse, 33

On the other hand, the participants felt that forcing professionals to use digital health solutions, hesitancy in how the systems function, and annoyance at malfunctioning or unnecessary work have an undesirable effect on technology adoption. Notably, professionals can be in unequal positions regarding information about why digital health should be used:

*"I also understand those who are unwillingly part of this, those who have just been told what to do and who may struggle with adapting."* -Registered nurse, 57

Attitudes towards increasing one's competence in digital health varied from interest and intrigue to fear of new things. Nevertheless, the participants concluded that - in general - the learning process mostly depends on the individual and their motivation.

### ***Influence from colleagues and the work community***

Colleagues were perceived to exert a significant influence on HCPs' digital competence development. The influence of colleagues was reported to be visible in how colleagues help one another in using different digital equipment, providing peer support in case of challenges, and having a satis-

factory level of competence (which reflects attitudes and perceptions of how digital health services should be used). The participants reflected that younger colleagues tend to have strong digital skills. It was also acknowledged that older age does not always indicate poorer digital competence:

*“Older age doesn’t always translate to poor learning skills.”* -Registered nurse, 53

Participants felt that peer support from colleagues and the work community influences a HCP’s digital competence development. Learning together was identified as improving digital competence development:

*“That kind of communal learning, guiding one another, is extremely important.”*-Physiotherapist, 55

Furthermore, the participants shared that the work community is a valuable resource when HCPs are discussing about digital tool implementation and applicability. This support system can function as a catalyst to realising the benefits of digitalisation:

*“I think it’s really positive that as we have been using the digital care path for a year, other people have started to give ideas such as ‘could this be developed more here’ [...]. Basic competence has started to improve and people see the possibilities.”* -Occupational therapist, 43

Colleagues’ views about digital services were reported to be conflicting and influenced by many aspects such as extensive work experience, insecurities about competence, and a reluctance to change. A colleague’s negative attitude towards digital health can influence the entire work community in a sense that others began viewing

changing work habits as something to be avoided. However, after a certain amount of adaptation and experience with a solution, the participants reported that most colleagues became more positive about digital health and were eager to develop their competence.

### ***Influence of the manager***

The manager was perceived to be an initial determinant of how digital health is introduced and endorsed at the work unit. Moreover, a manager was reported to influence which possibilities employees have in developing their digital competence. Although managers support employees’ competence development by promoting - at least to some extent - attendance in continuous education, the participants felt that a manager’s digital competence should be at a level at which the manager is knowledgeable about various digital health possibilities and how employees’ digital competence should be monitored:

*“I think there is a need to monitor employees’ basic competence. This way the manager would know that there is a certain group which needs special support [...]”*-Occupational therapist, 43

The manager’s role in digital competence development was mentioned to include feedback, orientation, and provision of resources. Supporting actions included open dialogue with employees about how digital solutions should be implemented, while controlling actions and sudden changes to work practices were reported to negatively influence competence development. Forcing employees to use digital health solutions was reported to significantly increase employees’ resistance towards digital health:

*"It was - to some extent - forcing it [the solution], so of course the resistance was bigger than it should have been." -Physiotherapist, 30*

The HCPs stated that active managers encourage innovative thinking among their employees and act as a strong advocate for the development of new digital health solutions. Passive endorsement included accepting digital health solutions but not sufficiently discussing how different digital tools could be used in the work unit.

### ***Influence of continuous education and orientation***

The participants felt that attending continuous education and being provided with orientation at work influence digital competence development in various ways. For example, interviewees who had attended university studies had more interest in digital health and they had more tools to find reliable information from different databases. A registered nurse described feeling more confident in digital health after university studies:

*"...I also feel stronger and more aware there [at work] in those different digital environments." -Registered nurse, 49*

The participants shared that basic health care education should cover more aspects of digitalisation in health care; otherwise, a HCP's digital health competence development depends on how their organisation has standardised new digital methods and how actively the organisation supports professionals in learning about new tools:

*"...it would be easier if we would know how to work with these [digital tools]. It could be consistent, and one professional could guide others. It's foolish to guide others if you aren't sure whether or not it should be done in this way." -Registered nurse, 33*

The participants felt that they could independently develop their competence through digital means, e.g., by attending online educations or searching for relevant materials. Also, the participating HCPs noted that popular social media channels are now reliable sources to search for information to develop professional skills:

*"One can develop their evidence-based working through that [Instagram] if one doesn't want or know how to search from the databases." -Physiotherapist, 30*

The interviewees reflected that education geared towards care or rehabilitation procedures is already being organised online. The participants also felt that they can leverage digital tools to determine necessary competencies in a specific area:

*"...there [Oppiportti] are a lot of interactive things. You study something and answer a few questions and then receive feedback on how much you have learned." -Occupational therapist, 43*

The participants emphasised a desire for additional education in digital communication and interaction, as well as training for specific digital tools or programmes. However, there were conflicting perceptions regarding the provision of resources for further education. Some participants felt that the education was adequate while others felt that the education was lacking:

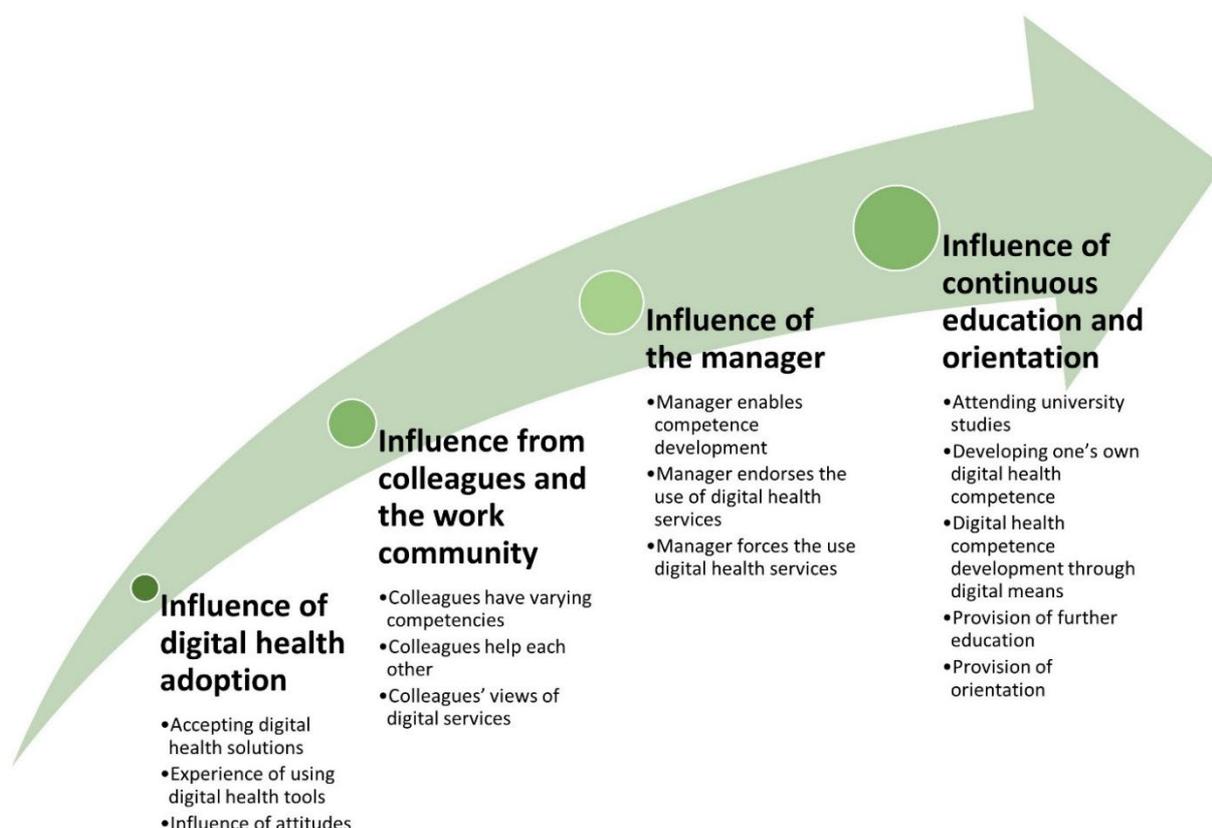
*"I think I am close to different applications that I never use on a daily basis... just because no information on how to use them has been provided..." -Registered nurse, 49*

Orientation to digital solutions was perceived as another important aspect of competence development. The interviewees described that their orientation had been provided according to indi-

vidual needs, in a group format, or from a colleague. However, orientation was also described as mostly consisting of self-learning or learning through trial and error:

*“I learned by trying, but it could have taken less work time if I had already known how to install it [alarm phone].” -Registered nurse, 28*

The outcome of orientation often depended on how actively a professional wanted to understand how new digital solutions can be used in practice. Additionally, irregular work shifts and a large number of professionals in the workforce were cited as challenges to everyone receiving the same level of orientation. Therefore, as was the case with further education, the participants identified a need for more, regularly organised orientation.



**Figure 1.** Aspects associated with HCP digital health competence development.

## Discussion

This qualitative descriptive study examined aspects associated with HCPs' development of digital health competence. The results indicate that colleagues and the work community, the manager, further education and orientation, and aspects related to digital health adoption influence professionals' digital competence development. Furthermore, the degree of digital health adoption was perceived to affect a professional's willingness to develop their digital health competence. The interviewed HCPs reflected that their development of digital competence was mainly motivated by improvements to evidence-based care rather than legal or regulative aspects [10]. The professionals agreed that digital health possibilities are changing the role of the professional [6]; this explains why digital competence development is necessary. These views reflect HCPs' willingness to keep up with the digital revolution even though they already feel skilled in digital health [15,19].

The introduction of digital health solutions to clinical practice led to various opinions of continuous learning about new systems. This result demonstrates a division of perceptions among professionals regarding their eagerness to start using new tools while simultaneously continuing their full-time work. Therefore, the professionals need resources (time, organisational support) to learn about digital health solutions and adjust to the change at their own pace, which is supported by previous research findings [10,18], as digital tools were primarily perceived to increase patient-centric care and facilitate work tasks. The presented results suggest along with previous research, that digital health competence development should consider professionals' individual needs [4,18].

Colleagues and the entire work community were identified as an important source of support for learning about new digital health tools. Similarly, a previous study reported that colleagues' support – and the social environment at work – significantly influence digital competence and technology use [10]. Nevertheless, colleagues may also negatively impact digital competence development through their own resistance towards digital health solutions; this dynamic can change the atmosphere and attitudes at work, which was evident in our interviews. Additionally, the professionals reflected on how the orientation process largely depends on colleagues' efforts; this finding demonstrates how colleagues are a versatile resource in HCPs' digital health competence development.

According to the professionals, the manager also plays a vital role through actions that enable digital health competence development and endorse the use of digital health solutions. The manager – and the organisation as whole – should provide the resources and support necessary to ensuring digital competence development and knowledge among employees [4,10]. The results indicate that a manager either actively or passively supports professionals' digital health competence development, but never inhibits the adoption of digital health possibilities. However, the manager may take a controlling or forcing role in digital competence development, which will negatively affect a professional's willingness to use digital health solutions. Moreover, the manager was not described as a role model in digital health use or knowledge transfer even though the participating professionals expected this, and prior research has acknowledged the importance of opinion leaders [12].

The results of this study support what has been reported in previous research that continuous education increases digital competence [15,18]

and professionals with a higher level of education are more willing to improve their digital health competence [13]. However, the influence of the workplace on digital health competence development should be further studied even though social influence has been previously recognised as a motivation builder in digital competence development [10,12]. The results of this study indicate that digital competence development is still highly reliant on how motivated professionals are to independently build competence, i.e., without organisational support, as the interviewed participants occasionally stated that they had not been afforded sufficient education opportunities. Digital health competence development should also extend broader than mere training and education [18]. In fact, the interviewed professionals described that various internet and social media resources have become a reliable way to develop digital health competence. Therefore, as one main finding of this study, different digital platforms should be integrated into efforts concentrating on the development of HCPs' digital health competence.

#### ***Limitations and trustworthiness of the study***

The presented research included some inherent limitations. For instance, the imbalance in the amount of respondents from two different countries may decrease the credibility of the results. However, it is important to note that all respondents showed similar demographic characteristics and saturation in data collection was achieved, improving credibility [29]. Both of the studied countries also have similar prerequisites of digital health use in health care [9]. The effects of the COVID-19 pandemic on Finnish respondents' perceptions of digital health care may have introduced some bias to the results since the Finnish and Swedish participants could have differed in

their use of - and adaptation to - remote digital health solutions. The interviews with Swedish participants were conducted in English which might introduce bias into the research. However, the influence of the language barrier was minimised by considering the participants' answers in the interview context.

The trustworthiness of the presented research was evaluated through the aspects of transferability, confirmability, credibility, and dependability [30]. The transferability of the results was addressed by describing the participants' characteristics and data in as detailed of a way as possible. Confirmability was improved by maintaining an objective stance when interviewing the professionals and discussing the data analysis process with cowriters. Dependability was enhanced by using the same question framework in all of the interviews even though data were collected at two different time points. To increase credibility, each step of the analytical process was described, and authentic citations from the participants were included in the article. In addition, the researchers continuously reflected on how well they were able to maintain objectivity. The interviewer has a professional background as a physiotherapist and conducting research in the area of HCPs digital health competence. Still, the researcher could bracket these preconceptions and maintain self-reflexivity to avoid affecting the results and reporting [29].

#### **Conclusion**

Digital health adoption, a manager's role, colleagues and the work community, and attending continuous education and orientation were found to influence HCPs' digital health competence development. Based on the results of the study, it seems as though digital health competence development in clinical work mostly depends on a HCP's

will to study independently and colleagues' input on orientation; hence, there remains a lack of systematic and individually designed continuous education on the topic. At the same time, digital interventions and social media networks have become sources of reliable and up-to-date information for digital health competence development. These platforms should be considered when planning new systematic interventions for the development of HCPs' digital competence. Based on the presented finding, future studies should focus on managers' and supervisors' digital health competence, along with the aspects that influence this area of clinical competence. Effective orientation methods that systematically build digital health competence was identified as another issue that remains understudied.

## References

- [1] World Health Organisation (WHO). Draft Global Strategy on Digital Health 2020-2025. Geneva: World Health Organisation; 2020.
- [2] Oliveira Hashiguchi T. Bringing health care to the patient: An overview of the use of telemedicine in OECD countries. OECD Health Working Papers, No. 116. Paris: OECD Publishing; 2020. <https://doi.org/10.1787/8e56ede7-en>
- [3] Lapão LV. The nursing of the future: combining digital health and the leadership of nurses. *Rev Lat Am Enfermagem*. 2020 Jun 19;28:e3338. <https://doi.org/10.1590/1518-8345.0000.3338>
- [4] Mather C, Cummings E. Modelling digital knowledge transfer: nurse supervisors transforming learning at point of care to advance nursing practice. *Informatics* 2017;4(2):12. <https://doi.org/10.3390/informatics4020012>

## Conflict of interest statement

The authors declare no conflict of interest.

## Acknowledgements

We would like to thank the HCPs who participated in this study for their immense contribution. We also wish to acknowledge Sees-Editing Ltd (<http://www.seesediting.co.uk>) for improving the language of this manuscript and helping us to communicate our findings to readers of the journal.

## Funding statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

- [5] World Health Organisation (WHO). Working for Health and Growth. Investing in the Health Workforce. Geneva: World Health Organisation; 2016.
- [6] Meskó B, Drobni Z, Bényei É, Gergely B, Györfly Z. Digital Health is a cultural transformation of traditional healthcare. *Mhealth*. 2017 Sep 14;3:38. <https://doi.org/10.21037/mhealth.2017.08.07>
- [7] World Health Organisation (WHO). WHO Guideline: Recommendations on Digital Interventions for Health System Strengthening. Geneva: World Health Organisation; 2019.
- [8] Ahonen O, Kouri P, Liljamo P, Granqvist H, Junttila K, Kinnunen UM, et al. eHealth strategy of the Finnish Nurses Association 2015-2020. The Finnish Nurses Association (FNA). Available from: [https://sairaanhoitajat.fi/wp-content/uploads/2020/01/eHealth\\_RAPORTTI-ENGLANTI.pdf](https://sairaanhoitajat.fi/wp-content/uploads/2020/01/eHealth_RAPORTTI-ENGLANTI.pdf)
- [9] Lundgren A, Vestergård LO, Jokinen JC, Penje O, Wang S, Norlén G, et al. Digital Health Care and

- Social Care – Regional Development Impacts in the Nordic countries. Nordregio Report 2020: 14. Stockholm, Sweden: Nordregio; 2020. <https://doi.org/10.6027/R2020:14.1403-2503>
- [10] Konttila J, Siira H, Kyngäs H, Lahtinen M, Elo S, Kääriäinen M, et al. Healthcare professionals' competence in digitalisation: a systematic review. *J Clin Nurs*. 2019 Mar;28(5-6):745-761. <https://doi.org/10.1111/jocn.14710>
- [11] Nazeha N, Pavagadhi D, Kyaw BM, Car J, Jimenez G, Car LT. A digitally competent health workforce: scoping review of educational frameworks. *J Med Internet Res*. 2020 Nov 5;22(11):e22706. <https://doi.org/10.2196/22706>
- [12] Virtanen L, Kaihlanen AM, Laukka E, Gluschkoff K, Heponiemi T. Behavior change techniques to promote healthcare professionals' eHealth competency: A systematic review of interventions. *Int J Med Inform*. 2021 May;149:104432. <https://doi.org/10.1016/j.ijmedinf.2021.104432>
- [13] Brown J, Pope N, Bosco AM, Mason J, Morgan A. Issues affecting nurses' capability to use digital technology at work: An integrative review. *J Clin Nurs*. 2020 Aug;29(15-16):2801-2819. <https://doi.org/10.1111/jocn.15321>
- [14] Kujala S, Rajalahti E, Heponiemi T, Hilama P. Health Professionals' Expanding eHealth Competences for Supporting Patients' Self-Management. *Stud Health Technol Inform*. 2018;247:181-185.
- [15] Kinnunen UM, Heponiemi T, Rajalahti E, Ahonen O, Korhonen T, Hyppönen H. Factors Related to Health Informatics Competencies for Nurses-Results of a National Electronic Health Record Survey. *Comput Inform Nurs*. 2019 Aug;37(8):420-429. <https://doi.org/10.1097/CIN.0000000000000511>
- [16] Socha-Dietrich K. Empowering the Health Workforce. Strategies to make the most of the digital revolution. OECD Health Division; 2020 [cited 31 December 2021]. Available from: <https://www.oecd.org/els/health-systems/Empowering-Health-Workforce-Digital-Revolution.pdf>
- [17] Kruk ME, Gage AD, Arsenault C, Jordan K, Leslie HH, Roder-DeWan S, et al. High-quality health systems in the Sustainable Development Goals era: time for revolution. *Lancet Glob Health*. 2018 Nov;6(11):e1196-e1252. [https://doi.org/10.1016/S2214-109X\(18\)30386-3](https://doi.org/10.1016/S2214-109X(18)30386-3)
- [18] Jimenez G, Spinazze P, Matchar D, Huat GKC, van der Kleij RMJJ, Chavannes NH, et al. Digital health competencies for primary healthcare professionals: a scoping review. *Int J Med Inform*. 2020 Nov;143:104260. <https://doi.org/10.1016/j.ijmedinf.2020.104260>
- [19] Dalati F, Lenglet G, Steen L, Giedrojc M, Filipe J, Florindi F, et al. Digital Skills For Health Professionals. Committee on Digital Skills For Health Professionals. European Health Parliament (EHP); 2016 [cited 30 December 2021]. Available from: <https://www.healthparliament.eu/wp-content/uploads/2017/09/Digital-skills-for-health-professionals.pdf>
- [20] Lluch M. Healthcare professionals' organisational barriers to health information technologies - a literature review. *Int J Med Inform*. 2011 Dec;80(12):849-62. <https://doi.org/10.1016/j.ijmedinf.2011.09.005>
- [21] O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. *Acad Med*. 2014 Sep;89(9):1245-51. <https://doi.org/10.1097/ACM.0000000000000388>
- [22] Jarva E, Oikarinen A, Andersson J, Mikkonen K. Health care professionals' perceptions of digital health competence and competence develop-

- ment; a qualitative descriptive study. Conference abstract. In: Meijías E, Kouri P, Ahonen O, Reponen J, editors. eHealth2021. The 26th Finnish National Conference on Telemedicine and eHealth. eHealth in a Lifecycle. 7-8.10.2021 Oulu. Finnish Society of Telemedicine and eHealth (FSTeH) publication 1/2021. Oulu: Grano Oy; 2021. p. 67. Available from:  
<https://www.telemedicine.fi/images/pdf/julkaisut/978-952-69224-4-7.pdf>
- [23] Kyngäs H. Inductive content analysis. In: Kyngäs H, Mikkonen K, Kääriäinen M (Eds.). The Application of Content Analysis in Nursing Science Research. Cham: Springer; 2020. <https://doi.org/10.1007/978-3-030-30199-6>
- [24] Elo S, Kyngäs H. The qualitative content analysis process. *J Adv Nurs*. 2008 Apr;62(1):107-15. <https://doi.org/10.1111/j.1365-2648.2007.04569.x>
- [25] Finnish National Board on Research Integrity TENK. Responsible Conduct of Research and Procedures for Handling Allegations of Misconduct in Finland - RCR Guidelines. Helsinki: Finnish Advisory Board on Research Integrity; 2020 [cited 11 April 2021]. Available from: <https://tenk.fi/en/research-misconduct/responsible-conduct-research-rcr>
- [26] Finlex. Personal Data Act 523/1999. Helsinki: Ministry of Justice; 1999 [cited 10 April 2021]. Available from: <http://www.finlex.fi/en/laki/kaannokset/1999/19990523>
- [27] Finlex. Medical Research Act 488/1999, 295/2004, 794/2010. Helsinki: Ministry of Social Affairs and Health; 1999 [cited 10 April 2021]. Available from: <https://www.finlex.fi/fi/laki/kaannokset/1999/en19990488>.
- [28] Information Commissioner's Office. Guide to the General Data Protection Regulation (GDPR). Information Commissioner's Office; 2018 [cited 10 April 2021]. Available from: <https://ico.org.uk/for-organisations/guide-to-data-protection/guide-to-the-general-data-protection-regulation-gdpr/>
- [29] Kyngäs H, Kääriäinen M, Elo S. The Trustworthiness of Content Analysis. In: Kyngäs H, Mikkonen K, Kääriäinen M (Eds.). The Application of Content Analysis in Nursing Science Research. Cham: Springer; 2020. <https://doi.org/10.1007/978-3-030-30199-6>
- [30] Elo S, Kääriäinen M, Kanste O, Pölkki T, Utriainen K, Kyngäs H. Qualitative content analysis: a focus on trustworthiness. *SAGE Open*. 2014;4(1):1-10. <https://doi.org/10.1177/2158244014522633>