

Original Article

ASSESSING DIGITAL COMPETENCIES OF SLOVENIAN NURSES IN CLINICAL PRACTICE: A PILOT STUDY**Melita Peršolja¹, Anton Grmšek Svetlin²**¹Faculty of Health Sciences, University of Primorska, Izola, Slovenia²Izola General Hospital, Slovenia**Received:** October 20, 2025; **Revised:** January 18, 2026; **Accepted:** January 19, 2026**Published:** January 24, 2026**DOI:** 10.5937/annnur3-62286**Abstract**

Background: Digitization brings innovative solutions to nursing practice in healthcare. Digital competencies and the application of knowledge in the field of digital technology are key aspects of nurses' work. **Aim:** The aim of this study was to describe the digital literacy of nurses. **Materials and Methods:** A quantitative, descriptive, non-experimental empirical research design was used. The survey was conducted on a sample of 51 nurses (36 women and 15 men). The questionnaire consisted of 25 statements related to knowledge, skills, and attitudes toward the use of digital technologies. The level of statistical significance (p) was set at ≤ 0.05 . In addition to descriptive statistics, the Wilcoxon test, Mann–Whitney U test, Kruskal–Wallis H test, chi-square test, and linear regression analysis were used. **Results:** Nurses demonstrated a high level of knowledge and skills in the use of digital technologies and expressed positive attitudes toward them ($Me = 122$, $p < 0.001$). Differences between genders were observed, with women achieving higher scores ($\bar{x} = 113.73$, $s = 15.80$) than men. **Conclusion:** Nurses are generally digitally competent and express positive attitudes toward the use of technology; however, further studies are needed. Nurses should continue to build on their existing knowledge of digital technologies, as this contributes to improved work processes and better patient care.

Keywords: electronic data processing, hospitals, nurses**Corresponding Author:** Anton Grmšek Svetlin, E-mail: anton.grmsek024@outlook.com

Introduction

Digitization has significantly transformed healthcare, requiring healthcare professionals—especially nurses—to acquire new digital competencies to effectively integrate technology into their practice^{1,2}. Digital competence encompasses technical skills, the ability to use digital technologies meaningfully, understanding digital phenomena, and motivation to engage in an increasingly digital culture³. In nursing, digital competencies include knowledge and skills for delivering high-quality, patient-centered care, digital communication with patients and colleagues, and understanding the ethical implications of digitization⁴.

Nurses' knowledge of digital technologies is a fundamental prerequisite for their effective use⁵. However, evidence shows that access to training and support varies widely across settings. Hospitals generally provide more established networks and electronic health information systems than other healthcare institutions; yet nurses often receive less training than physicians in areas such as database searching, research using digital technologies, and data management⁶. Ahmed et al.⁷ found in a sample of 205 nurses working in a hospital setting that 97.1% possessed a satisfactory level of knowledge, appropriate skills, and positive attitudes toward the use of digital technology. In contrast, a study by Tegegne et al.⁸ found low levels of digital literacy among healthcare professionals in just under half (48.2%) of participants. A study conducted in a university hospital in Thailand by Pituk Sung et al.⁹ found that 62.2% of nurses used digital technology in their daily work; however, less than half (46.9%) demonstrated moderate digital technology skills.

Digital literacy, a component of digital competence, includes the ability to search, analyze, and use data with digital tools¹⁰, as well as the ability to search for, critically use, and disseminate data using digital technologies¹¹. Digital health literacy, specifically, refers to the ability to find, understand, and evaluate health information from electronic sources and apply it to health-related problems¹².

Beyond knowledge, nurses' attitudes toward technology critically affect their adoption of innovations in practice. Studies indicate that nurses generally hold positive attitudes toward digital innovations^{13,14}, although resistance remains an important barrier¹⁵. Negative attitudes are often associated with lower digital competencies, suggesting that knowledge, skills, and attitudes are interconnected and collectively influence the successful implementation of digital technologies¹⁵. Institutional and environmental factors also shape nurses' digital competencies. Organizational culture, leadership, and inclusion in technology implementation can reduce resistance to change and promote the adoption of digital innovations^{16,17}. Conversely, high workloads, lack of institutional support, and training gaps hinder nurses' skill development¹⁸.

Strengthening nurses' digital competencies is essential not only for quality patient care but also for career sustainability in an increasingly digital healthcare landscape¹⁹. Digitally competent nurses are better equipped to adapt to technological advances, remain productive, and contribute effectively to the digital transformation of healthcare systems^{5,20–22}. Despite growing recognition of its importance, digital development has often outpaced training and education, leaving many nurses without the necessary skills to fully leverage digital technologies in their daily work^{5,6}. Addressing these gaps is critical for enabling nurses to participate fully in modern, digitally driven healthcare environments and to improve both patient outcomes and workforce sustainability¹⁹.

Despite growing international and local research on nurses' digital competencies, few studies have examined comprehensive measures that capture knowledge, attitudes, and practical skills in a standardized way, particularly in developing countries such as Slovenia. The aim of this pilot study was to explore nurses' self-perceived digital competencies in clinical practice and to preliminarily assess the feasibility and composite structure of a translated questionnaire measuring nurses' knowledge, skills, and attitudes toward digital technologies.

Materials and Methods

This pilot study employed a descriptive, non-experimental, cross-sectional design to explore nurses' self-perceived digital competencies in clinical practice. The study was conducted in Slovenia, across primary, secondary and tertiary healthcare settings between 2nd of July 2024 and 24th of August 2024.

Research Instrument Description

The research instrument was developed by Golz, et al.²³ and consists of 25 statements, divided into three themes (knowledge, skills and attitude towards digital technologies). Before using the questionnaire, we obtained written permission by the original authors to translate the questionnaire in to Slovenian language. The questionnaire was named »Questionnaire to Measure Digital Competencies of Nurses in Clinical Practice« and was translated both ways from English into Slovenian and back into English and was translated by four persons to ensure linguistic equivalence and conceptual clarity. The questionnaire was distributed in digital form.

Respondents indicated their level of agreement with the statements on a 5-point Likert scale ranging from 1-Disagree, 2-Somewhat Disagree, 3-Neither Disagree nor Agree, 4-Somewhat Agree, 5-Agree. The second part of the questionnaire relates to demographic data, of which we were interested in the clinical setting where the respondents are employed, the field of work, and the number of years of working experience in healthcare. The Cronbach alpha coefficient for the reliability of the first part of the questionnaire was 0,97, indicating an excellent level of reliability²⁴.

Sample

In this study we used a convenience sample of registered nurses (BSc or RN). The introductory

page of the questionnaire was viewed by 245 people. The responses of the 51 (36 women and 15 men) participants who completed the questionnaire were included in the analysis.

Research description and data processing

The survey data were collected by using an open-source web-based survey application (1KA). Before beginning with the questionnaire, respondents gave their consent to participate in the survey. The obtained data was analysed using SPSS, version 26.0. Descriptive statistics was used (frequency (n), minimum (Min), maximum (Max), mean ($\bar{x}$), median (Me) and standard deviation (s)) and inferential statistics (Mann-Whitney U-test (U), Kruskal-Wallis test (H), Chi-square test (χ^2) and linear regression analysis) was performed.

We used the Wilcoxon test for one sample to check the level of digital competencies among nurses. The answers to the content questions were scored, with possible scores ranging from 25 (lowest possible value) to 125 (highest possible value). The median ($Me = 62,5$) represented mean value. Values below 62,5 show low levels of competencies, while values above 62,5 show high levels of competencies. The level of statistical significance was $p \leq 0,05$.

In the course of the analysis, three composite variables were calculated: Knowledge (4 items), Skills (8 items) and Attitude (13 items). Each composite variable was computed as the sum of item scores with equal weighting. Later, a Digital Competencies Index was constructed by combining these three composite variables. The rationale for this aggregation was to provide a preliminary overall measure that captures the multidimensional nature of digital competencies in a single index, facilitating exploratory analysis and trend identification.

Ethical considerations

The study complied with the ethical standards outlined in the Declaration of Helsinki ²⁵. This research was conducted under the umbrella ethical

approval of Commission of the University of Primorska for Ethics in Human Subjects Research (approval number: 4264-19-6/23). Before beginning the survey, participants were provided

Results**Sample characteristics**

Among the 45 patients, 21 (47%) experienced pain of mechanical nature, 17 (38%) reported combined mechanical and thermal pain, and 7 (15%) suffered from pure thermal pain.

Fifteen respondents (29,4%) are employed at the primary setting of healthcare, 30 (58,8%) at the secondary setting and 6 (11,8%) at the tertiary setting. Respondents have been working in healthcare for an average of 10,5 years ($s = 7,8$), most of them in hospital wards. (Table 1).

Table 1: Demographic characteristics of participants

Variable		Value	
		<i>n</i>	%
Gender	Women	36	70,6
	Men	15	29,4
Level of healthcare	Primary	15	29,4
	Secondary	30	58,8
	Tertiary	6	11,8
Field of work	Internal medicine ward	10	19,6
	Surgical ward	9	17,6
	Pediatric ward	8	15,7
	Nursing home	4	7,8
	General outpatient clinic	4	7,8
	Specialist outpatient clinic	4	7,8
	Radiology ward	2	3,9
	Home care nursing	1	2,0
	Other	9	17,6

Legend: *n* – number, % – percentage.

Descriptive Statistics

Given the pilot nature of the study and the limited variability in responses, cautious interpretation of the results is warranted. The distribution of item scores across the questionnaire consistently showed high mean and median values, with most items receiving rating above $\bar{x} = 4$ on the 5-point Likert scale.

Results show that the mean values for the statements on the level of knowledge related to the use of digital technologies are around 4,44. This means that respondents express a moderate level of agreement with the statements offered about perception of their own knowledge about digital technologies (Table 2).

Table 2: Values of statements regarding participants' knowledge to use digital technologies

Statement	Value						
	$\bar{x}$	% ^a (n)	Min	Max	s	β	p
Composited variable Knowledge	4,44	-	1	5	-	-	-
I am familiar with the current laws and regulations pertaining to the protection and exchange of medical data (eg, data protection, informed consent, and confidentiality) at my workplace.	4,59	82,4 (42)	1	5	1,10	0,21	0,00
I am familiar with digital technologies at my workplace.	4,51	80,4 (41)	1	5	1,17	0,33	0,00
In general, I would rate my knowledge of digital technology as satisfactory.	4,49	80,4 (41)	1	5	1,21	0,21	0,02
Patients use digital technologies to manage their symptoms themselves.	4,16	62,7 (32)	1	5	1,35	0,37	0,00

Legend: $\bar{x}$ – average, n – number, Min – minimum, Max – maximum, s – standard deviation, β – beta coefficient, p – statistical significance, % - percent, a – percent of participants confirming the statement.

In the next part of the questionnaire, respondents answered questions related to their beliefs about their own skills in using digital technologies (Table 3). Using descriptive statistics, we found that the highest score ($\bar{x} = 4,66$) reached the statement on confidence to use digital technologies.

Table 3: Values of statements regarding participants' skills to use digital technologies

Statement	Value						
	$\bar{x}$	% ^a (n)	Min	Max	s	β	p
Composite Variable »Skills«	4,53	-	1	5	-	-	-
I feel confident about using digital technology.	4,66	80,0 (40)	1	5	0,87	-0,05	0,72
I feel confident about using digital technology to communicate.	4,61	81,6 (40)	1	5	0,99	0,09	0,59
I feel confident about using digital technology to find relevant information.	4,58	78,0 (39)	1	5	1,01	0,16	0,21
I feel confident about using digital technology to share information.	4,58	78,0 (39)	1	5	0,99	0,14	0,38
I feel confident in dealing with confidentiality issues relating to digital technology at my workplace.	4,54	82,0 (41)	1	5	1,16	0,14	0,50
I feel confident about using digital technology to obtain data and information on clinical care.	4,51	77,6 (38)	1	5	1,12	-0,04	0,89
I feel confident about the secure management of health data using digital technology.	4,44	72,0 (36)	1	5	1,15	0,31	0,10
I am able to reach conclusions based on information acquired through digital technologies.	4,35	77,1 (37)	1	5	1,33	0,27	0,01

Legend: $\bar{x}$ – average, n – number, Min – minimum, Max – maximum, s – standard deviation, β – beta coefficient, p – statistical significance, % - percent, a – percent of participants confirming the statement.

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The final part of the questionnaire consisted of 13 statements about respondents' attitudes towards the use of digital technologies at their work. Results are shown in Table 4. The highest value ($\bar{x} = 4,80$) scored the statement concerning nurses' willingness to improve their ability to use digital technology in further training. Respondents showed the lowest agreement ($\bar{x} = 4,02$) with the statement that they encourage colleagues to use digital technology.

Table 4: Values of statements regarding participants' attitudes toward digital technologies

Statement	Value						
	$\bar{x}$	% ^a (n)	Min	Max	s	β	p
Composite Variable Attitude	4,39	-	1	5	-	-	-
I am willing to improve my ability to use digital technology through further training.	4,80	86,0 (43)	1	5	0,64	-0,20	0,20
I believe that digital technology is relevant for my future profession.	4,60	79,2 (38)	1	5	1,00	-0,15	0,48
I have an open attitude toward digital technology-related innovations at my workplace.	4,49	68,6 (35)	1	5	0,99	0,51	0,00
Digital technology fits well with the way I like to work.	4,47	70,6 (36)	1	5	1,05	0,12	0,39
I am keen to use new digital technologies in my future professional practices.	4,47	69,4 (34)	1	5	1,00	-0,65	0,00
I believe that digital technology provides numerous benefits in terms of quality of care.	4,45	68,6 (35)	1	5	1,04	-0,23	0,31
I believe that digital technology is beneficial for health professionals.	4,43	68,6 (35)	1	5	1,12	-0,72	0,00
I believe that digital technology improves clinical care.	4,41	54,9 (28)	1	5	0,88	0,40	0,01

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Digital technologies make my day-to-day work easier.	4,30	60,0 (30)	1	5	1,15	- 0,35	0,03
I enjoy using digital technology at my workplace.	4,27	66,7 (34)	1	5	1,31	0,83	0,00
I believe that digital technology is beneficial for my patients.	4,14	52,0 (26)	1	5	1,23	0,67	0,00
I encourage colleagues to use digital technology in their professional practices.	4,02	44,9 (22)	1	5	1,23	0,56	0,00

Legend: $\bar{x}$ – average, n – number, Min – minimum, Max – maximum, s – standard deviation, β – beta coefficient, p – statistical significance, % - percent, a – percent of participants confirming the statement

Results of linear regression showed that the variability of the final Digital Competencies Index, which combines three composite variables (Knowledge, Skills and Attitude), is most strongly influenced by the variable indicating the respondents' attitudes toward digital technology (Table 5).

Table 5: Digital Competencies Index Values

Variable	Value				
	$\bar{x}$	Min	Max	β	p
kills	4,53	1	5	0,34	0,00
knowledge	4,44	1	5	0,26	0,02
attitude	4,39	1	5	0,46	0,00

Legend: $\bar{x}$ – average, n – number, Min – minimum, Max – maximum, p – statistical significance

Inferential Statistics

The distribution of the "Competencies" index values showed that 95,2% ($n = 40$) of the respondents had a good knowledge of digital competencies, while 4,8% ($n = 2$) had a poor knowledge of digital competencies. The

Wilcoxon one-sample test showed that the observed median ($Me = 122$) is statistically significantly ($p < 0.001$) higher than the hypothesized median, indicating that nurses in practice possess high digital competencies.

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Due to the abnormal distribution of the data detected by the Kolmogorov-Smirnov test ($KS = 0,302$, $p < 0,05$), the Mann-Whitney U test was used for further analysis. The results ($U = 138,50$, $Z = -1,17$; $p = 0,24$) show that there are no statistically significant differences in the perception of one's own digital competencies between genders. The Chi-square test did not show a statistically significant difference in the level of digital competencies of nurses working at different settings of healthcare ($df(1,43) = 2$, $p = 0,49$).

Discussion

This pilot study aimed to explore nurses' self-perceived digital competencies and to preliminarily assess the feasibility and performance of a translated questionnaire measuring nurses' knowledge, skills, and attitudes toward digital technologies in clinical practice. Overall, participants reported high levels of self-perceived digital competencies. These findings are broadly consistent with previous studies indicating that nurses increasingly perceive themselves as digitally competent and express positive attitudes toward digital technologies^{7,13,14,26}. While these findings are encouraging, they should be interpreted cautiously given the exploratory nature of the study, the small sample size, and the convenience-based sampling strategy within a limited local context.

Regarding nurses' knowledge of digital technologies, respondents reported strong familiarity with digital tools used in their workplace as well as with legal and ethical aspects of digital data management. Similar findings have been reported in other studies conducted in hospital environments, where access to digital systems and electronic health records is more established than in other healthcare settings^{6,7,26}. At the same time, nurses were less likely to agree that patients actively use digital technologies to manage their symptoms. This finding aligns with other research suggesting that, although digital health tools are increasingly available, patients' effective use of such technologies remains uneven and dependent on adequate support from healthcare professionals²⁷. Nurses therefore play a crucial role in facilitating patients' digital and health literacy, which in turn requires nurses themselves to possess adequate and up-to-date digital competencies^{11,12,27}.

In terms of skills, participants in this study reported high confidence in using digital technologies for communication, information retrieval, data management, and clinical decision-making. These results are comparable to those of Ahmed et al.⁷ and Pituksung et al.⁹, who found that nurses who frequently use digital systems in their daily work tend to rate their digital skills more highly. However, the consistently high mean scores across skill-related items in our questionnaire suggest the possible presence of a ceiling effect, which may have limited the instrument's ability to discriminate between different levels of digital competence. This ceiling effect may reflect both genuine familiarity with digital tools and a tendency toward socially desirable responses, particularly in a professional context where digital competence is increasingly expected of nurses.

Participants also expressed predominantly positive attitudes toward digital technologies, especially regarding their willingness to further develop their digital competencies through additional education and training. Positive attitudes toward digital technologies have been widely documented in nursing research and are considered a key facilitator of successful digitalization in nursing practice^{13,14,28}. At the same time, contrasting findings have also been reported, with some studies describing skepticism or negative attitudes toward digital technologies among nurses¹⁵. The uniformly positive attitudes observed in the present study may partly be explained by self-selection bias, as nurses with greater interest in digital technologies or greater confidence in using them may have been more likely to participate in an online survey distributed via digital channels such as social media. The Digital Competencies Index, combining three composite variables—Knowledge, Skills, and

Attitudes—demonstrated internal consistency and were most strongly influenced by the Attitude domain. This finding aligns with other research^{10,29} suggesting that attitudes and motivation play a central role in technology adoption and the acquisition of digital competencies among nurses. However, the very high Cronbach's alpha coefficient may also indicate conceptual overlap among some items, particularly within the Attitude domain.

Peršolja M, Svetlin AG. Nurses' Digital Competencies Although female nurses demonstrated higher mean scores regarding their digital competence levels than male nurses, these differences were not statistically significant and should be interpreted merely as descriptive trends rather than evidence of true gender differences. Other studies have found that male and younger nurses tend to demonstrate higher preparedness to use digital technologies^{30,31}. However, given the limited statistical power of the present pilot study, meaningful conclusions regarding demographic differences cannot be drawn.

Overall, while the findings suggest that participating nurses perceive themselves as digitally competent and open to digital innovations in their workplace, the scope of interpretation must remain limited. Rather than providing definitive evidence on digital competence levels among nurses, this study primarily aimed to demonstrate the feasibility and preliminary utility of a recently translated questionnaire used in a developing country.

This study also aimed to preliminarily assess the feasibility of the translated questionnaire. Feasibility is supported by several indicators. First, the questionnaire demonstrated good internal consistency, with a Cronbach's alpha of 0.97, suggesting a high level of reliability of the translated instrument. Although the overall response rate was not high—an outcome common in online surveys and pilot studies—the completion rate among respondents was high, indicating good acceptability and comprehensibility of the items. Additionally, the distribution of responses and the coherent structure of the composite variables suggest that the questionnaire functioned as intended, despite the very small sample size. These findings support the feasibility of the translated questionnaire for assessing nurses' digital competencies in clinical practice while also highlighting the need for further validation in larger and more diverse samples.

Study limitations and suggestions for further research

This pilot study has several limitations that should be considered when interpreting the findings. First, the study employed a small convenience sample of nurses, which limits statistical power and restricts the generalizability of the results. Participants were

recruited through digital channels such as social media, which may have introduced self-selection bias, as nurses with greater interest in or confidence with digital technologies may have been more likely to participate. In addition, the consistently high scores observed across questionnaire items suggest a potential ceiling effect, which may have reduced the sensitivity of the research instrument. Furthermore, the study relied on self-reported data, which may not accurately reflect nurses' actual digital competencies and may have been influenced by social desirability bias.

Future research should involve larger and more representative samples with predefined demographic characteristics such as age, gender, education level, years of professional experience, and healthcare setting. Longitudinal and quasi-experimental study designs could provide deeper insight into the development of digital competencies among nurses and allow for triangulation of self-reported data with more objective measures of digital skills.

Implications for nursing practice

Despite its limitations, this pilot study highlights the growing importance of digital competencies as a core component of contemporary nursing practice. The findings suggest that participating nurses perceive themselves as having adequate knowledge, skills, and generally positive attitudes toward digital technologies. These preliminary results underscore the need to support nurses in maintaining and further developing their digital competencies as healthcare systems continue to undergo rapid digital transformation. Given the exploratory nature of this study, the results should not be interpreted as evidence of uniformly high digital competencies among nurses, but rather as an indication of areas where nurses feel confident and motivated to further develop their competencies.

Conclusion

Nursing has undergone an intensive digitization process in recent years. With the introduction of new processes and working methods, it is important not to

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overlook the human factor, namely nurses. For the successful implementation of digital technologies, nurses' knowledge, skills, and attitudes toward the use of technology are crucial to understand. It is essential that they are trained in the use of digital technologies, and that they are motivated to acquire new digital competencies. This pilot study provided preliminary insight into nurses' self-perceived knowledge, skills, and attitudes toward digital technologies and demonstrated the feasibility of the translated questionnaire for assessing nurses' digital competencies in clinical practice.

Conflict of Interest

The authors declare no conflict of interest.

References

1. Fachinger U, Mähs M, Digitalisierung und Pflege. : In: Klauber J, Geraedts M, Friedrich J. & Wasem J.eds. Krankenhaus-Report 2019. Berlin, Heidelberg:Springer 2019; pp. 115–128. DOI:10.1007/978-3-662-58225-1_9.
2. Korte L, Bohnet-Joschko S. Digitization in Everyday Nursing Care: A Vignette Study in German Hospitals. *Int J Environ Res Public Health* 2022; 19, 10775. DOI: 10.3390/ijerph191710775
3. Ilomäki L, Paavola S, Lakkala M, Kantosalo A. Digital competence – an emergent boundary concept for policy and educational research. *Educ Inf Technol* 2016; 21, 655–679. DOI: 10.1007/s10639-014-9346-4.
4. Jarva E, Oikarinen A, Andersson J. et al. Healthcare professionals' perceptions of digital health competence: A qualitative descriptive study. *Nursing Open* 2022; 9, 1379–1393. DOI: 10.1002/nop2.1184
5. Booth RG, Strudwick G, McBride S, O'Connor S, Solano López AL. How the nursing profession should adapt for a digital future. *BMJ* 2021; 373, n1190. DOI: 10.1136/bmj.n1190
6. Mengestie ND, Yeneneh A, Baymot AB. et al. Health Information Technologies in a Resource-Limited Setting: Knowledge, Attitude, and Practice of Health Professionals. *Biomed Res Int* 2023, 4980391. DOI: 10.1155/2023/4980391
7. Ahmed AM, Elaziz EA, Mohamed NA, Nurse's Knowledge, Skills, and Attitude toward Electronic Health Records. *J Nurs Health Sci* 2021; 9 (5):53-60. DOI:10.9790/1959-0905025360.
8. Tegegne MD, Tilahun B, Mamuye A. et al. Digital literacy level and associated factors among health professionals in a referral and teaching hospital: An implication for future digital health systems implementation. *Front Public Health* 2023; 11, 1130894. DOI: 10.3389/fpubh.2023.1130894
9. Pituksung A, Poyen J, Namthep J et al. Digital Literacy among Nurses Working in a University Hospital. *The Journal of Thailand Nursing and Midwifery Council* 2023; 38, 38–48. DOI: <https://doi.org/10.60099/jtnmc.v38i02.261436>
10. Jeon J, Kim S. The mediating effects of digital literacy and self-efficacy on the relationship between learning attitudes and Ehealth literacy in nursing students: A cross-sectional study. *Nurse Education Today* 2022; 113, 105378. DOI: 10.1016/j.nedt.2022.105378
11. Roche TB. Assessing the role of digital literacy in English for Academic Purposes university pathway programs. *Journal of Academic Language and Learning* 2017; 11, A71–A87.
12. Isazadeh M, Asadi ZS, Badiani E, Taghizadeh MR. Electronic Health Literacy Level in Nurses Working at Selected Military Hospitals in Tehran in 2019. *Ann Mil Health Sci Res* 2019; 17. DOI: 10.5812/amh.99377

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13. Olorunfemi O, Osunde NR, Olorunfemi OM, Adams S. Assessing Nurses' Attitudes toward the Use of Modern Technology to Care for Patients at Selected Public and Private Hospitals, Benin-City, Nigeria, 2020. *International Archives of Health Sciences* 2020; 7, 143. DOI: 10.4103/iahs.iahs_25_20
 14. Majid S, Foo S, Luyt B, et al. Adopting evidence-based practice in clinical decision making: nurses' perceptions, knowledge, and barriers. *J Med Libr Assoc* 2011; 99, 229–236. DOI: 10.3163/1536-5050.99.3.010
 15. Ghonem N, Ibrahim F, Abd elrahman R. Information Technology: Nurses' Attitudes towards the Use of Computer and Their Informatics Competencies in Nursing Practice. *Assiut Scientific Nursing Journal* 2023; 11, 89–97. DOI: 10.21608/asnj.2023.188845.1502
 16. Hyde AM, Johnson E, Luig T, et al. Implementing a cirrhosis order set in a tertiary healthcare system: a theory-informed formative evaluation. *BMC Health Services Research* 2023; 23, 636, DOI: 10.1186/s12913-023-09632-z
 17. Lampo A. How is Technology Accepted? Fundamental Works in User Technology Acceptance from Diffusion of Innovations to UTAUT-2. in *Proceedings of the 8th International Conference on Industrial and Business Engineering* 260–266 (Association for Computing Machinery, New York, NY, USA, 2023). doi:10.1145/3568834.3568903. DOI: 10.1186/s12912-023-01284-y
 19. Zhang Z. et al. The Effect of Digital Competence on Nurses' Career Sustainability: A Cross-Sectional Study. *J Nurs Manag* 2024, 8813704. DOI: 10.1155/jonm/8813704.
 20. Li Y, Jing Q, Feng T, Yang X. The Impact of Self-Efficacy on Nurses' Well-Being: Does Digital Competence Matter? *J Korean Acad Nurs* 2023; 53, 385–396. DOI: 10.4040/jkan.23037
 21. De Leeuw JA, Woltjer H, Kool RB. Identification of Factors Influencing the Adoption of Health Information Technology by Nurses Who Are Digitally Lagging: In-Depth Interview Study. *J Med Internet Res* 2020; 22, e15630. DOI: 10.2196/15630.
 22. Isido V, Diamanti F, Gios L et al, Digital Technologies and the Role of Health Care Professionals: Scoping Review Exploring Nurses' Skills in the Digital Era and in the Light of the COVID-19 Pandemic. *JMIR Nurs* 2022; 5, e37631. DOI: 10.2196/37631
 23. Golz C, Hahn S, Zwakhalen SMG. Psychometric Validation of the Digital Competence Questionnaire for Nurses. *Sage Open Nursing* 2024; 10, 23779608241272641. DOI:10.1177/2377960824127
 24. Taber KS. The Use of Cronbach's Alpha When Developing and Reporting Research Instruments in Science Education. *Res Sci Educ* 2018; 48, 1273–1296. DOI: 10.1007/s11165-016-9602-2
 25. World Medical Association. World Medical Association Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects. *JAMA* 2013; 310, 2191–2194. DOI: 10.1001/jama.2013.281053
 26. Abuhammad S, Alzoubi KH, Al-Azzam SI, Karasneh RA. Knowledge and Practice of Patients' Data Sharing and Confidentiality Among Nurses in Jordan. *J Multidiscip Healthc* 2020; 13, 935–942. DOI: 10.2147/JMDH.S269511
 27. Wilandika A, Pandin MGR, Yusuf A. The roles of nurses in supporting health literacy: a scoping review. *Front Public Health* 2023; 11, 1022803. DOI: 10.3389/fpubh.2023.1022803
 28. Jedwab RM, Manias E, Redley B, Dobroff N, Hutchinson AM. Impacts of technology implementation on nurses' work motivation, engagement, satisfaction and well-being: A realist review. *J Clin Nurs* 2023; 32, 6037–6060. DOI 10.1111/jocn.16730
 21. De Leeuw JA, Woltjer H, Kool RB. Identification of Factors Influencing the Adoption of Health

29. Guillari A, Sansone V, Giordano VM, Rea T. Assessing digital health knowledge, attitudes and practices among nurses in Naples: a survey study protocol. *BMJ Open* 2024; 14, e081721. DOI: 10.1136/bmjopen-2023-081721
30. Franken S, Schenk J, Wattenberg M. Gender-specific attitudes and competencies of young professionals in the context of digitalization. in *Proceedings of the 4th Conference on Gender & IT* 139–141 (Association for Computing Machinery, New York, NY, USA, 2018). DOI:10.1145/3196839.3196860.
31. Friedrichsen M, Wersig W,. Digitale Kompetenz – Notwendigkeit und Kerngedanken. in *Digitale Kompetenz: Herausforderungen für Wissenschaft, Wirtschaft, Gesellschaft und Politik* (eds Friedrichsen, M. & Wersig, W.) 3–6 (Springer Fachmedien, Wiesbaden, 2020). DOI:10.1007/978-3-658-22109-6_1