Attitudes and Experiences of Nursing Staff towards Digital Health Literacy

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Abstract:

Background: Nursing staff's attitudes and experiences have a great role in nursing digital health literacy, which is considered the keys to increasing the quality, accessibility, and affordability of health services for patients. **Aim of the study**: Assess the attitudes and experiences of nursing staff towards digital health literacy. **Research Design:** A descriptive-correlational research design was applied. **Setting:** El-Mahalla El-Kobra General Hospital in all inpatient departments and intensive care units. **Subjects**: A stratified proportional randomized sampling of nursing staff (n=260) who are working in the previously mentioned settings and available at the time of data collection. **Tools of data collection:** Three tools were used: the Digital Technology Use Questionnaire, Digital Health Literacy Attitudes Questionnaire, and Digital Health Literacy Experiences Questionnaire. **Results**: The study findings revealed that 63.80% of nursing staff had negative attitudes towards digital health literacy and 46.2% of them had an average level of experience in digital health literacy. **Conclusion:** There was a strong positive and statistically significant correlation between nursing staff's attitudes and their experiences toward digital health literacy. **Recommendations:** Regularly assessing the digital competencies of nursing staff to tailor support and training programs to their actual needs and levels, as well as embedding digital health literacy into the nursing curricula of both undergraduate and graduate programs.

***Keywords*:** Attitudes, Experiences, Digital health literacy, Nursing staff.

Introduction

Nursing staff are the backbone of the healthcare industry and play a vital role by providing care that is safe, effective, person-centered, timely, efficient, and equitable. Those professionals work in various specialties to recuperate patients' health and prevent injuries and illness **(Shahbal et al., 2022).** Those professionals have various responsibilities extend beyond traditional patient care to include advocacy, education, and collaboration within healthcare teams. These multifaceted roles are increasingly vital, especially in the context of evolving healthcare demands and challenges **(Nazneen & Sohail, 2020; Roth et al., 2022)**.

Nursing staff use various technologies in medical devices to improve patients' safety through automation, alerting medications, providing reminders of important information, offering better diagnostic and consultation reports, sharing information, supporting clinical decision-making, avoiding errors, standardizing practices, and addressing staff shortages **(Elnaggar, Abd-Ellatief, Elbana, 2024; Henriksen & Nielsen, 2021)**. In this context, nursing staff have a great role in digital health (DH), which is considered the key to increasing the quality, accessibility, and affordability of health services for patients. Nursing staff are experts in interpreting this data to inform evidence-based decision-making and use digital tools to assess patient progress, track outcomes, and continuously adapt care plans for the best results. DH solutions can not only be enabling the transition to a patient-centered DH system but also benefit the nursing staff **(Janzarik, Wollschläger, Wessa, & Lieb, 2022)**.

Digital health literacy (DHL) is the ability to find, understand, and apply health information through electronic resources to solve health-related problems. It aims to obtain, comprehend, critique, and use of health information in decision-making about healthcare, disease prevention, and health promotion to improve patients' quality of life **(Shiferawy, Tilahun, & Endehabtu, 2020).** It also contributes to reducing inequalities in accessing healthcare services. Excellent digital literacy increases readiness for electronic health record systems that in turn improve healthcare systems' efficiency and long-term viability **(Isazadeh Asadi, Eand, & Taghizadeh, 2019).**

Through DH, nursing staff improve efficiency in service delivery,

expand the scope of care, change tasks, or collaborate in interdisciplinary teams to provide better care of patients **(Hoang, Tran, & Nguyen, 2023).** Nursing staff attitudes have a critical role in helping them to understand how individuals view issues and problems in the healthcare system as well as what they consider to be significant, good, pertinent, and suitable. Attitudes of nursing staff are an important factor in increasing the quality of nursing care, reducing missed nursing care, tolerating workload, and organizing tasks **(Kammeyer-Mueller, Rubenstein, & Barnes, 2024)**.

Furthermore, the nursing staff's experience is a personalized and distinct understanding of their practices, which is considered as the outcome of ongoing interplay between meaning, and the lived world **(Galuska, Hahn, Polifroni, & Crow, 2018).** The process of getting knowledge or skill that is obtained from doing, seeing, or feeling things reflects the personal experience of nursing staff that happens and affects their practices. The experience of DHL has six aspects, including operational skills, navigation skills, information searching, adding self-generated content, determining data relevancy, and evaluating information reliability **(Van der Vaart & Drossaert, 2019).**

The operational skills indicate the ability to use the computer and Internet browser through using a keyboard, touching the screen, and being able to find one's way around on the Internet. The navigation skills describe the necessary skills to successfully use electronic health information or patient resources, access digital platforms, and evaluate online health information **(Palumbo & Adinolfi, 2022).**

Information searching of DHL involves the ability to search, appraise, and apply online information by formulating a correct search query, choosing reliable search results, and understanding the obtained search results**.** The aspect of adding self-generated content to the Internet specifies the ability to express oneself in written language. The skill of determining data relevancy demonstrates a favorable state in determining the relevance and applicability of information. The aspect of evaluating information reliability shows the ability to think critically about reliability, validity, accuracy, authority, and timeliness of health information **(Agormedah et al., 2022; Aspihan, Pandin, & Kusnanto, 2021; Timotheou et al., 2023).**

The implementation of digital health technologies (DHTs) into healthcare environments depends on the agility of the healthcare workforce to adapt, use, and effectively contribute to the development of these innovations**.** Therefore, it is important that efforts be directed towards raising the understanding of health literacy of healthcare professionals, who in turn have the responsibility of facilitating the development of health literacy among the general population **(Kuek & Hakkennes, 2020; Kemp et al., 2021).**

Significance of the study

All countries have an obligation towards the sustainable development goals of creating environments that promote nursing staff members' attitudes and experiences in accessing, comprehending, appreciating, remembering, and applying information about health using digital communication channels **(WHO, 2022)**. DHL is important for nursing staff to effectively navigate and utilize electronic medical records, participate in online applications, and stay current on research and best practices.

Historically, nursing staff used books and journals for evidence-based research, but now pursuit engines have made easier to access information. There is currently an increasing number of people who have access to health care information online, so nursing staff are obligated to empower patients with knowledge of how to evaluate the quality of that information, but how can this occur if they are not digitally literate or not trained. Therefore, nursing staff must have the ability to access online tools to search for the best evidence-based practices and access the most reliable sources of knowledge.

Aim:

This study aimed to assess the attitudes and experiences of nursing staff towards DHL.

Research Questions:

1. What are the nursing staff's attitudes towards digital health literacy?
2. What are the nursing staff's experience levels regarding digital health literacy practice?
3. What is the relation between nursing staff's experiences and their attitudes regarding digital health literacy?

Subjects and Methods:

Design: A descriptive-correlational research design was used.

Setting: The study was conducted at El-Mahalla El-Kobra General Hospital, which is affiliated with the Ministry of Health and Population in all departments of

general surgery, emergencies, orthopedic, neurological, vascular, medical, genecology, dialysis, neonates, and clinics. Besides, all adult Intensive Care Units (Surgical, Medical, Intermediate, and Cardiac), Pediatric intensive care unit, and Intermediate pediatric care unit were involved.

Subjects: The study subjects contained a stratified proportional randomized sampling of nursing staff (n=260) who are working in the previously mentioned settings. In this study, each department will be considered as a stratum and will be selected based on the proportion of the total number of nursing staff. The total study sample was calculated using the Epi. Info. Microsoft to ensure obtaining an adequate and representative size, where N= population size (800), Z= confidence level at 95% (1.96), d= margin of error proportion (0.05).

Tools of data collection:

The study data was collected using three tools:

Tool (I): Digital Technology Use Questionnaire:

This tool consisted of two parts as follows:

Part 1: Nursing staff's personal and work-related data: This part included nursing staff's age, gender, marital status, educational level, position, years of experience, hospital name, department name, number of patients served per day, shift, and previous training in digital technology.

Part 2: Nursing staff's digital technology use: This part was utilized to assess nursing staff's use of digital technology. It was developed by researchers based on **Williams & Williams, 2023; Almalki & Alzahrani, 2022; and Lai & Lee, 2021.** It included seven closed-ended questions with multiple choices regarding accessing the internet at the workplace, frequency of internet use for health-related purposes, digital devices most used to access the internet, and self-rated personal digital skills. Furthermore, it involved questions related to perceiving the importance of DHL, the usefulness of digital skills to make health decisions, and reasons for using digital skills at the workplace.

Scoring system:

The nursing staff could select just one response for each question; however, in the final question, which asked about the reasons for using digital skills, they may select multiple responses. The sum score was calculated by adding up the scores on each item and determining the number and percent for each question.

Tool (II): Digital Health Literacy Attitudes Questionnaire:

It was developed by the researchers based on **González & Martínez, (2023); Choi & Kim, (2022), and Smith & Williams (2021)**. It consisted of thirteen items to assess the nursing staff's attitudes towards DHL.

Scoring system:

Subjects' responses were rated on a five-point Likert Scale ranging from 1= strongly disagree to 5= strongly agree, but the negative statements were scored inversely. The total score was summed up and categorized according to cut-off points that were used to detect the following:

- Negative attitudes <60% (<39).
- Positive attitudes ≥60% (≥39).

Tool (III): Digital Health Literacy Experiences Questionnaire (DHLEQ):

This tool was developed by the investigator based on **Hoang, Tran, & Nguyen, (2023),** and **Tegegne *et al.* (2023)** to assess the nursing staff's self-perceived abilities with DHL skills. It was utilized to determine how difficult nursing staff perceive certain tasks to be and how often they experience certain problems on the Internet. It contained 31 items divided into six categories about DHL: operational skills (5 items), information searching (3 items), adding self-generated content (6 items), determining relevancy (4 items), evaluating reliability (7 items), and navigation skills (6 items).

Scoring system:

The first five categories were measured by a 4-point Likert Scale with response options ranging from very difficult=1 to very easy=4. While the items related to the category of navigation skills were assessed using a 4-point scale ranging from never=1 to always= 4. A higher score represented a higher level of DHL. The cut-off point was used to determine the criterion for assessing six categories based on the percentage of the total score as follows:

- Very undesirable experiences >21% (>26).
- Undesirable experiences between 21–40% (26-50).
- Average experiences between 41–60% (51-75).
- Desirable experiences between 61–80% (76-99).
- Very desirable experiences between 81–100% (100-124).

Methods:

Tools Validity

The contents of the study instruments were prepared and tested for validity by a jury of five academic staff in nursing administration from Faculty of

Nursing, Tanta University. The face validity value of tool I was 93.33%, for tool II was 96.2%, and for tool III was 99.26%

Pilot study

A pilot study was carried out after the experts' opinions and before starting the actual data collection. It was carried out on a sample 10% of staff nurses (80), who were excluded from the main study sample during the actual collection of data. The aim of pilot study was to test the sequence of items, clarity, applicability, and relevance of the questions. Necessary modifications were made. The time required for filling out the questionnaire sheets was 10-15 minutes for each questionnaire.

Reliability of study tools

The reliability of tools used the Cronbach Alpha Coefficient test. The value of reliability test for tool I was 0.868, for tool (II) was 0.916, and for tool III was 0.919

Ethical considerations:

Approval was obtained from the nursing Scientific Research Ethical Committee before conducting the study with code no 2023/9/297. Nature of the study was not causing any harm or pain to the nursing staff, who were involved in the study. Nursing staff consent to participate in the study will be obtained and will be informed about the right to withdrawal.

Data collection:

The data were collected from nursing staff by the researcher by meeting them in the form of small groups in different areas during working hours to distribute the questionnaire. The questionnaire was completed in the presence of the researcher to ascertain that all questions were answered. The data was collected from the beginning of November 2023 to the end of February 2024.

Statistical analysis

The data was fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp). Qualitative data were described using numbers and percents, in which the Kolmogorov-Smirnov test was used to verify the normality of distribution. While the quantitative data were described using range minimum and maximum, mean, standard deviation. The Chi-square test used categorically the study's variables to compare between different groups and Monte Carlo correction test utilized to correct the chi-square when more than 20% of the cells expected countless than 5. Furthermore, the Pearson coefficient test was used to correlate

between two normally distributed quantitative variables. The significance of the obtained findings was judged at the 5% level.

Results:

Table 1 shows the frequency and distribution of nursing staff's personal data. It was observed that 45.8% of nursing staff were in the age group less than thirty years, with a mean score of 32.48±7.80, and 76.2% of them were females. Furthermore, 70.8% of nursing staff were married and 82.4% had an associate degree in nursing. Moreover, 42.3% of the nursing staff had more than ten years of experience, with a mean score of 10.5±8.12%, 27.3% worked in the emergency department, and 78.8% had an average five to ten patients served per day, with a mean score of 8.26±2.64. On the other hand, 45.8% worked in the morning shift, while 71.2% and 52.7% of them did not receive any previous training in digital technology or use electronic health records in their units, respectively.

Table 2 reveals the frequency and distribution of the nursing staff according to their digital technology use. More than two-thirds (69.6%) of nursing staff accessed the internet at their workplace and 56.5% of them had almost used the internet for health-related purposes every day. Most nursing staff (90.4%) use mobile phones mostly to access the internet, 52.3% of them rated themselves as having good personal digital skills, and 78.8% perceived DHL as very important. Sixty percent (60%) of nursing staff perceived digital skills to make health decisions as very useful and 37.7% of them searched for information on health or illness as a reason for using digital skills at the workplace.

Figure 1 portrays levels of nursing staff's attitudes towards digital health literacy. It was noted that 63.80% of nursing staff had negative attitudes, while 36.20% of them had positive attitudes towards DHL.

Figure 2 illustrates the overall levels of nursing staff's experiences regarding digital health literacy. The figure discloses that 46.2% of nursing staff had an average level of experience in DHL. While 28.8% and 18.5% of them had desirable and undesirable levels of experience in DHL, respectively. The minority (4.2% & 2.3%) of them had very desirable and very undesirable levels of experience in DHL, respectively.

Table 3 illustrates the relation between nursing staff's attitudes toward digital health literacy and their digital technology use. There

was no statistically significant difference between nursing staff's attitudes toward digital health literacy and their digital technology use except for the items of their accessing the internet at the workplace ($\chi2=7.202$ & $p<0.007$), self-related personal skills ($\chi2=11.187$ & $MCp<0.008$), and usefulness of digital skills to make health decisions ($\chi2=17.244$ & $MCp<0.001$).

Table 4 declares the relation between nursing staff's experiences of digital health literacy and their digital technology use. There were statistically significant differences between nursing staff's experiences toward digital health literacy and their digital technology use in relation to the items of their accessing the internet at workplace ($\chi2=14.283$ & $p<0.005$), frequency of internet use for health-related purposes ($\chi2=27.149$ & $p<0.015$), self-rated personal digital skills ($\chi2=19.937$ & $p<0.038$),, and reasons for using digital skills at the workplace ($\chi2=36.422$ & $p<0.005$),.

Figure 3 represents the correlation between the overall score of nursing staff's attitudes and experiences toward digital health literacy. There was a strong positive statistically significant correlation between nursing staff's attitudes and their experiences toward DHL at $r=0.537$ and $p<0.001$.

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Table (1): Frequency and distribution of nursing staff's personal data (n = 260)

Nursing staff's personal data	No.	%
Age:		
<30	119	**45.8**
.30 - <40	87	33.5
40 - <50	45	17.3
≥ 50	9	3.5
. Min. – Max	20.0 – 56.0	
. Mean ± SD	**32.48 ± 7.80**	
Gender:		
Male	62	23.8
Female	198	**76.2**
Marital status:		
Married	184	**70.8**
Not married	76	29.2
Educational level:		
Associate degree of Nursing	214	**82.4**
Bachelor of Sciences in Nursing	14	5.4
Postgraduate studies	32	12.3
Position:		
Head nurse	77	29.6
Staff nurse	183	**70.4**
Years of experience:		
<5	87	33.5
5 – 10	63	24.2
>10	110	**42.3**
. Min. – Max.	0.25 – 35.0	
. Mean ± SD.	**10.05 ± 8.12**	
Department name:		
General Surgery	9	3.5
Emergency	71	27.3
Orthopedic	4	1.5
Neurological	2	.8
Vascular	2	.8
Medical	13	5.0
Obstetrics and Gynecology	17	6.5
Dialysis	20	7.7
Neonates	15	5.8
Outpatient Clinics	22	8.5
Surgical ICU	17	6.5
Medical ICU	21	8.1
Intermediate ICU	8	3.1
Cardiac ICU	11	4.2
Pediatric & Intermediate pediatric ICUs	28	10.8

Continue, Table (1): Frequency and distribution of nursing staff's personal data (n = 260)

Nursing staff's personal data	No.	%
Average number of patients served/day:		
<5	55	21.2
.5 – 10	205	**78.8**
. Min. – Max.	2.0 – 10.0	
. Mean ± SD.	**8.26 ± 2.64**	
Shift:		
Morning	119	**45.8**
Afternoon	74	28.5
Night	67	25.8
Did you have previous training in digital technology?		
Yes	75	28.8
No	185	**71.2**
Did your unit use any EHRs* or electronic system?		
Yes	123	47.3
No	137	**52.7**

SD: Standard deviation

EHRs: Electronic Health Records

Table (2): Frequency and distribution of nursing staff according to their digital technology use (n = 260)

Items nursing staff`s digital Technology Use	No.	%
Are you accessing the internet at workplace?		
Yes.	181	**69.6**
No.	79	30.4
Frequency of internet use for health-related purposes:		
Almost every day.	147	**56.5**
Several days a week.	50	19.2
About one day a week.	18	6.9
Sometimes in a month.	24	9.2
Almost never.	21	8.1
Digital devices mostly used to access the internet are:		
Mobile phone	235	**90.4**
Laptop	5	1.9
Tablet	4	1.5
Personal computer at home	2	.8
Computer at work	12	4.6
Public computer	2	.8
Self-rated personal digital skills:		
Excellent	0	0.0
Good	136	**52.3**
Average	89	34.2
Reasonable	30	11.5
Poor	5	1.9
Perceived importance of digital health literacy:		
Very important	205	**78.8**
Important	41	15.8
Unsure	12	4.6
Not important	2	0.8
Usefulness of digital skills to make health decisions:		
Very useful.	156	**60.0**
Useful	94	36.2
Unsure	9	3.5
Not useful	1	0.4
Reasons for using digital skills at the workplace:		
Search for information on health or illness.	98	**37.7**
Read on a health-related forum or social media website.	54	20.8
Read a health care review.	24	9.2
Use a health-related mobile phone app.	10	3.8
Ask a question of their health care provider.	0	0.0
Monitor disease symptoms.	3	1.2
Share personal medical information with others.	36	13.8
Log on to their own electronic medical record.	23	8.8
Take a Web-based self-management course.	12	4.6
Others.	0	0.0

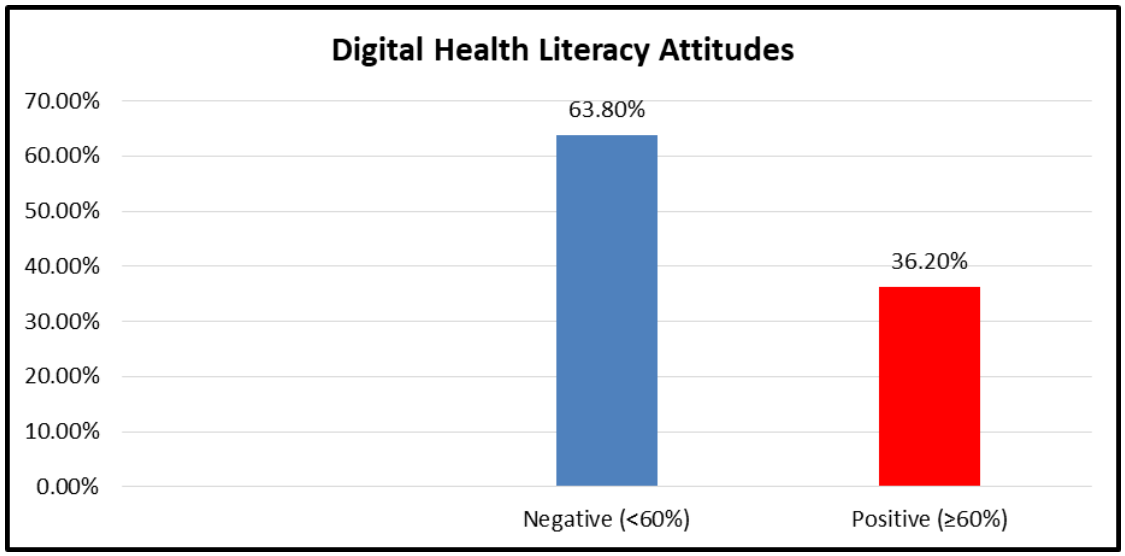

Figure (1): Levels of nursing staff's attitudes towards digital health literacy

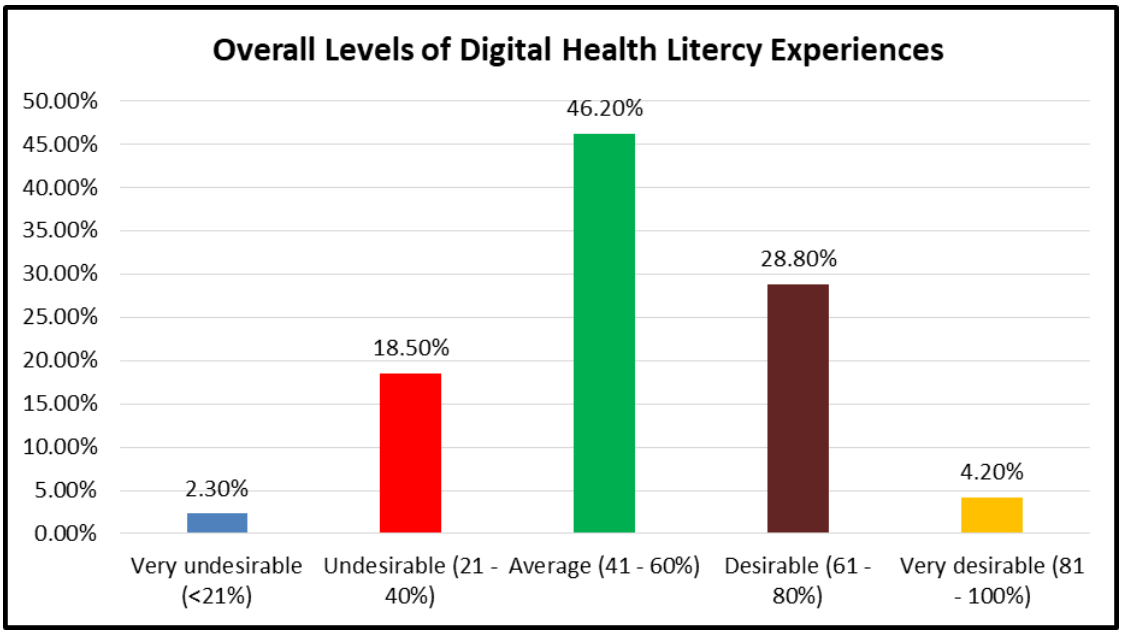

Figure 2: levels of nursing staff's experiences regarding digital health literacy

Table (3): Relation between nursing staff's attitudes toward digital health literacy and their digital technology use (n = 260)

Items nursing staff`s digital technology use	Digital Health Literacy Attitudes				χ^2	p
	Negative (n = 166)		Positive (n = 94)			
	No.	%	No.	%		
Are you accessing the internet at workplace?						
Yes	106	58.6	75	41.4	**7.202***	0.007*
No	60	75.9	19	24.1		
Frequency of internet use for health-related purposes:						
Almost every day	86	58.5	61	41.5		
Several days a week	36	72.0	14	28.0		
About one day a week	11	61.1	7	38.9	5.829	0.212
Sometimes in a month	19	79.2	5	20.8		
Almost never	14	66.7	7	33.3		
Digital devices mostly used to access the internet:						
Mobile phone	153	65.1	82	34.9		
Laptop	3	60.0	2	40.0		
Tablet	2	50.0	2	50.0	2.886	MCp= 0.755
Personal computer at home	1	50.0	1	50.0		
Computer at work	6	50.0	6	50.0		
Public computer	1	50.0	1	50.0		
Self-rated personal digital skills:						
Good	75	55.1	61	44.9		
Average	62	69.7	27	30.3	**11.187***	MCp= 0.008*
Reasonable	25	83.3	5	16.7		
Poor	4	80.0	1	20.0		
Perceived importance of digital health literacy:						
Very important	123	60.0	82	40.0		
Important	32	78.0	9	22.0	6.197	MCp= 0.071
Unsure	9	75.0	3	25.0		
Not important	2	100.0	0	0.0		
Usefulness of digital skills to make health decisions:						
Very useful	84	53.8	72	46.2		
Useful	74	78.7	20	21.3	**17.244***	MCp <0.001*
Unsure	7	77.8	2	22.2		
Not useful	1	100.0	0	0.0		
Reasons for using digital skills at the workplace:						
Search for information on health or illness	70	71.4	28	28.6		
Read on a health-related forum or social media website	31	57.4	23	42.6		
Read a health care review	15	62.5	9	37.5		
Use a health-related mobile phone app	7	70.0	3	30.0	5.935	MCp= 0.547
Monitor disease symptoms	1	33.3	2	66.7		
Share personal medical information with others	22	61.1	14	38.9		
Log on to their own electronic medical record	13	56.5	10	43.5		
Take a Web-based self-management course	7	58.3	5	41.7		

χ^2: Chi square test**, MC:** Monte Carlo**, p:** p value for comparing between the different categories

*: Statistically significant at $p \leq 0.05$

Table (4): Relation between nursing staff's experiences of digital health literacy and their digital technology use (n = 260)

Items nursing staff's digital Technology Use	Digital Health Literacy Experiences										χ^2	MC p
	Very undesirable (n = 6)		Undesirable (n = 48)		Average (n = 120)		Desirable (n = 75)		Very desirable (n = 11)			
	No.	%	No.	%	No.	%	No.	%	No.	%		
Are you accessing the internet at workplace?												
Yes	3	1.7	25	13.8	83	45.9	62	34.3	8	4.4	14.283*	0.005*
No	3	3.8	23	29.1	37	46.8	13	16.5	3	3.8		
Frequency of internet use for health-related purposes:												
Almost every day	4	2.7	23	15.6	62	42.2	51	34.7	7	4.8		
Several days a week	0	0.0	7	14.0	26	52.0	17	34.0	0	0.0		
About one day a week	0	0.0	4	22.2	10	55.6	3	16.7	1	5.6	27.149*	0.015*
Sometimes in a month	1	4.2	7	29.2	13	54.2	3	12.5	0	0.0		
Almost never	1	4.8	7	33.3	9	42.9	1	4.8	3	14.3		
Digital devices mostly used to access the internet:												
Mobile phone	6	2.6	46	19.6	110	46.8	65	27.7	8	3.4		
Laptop	0	0.0	0	0.0	2	40.0	2	40.0	1	20.0		
Tablet	0	0.0	1	25.0	2	50.0	1	25.0	0	0.0		
Personal computer at home	0	0.0	0	0.0	1	50.0	0	0.0	1	50.0	24.592	0.176
Computer at work	0	0.0	1	8.3	4	33.3	7	58.3	0	0.0		
Public computer	0	0.0	0	0.0	1	50.0	0	0.0	1	50.0		
Self-rated personal digital skills:												
Good	3	2.2	19	14.0	58	42.6	49	36.0	7	5.1		
Average	3	3.4	20	22.5	40	44.9	22	24.7	4	4.5	19.937*	0.038*
Reasonable	0	0.0	6	20.0	21	70.0	3	10.0	0	0.0		
Poor	0	0.0	3	60.0	1	20.0	1	20.0	0	0.0		
Perceived importance of digital health literacy:												
Very important	4	2.0	35	17.1	90	43.9	65	31.7	11	5.4		
Important	1	2.4	10	24.4	23	56.1	7	17.1	0	0.0	13.479	0.299
Unsure	1	8.3	2	16.7	6	50.0	3	25.0	0	0.0		
Not important	0	0.0	1	50.0	1	50.0	0	0.0	0	0.0		
Usefulness of digital skills to make health decisions:												
Very useful	3	1.9	25	16.0	67	42.9	51	32.7	10	6.4		
Useful	2	2.1	19	20.2	49	52.1	23	24.5	1	1.1	18.850	0.091
Unsure	1	11.1	3	33.3	4	44.4	1	11.1	0	0.0		
Not useful	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0		
Reasons for using digital skills at the workplace:												
Search for information on health or illness	0	0.0	15	15.3	55	56.1	24	24.5	4	4.1		
Read on a health-related forum or social media	4	7.4	11	20.4	22	40.7	14	25.9	3	5.6		
Read a health care review	0	0.0	4	16.7	10	41.7	9	37.5	1	4.2		
Use a health-related mobile phone app.	0	0.0	2	20.0	6	60.0	1	10.0	1	10.0	36.422	0.005
Monitor disease symptoms	0	0.0	0	0.0	2	66.7	1	33.3	0	0.0	*	*
Share personal medical information with others	0	0.0	7	19.4	15	41.7	12	33.3	2	5.6		
Log on to their own electronic medical record	1	4.3	6	26.1	10	43.5	6	26.1	0	0.0		
Take a Web-based self-management course	1	8.3	3	25.0	0	0.0	8	66.7	0	0.0		

χ^2: **Chi square test** MC: **Monte Carlo**

p: p value for comparing between the different categories
*: Statistically significant at p ≤ 0.05

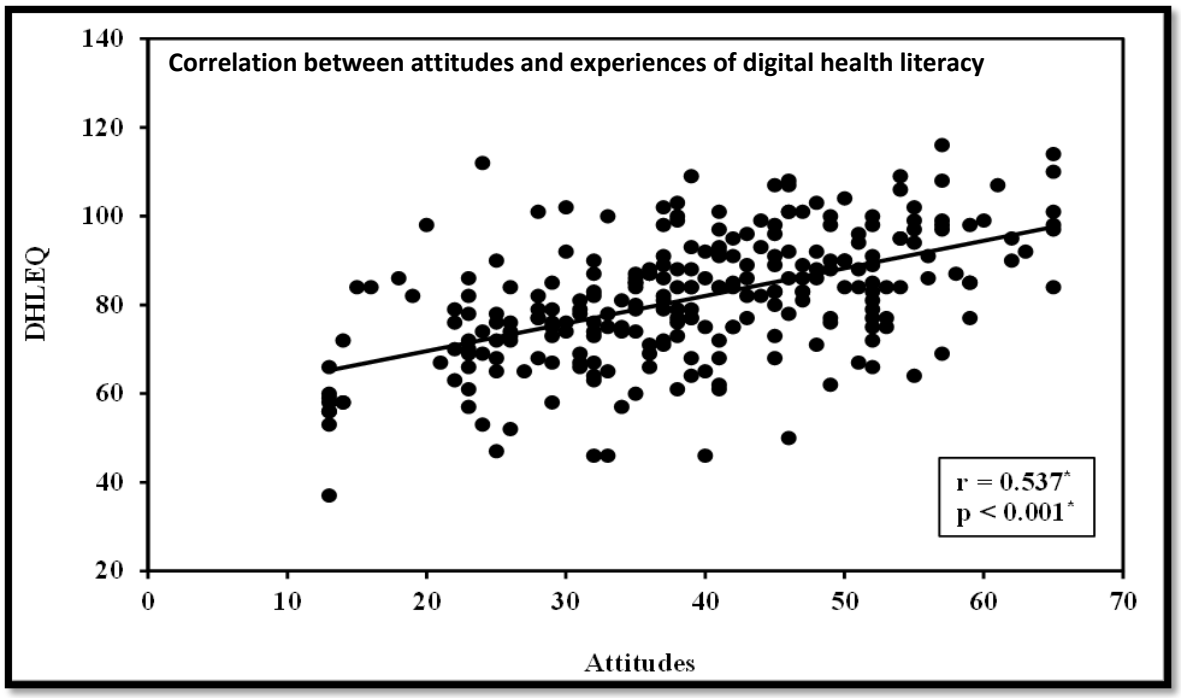

Figure (3): Correlation between overall score of nursing staff's attitudes and experiences toward digital health literacy

Discussion

DHL has been proposed as a means of enabling healthy decisions for protective behavior, preventive measures, and adherence to policies and recommendations, especially in the era of informatics, and consequently, contributing to the sustainability of the healthcare system **(Nes, Finbråten, & Guttersrud, 2020).** It enables nursing staff to effectively utilize electronic health records, participate in online learning, and leverage digital tools for better patient care, communication, and decision-making **(Shudayfat, Hani, & Al Qadire, 2023).** To succeed academically and utilize technology in nursing practices in the future, nursing staff must have adequate DHL **(Mekawy, Ismail, & Zayed, 2020; Alanazi et al. 2024).** Therefore, this study was studied to assess the attitudes and experiences of nursing staff towards DHL.

The current study findings revealed that slightly less than two-thirds of nursing staff had negative attitudes towards DHL, while around one-third of them had positive attitudes towards DHL. This result may be explained by the fact that nursing staff have inadequate training and

lack confidence concerning using technology in their work, in which more than half of them did not receive any previous training in digital technology (DT) or use electronic health records in their units.

The nursing staffs do not have adequate knowledge about information technology and digitalization in nursing, in which most of them have an associate degree in nursing. Moreover, using technology may cause some anxiety and stress for some nurses.

Similarly, **Kuek and Hakkennes, (2020)** reported that healthcare workers held negative attitudes towards DH systems due to feelings of anxiety and lack of confidence in using them. The study of **Salameh, Eddy, Batran, Hijaz, & Jaser, (2019)** showed that nurses had negative attitudes toward the implementation of electronic health records due to concerns over increased workload and fear of being monitored.

Additionally, **Tubaishat, (2017)** informed that Jordanian nurses had generally negative attitudes toward computers in healthcare, particularly among older nurses and those with less computer experience. Moreover, **Ghonem, Ibrahim, and Abd elrahman** indicated that most surveyed nurses exhibited negative attitudes towards nursing informatics, and the overall mean of the informatics competencies among the respondents was inadequate.

On disagreement, **Abou Hashish (2024)** indicated that the participants exhibited good knowledge and positive attitudes toward digital transformation services. They possessed strong digital skills and positive attitude toward artificial intelligence were commendable.

Additionally, the findings of **Tadesse, Alemayehu and Abebe (2022)** reported that a high proportion of nurses with good computer skills and frequent internet use had favorable attitudes and high DHL. Furthermore, a mixed-method study in Nepal by **Regmi and Bhandary (2024)** found that a great percentage of health workers had a high digital health literacy, and a good attitude toward DHL.

The current study findings showed that less than half of the nursing staff had an average level of experience in DHL. Less than one-third of nursing staff had a desirable level of experience in DHL while the minority of them had a very undesirable level of experience in DHL. These results mean that a significant portion of nursing staff may lack the necessary skills to effectively utilize DH tools and information in their jobs. Actually,

various reasons contribute to this situation, including limited access to DT, insufficient training, and a lack of positive attitudes towards DHTs.

On agreement, **Thummaphan and Phuphaibul (2022)** informed that about half of the nursing staff had an average level of DHL. **Elkefi, Arfaoui, Mechergui, & Aslam (2024)** found only a minority of nurse managers to be incompetent. Moreover, the study of **Ahmed et al. (2020)** exhibits that less than half of healthcare providers have an average level of DHL during the COVID-19 pandemic. In the same vein, the findings of **Dumbre, Upendra, Waghmare, Zacharias, & Salve, (2025)** exhibited that more than half of staff nurses who were working in multispecialty hospitals had lower levels of proficiency in high DHL.

The study findings of **Molla and Wondimu (2022),** discovered that a high percentage of health professionals possessed high DHL levels. Furthermore, **Hegney et al. (2019)** observed that most healthcare staff reported high DHL and expressed confidence in using technology that consequently reflects a significant portion of them, including nurses, possess strong digital competencies.

The study findings show statistically significant differences between nursing staff's attitudes towards DHL in terms of accessing the internet at the workplace, self-related personal skills, and the usefulness of digital skills to make health decisions. On the other hand, there were statistically significant differences between nursing staff's experiences towards DHL in terms of accessing the internet at workplace, frequency of internet use for health-related purposes, self-rate personal digital skills, and reasons for using digital skills at the workplace.

This implies that most nursing staff had limited access to the internet in their workplace, maybe due to slow internet speeds or lack of reliable network connections, which can affect their ability to utilize online resources for patient care and consequently lead to negative attitudes. Some nursing staff may not fully recognize the potential of digital tools to enhance their decision-making process.

The findings of the current study are supported by **Caton, Philippou, Baker, & Lee, (2023)** found that institutional factors**,** particularly internet access and infrastructure**,** significantly influenced nurses' ability to apply digital skills in practices. **Macalindin, Ahmed, Granaghan, & Goodfellow, (2023)** emphasized that self-perceived digital competence and the

perceived usefulness of digital tools were strong predictors of engagement and trust in digital environments. However, general use patterns of digital devices and frequency of use were not consistently predictive of DHL levels among nurses.

In contrast, other studies suggest that all dimensions of DT use, including frequency, purposes, and diversity of tools used can significantly predict DHL among nursing staff professionals **(Alwan, Zhou, Wu, & Li, 2020; Zhou, Wu, & Li 2021)**. The findings of **Alwan et al. (2020)** found a significant positive correlation between the breadth of DT use and both attitudes and competency in DHL.

Similarly, **Zhou et al. (2021)** showed that frequent engagement with a wide range of digital platforms, including mobile health apps, hospital intranet, and clinical decision support systems, were associated with higher DHL scores and more positive attitudes toward digital transformation in healthcare. This study challenges the notion that only a few specific variables such as internet access or self-rate skills are important, instead of arguing for a broader influence of general digital habits.

The current study findings illustrated a strong positive statistically significant correlation between nursing staff's attitudes and their experiences of DHL. This entails that negative attitudes of nursing staff or their lack of confidence in DH tools can hinder the development of digital health literacy, leading to a cycle where poor experiences reinforce negative attitudes. Conversely, positive attitudes towards technology can foster a willingness to learn and engage with DH tools.

In agreement, **Ahmadi, Sharifi, & Aslani, (2022)** found that positive attitudes among nurses toward digital tools were significantly correlated with their previous experiences using DHTs, reinforcing the role of familiarity in shaping attitudes. **Positiveni et al. (2024)** confirmed that nurses in managerial roles with postgraduate degrees had higher DHL and more frequent use of digital resources, suggesting that professional experience and positive attitudes are associated with greater DHL.

Moreover, **Kuwahara, Yamamoto, & Suzuki (2023)** highlighted that nurses with higher e-Health literacy were more likely to have experience and confidence in providing health education using online health information, indicating a positive correlation between digital health literacy and practical experience.

On the opposite side, **Kuek and Hakkennes (2020)** reported that despite prior experiences with digital health systems, some nurses maintained negative or neutral attitudes due to perceived workload increases and insufficient training, suggesting experience alone may not determine positive attitudes. Additionally, the Lebanon study **of Nsouli and Vlachopoulos (2021**) instituted that senior nursing faculty members exhibited resistance to adopting information and communication technology (ICT), negatively impacting their attitudes toward DH.

Conclusion

Based on the current study's findings, it concluded that slightly less than two-thirds of nursing staff had negative attitudes towards DHL and less than half of nursing staff had an average level of experience in DHL. However, there was a positive statistically significant correlation between nursing staff's attitudes and their experiences toward DHL.

Recommendations

The findings of the present study recommend the following:

For hospital administration:

- Enhance digital infrastructure by ensuring all departments are equipped with reliable internet, updated hardware, and accessible digital systems
- Implement structured digital training by providing hands-on workshops focusing on electronic health records, telehealth, and mobile health platforms
- Incentivize participation through offering continuous education credits or rewards for nursing staff who excel in digital skill development.
- Employ digital health champions by designating tech-savvy nursing staff as mentors and liaisons with information technology teams to improve confidence & peer support.

For nurse managers:

- Regularly assess nursing staff's digital competencies to tailor support and training programs to actual needs and levels.
- Encourage pairing experienced nurses with less confident ones to provide hands-on support and reduce digital anxiety.
- Gradually introduce digital tools during daily practices to make nursing staff a natural part of workflow, especially in high-pressure units.
- Acknowledge nurses who adopt and champion digital tools effectively within their teams.

For nursing education:

- Embed DHL in nursing curricula of undergrad and postgraduate

programs to improve digital competencies.

- Use simulation-based learning and create clinical scenarios that allow nursing students to practice with electronic health records, telehealth consultations, and decision-support systems in controlled settings.
- Train nursing students on digital health websites and platforms to provide hands-on experiences of nursing staff.

For nursing research:

- Explore facilitator's barriers toward digital health literacy and evaluate the impact of interventions.
- Perform longitudinal studies to assess changes in nursing staff's digital competencies before and after training programs about digital health literacy.
- Conduct further research on outcomes of digital integration on patient safety, nursing documentation accuracy, and workflow efficiency.

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