

Protecting patient privacy in the digital era: A cross-sectional study among nursing students

Patient Privacy in the Digital Era

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ABSTRACT

Introduction: Protecting patient privacy and confidentiality is a fundamental ethical and professional responsibility in healthcare and has become increasingly important in the era of digitalization. This study aimed to examine nursing students' attitudes toward patient privacy protection and to assess differences according to sex, age, and year of study.

Methods: A cross-sectional study was conducted between April and May 2024 among 176 undergraduate and graduate nursing students at the Faculty of Dental Medicine and Health Osijek, Croatia. Data were collected using an anonymous questionnaire developed for this study. Descriptive statistics and nonparametric tests were used for data analysis.

Results: Most participants reported respecting patient privacy (97.2%), rarely or never searching for patient information on social media (88.9%), not taking photographs with patients (88.1%), not posting patient photographs on social media (96.6%),

and frequently or always adhering to ethical principles (98.3%). Female participants demonstrated significantly greater respect for patient privacy ($P = 0.05$), communicated more frequently with patients' family members ($P = 0.04$), and more often closed patients' room doors during nursing care or medical procedures ($P = 0.04$). Male participants reported significantly more frequent unprofessional behaviors, including discussing patients' diagnoses with friends ($P = 0.01$), accessing acquaintances' medical records during breaks ($P = 0.002$), and commenting on patients' appearance with colleagues ($P = 0.02$). Significant differences according to age and year of study were also observed in several privacy-related behaviors, including social media use and professional conduct.

Conclusion: Nursing students demonstrated a high level of awareness regarding patient privacy and ethical responsibility. However, differences according to sex, age, and year of study suggest the need for continued education on professional ethics, digital professionalism, and responsible use of social media throughout nursing education.

INTRODUCTION

The rapid development of digitalization and information technology has introduced new challenges to ensuring data privacy [1]. Data protection regulations apply across all healthcare settings and govern the conduct of healthcare professionals both within and outside the workplace [2]. Violation of the right to privacy and confidentiality is subject to legal sanctions, particularly in healthcare [3]. Discussing patients and their health conditions with healthcare professionals not directly involved in patient care, commenting on patients' personal characteristics, or giving preferential treatment constitute violations of privacy and equality.

Professional experience and nurses' level of education influence communication with patients, respect for patients' rights, and preservation of data confidentiality [4]. Upon admission, patients should be informed about their right to privacy, including how their personal data will be used. Patients also have the right to request that healthcare professionals do not discuss their health condition with family members or friends without their consent [3, 5]. Informing patients before procedures supports decision-making, improves the quality of nursing care, and contributes to better outcomes [6]. During nursing care, nurses should ensure an individualized approach and equal attention to every patient regardless of personal characteristics or medical condition. Respect for ethical standards also includes protecting patient privacy during diagnostic, therapeutic, and nursing procedures [7]. Nurses should ensure patient privacy by using privacy screens, and healthcare professionals not directly involved in patient care should not enter the room during procedures [8].

Internet use poses one of the major challenges in data protection and requires secure data transmission. Data encryption reduces the risk of information leakage [9, 10]. Many healthcare institutions also apply strict access control measures, including password protection and biometric authentication [3]. The use of the internet and smartphones enables searching for patient information on social media, taking and posting photographs with patients, and

communicating with patients, all of which may compromise privacy [1, 8, 10]. Such practices may unintentionally disclose patient information, resulting in legal liability and damage to the reputation of healthcare professionals and healthcare institutions [1, 3]. The widespread use of social media, artificial intelligence, and data linkage presents additional challenges to protecting patient privacy, particularly when publishing health data and conducting research using social media platforms [11, 12].

Despite increasing digitalization, patient privacy remains one of the fundamental ethical principles of nursing practice. International studies indicate that nursing students generally demonstrate a high level of awareness regarding data confidentiality; however, challenges related to digital technologies remain, particularly in relation to information sharing and maintaining professional boundaries on social media platforms [13]. Systematic reviews further highlight the professional and ethical challenges associated with social media use among nursing students, particularly regarding patient privacy and confidentiality [14].

In Croatia, few studies have examined nursing students' attitudes toward patient privacy protection in the era of digitalization. Existing research has mainly focused on preserving patient dignity and privacy or on nursing documentation and professional responsibility [15], without specifically addressing challenges arising from the digital environment. This lack of empirical evidence highlights the need for further research among nursing students in Croatia.

Therefore, this study aimed to examine nursing students' opinions regarding the protection of patient privacy in the era of digitalization and to determine whether opinions differ according to age, sex, and year of study.

METHODS

Study design

A cross-sectional study was conducted between April and May 2024.

Participants

The study included 176 participants. The participants were undergraduate and graduate nursing students from the Faculty of Dental Medicine and Health Osijek.

Instruments

Data were collected using an anonymous questionnaire developed for this study based on previously published literature [16, 17]. The questionnaire consisted of two parts: demographic characteristics and items/questions related to the protection of patient privacy. The first part included seven socio-demographic questions addressing participants' characteristics, year of study, and employment status. The second part included questions related to patient privacy protection. Participants responded to each item/question by selecting one of the provided response options. Responses were scored using a five-point Likert scale (1 – never; 2 – rarely; 3 – sometimes; 4 – often; 5 – always).

Data collection / Procedure

The questionnaires were distributed by the principal investigator or designated contact persons. All participants were informed about the purpose of the study and were assured that participation was completely anonymous and that their identity could not be determined from their responses during data analysis or presentation of results. The questionnaire required approximately 10 minutes to complete. All stages of the study were conducted in accordance with the General Data Protection Regulation (GDPR).

Ethical considerations

The study was conducted in accordance with the ethical principles of scientific research while ensuring anonymity and confidentiality of participant data. Participation in the study was voluntary, and all participants were informed in advance about the aim and purpose of the research. Completion of the questionnaire was considered to constitute informed consent to participate in the study.

Statistical data analysis

Categorical variables were presented as absolute and relative frequencies. Numerical variables were summarized using the mean and standard deviation or the median and interquartile range, as appropriate. Differences between categorical variables were tested using the chi-square test (χ^2 test). The normality of distribution of numerical variables was assessed using the Kolmogorov–Smirnov test. Due to deviations from normal distribution, differences between two independent groups were analyzed using the Mann–Whitney U test. Differences among three or more independent groups were analyzed using the Kruskal–Wallis test. All *P*-values were two-tailed. The level of statistical significance was set at $\alpha = 0.05$.

Statistical analysis was performed using SPSS statistical software (version 22.0, SPSS Inc., Chicago, IL, USA).

RESULTS

A total of 176 participants were included in the study. The mean age of participants was 29.9 years (SD = 8.5), ranging from 19 to 55 years. The average length of work experience was 8.65 years (SD = 8.2), ranging from 1 to 32 years. Most participants (n = 120; 68.2%) reported using social media exclusively for personal purposes (Table 1).

Table 1. Participant characteristics and patterns of social media use

Participant characteristics		n (%)
Sex	Male	43 (24.4)
	Female	133 (75.6)
Age (years)	19 – 24	59 (33.5)
	25 – 29	45 (25.6)
	30 – 34	16 (19.1)
	≥35	56 (31.8)
Year of study	First-year undergraduate	39 (22.2)
	Second-year undergraduate	38 (21.6)
	Third-year undergraduate	37 (21.0)
	First-year graduate	30 (17.0)
	Second-year graduate	32 (18.2)
Place of residence	Urban	82 (46.6)
	Rural	94 (53.4)
Are you employed as a nurse/ technician?	Yes	150 (85.2)
	No	26 (14.8)
Years of work experience (Employed participants)	Not employed	26 (14.8)
	1–5	57 (32.4)
	6–10	33 (18.8)
	11–15	17 (9.7)
	≥16	43 (24.4)
Type of secondary school completed	Medical school	145 (82.4)
	General grammar school	18 (10.2)
How often do you check your social media accounts?	Once a week or less	40 (22.7)
	Several times a week	21 (11.9)
	Once daily	31 (17.6)
	2–5 times daily	47 (26.7)
	≥6 times daily	37 (21.0)
Usual purpose of social media use	Exclusively personal	120 (68.2)
	Mostly personal, less professional	40 (22.7)
	Equally personal and professional	13 (7.4)
	Mostly professional, less personal	2 (1.1)
	Exclusively professional	1 (0.6)
Social media profile includes	Facebook	43 (24.4)
	Facebook and Instagram	44 (25.0)
	YouTube	3 (1.7)
	Instagram	17 (9.7)
	TikTok	2 (1.1)
	Combination of multiple platforms	67 (38.1)
Total		176 (100)

Nursing students' opinions on maintaining patient privacy are presented in Table 2.

Table 2. Opinions of nursing students on maintaining patient privacy

Question	Number (%) of respondents				
	1	2	3	4	5
How often did you give more attention to younger patients than to older patients?	65 (36.9)	47 (26.7)	41 (23.3)	17 (9.7)	6 (3.4)
How often did you respect patient privacy?	1 (0.6)	2 (1.1)	2 (1.1)	44 (25.0)	127 (72.2)
How often did you respect the privacy of patients with disabilities?	0 (0.0)	1 (0.6)	4 (2.3)	52 (29.5)	119 (67.6)
How often did you have contact with patients' family members?	20 (11.4)	23 (13.1)	45 (25.6)	68 (38.6)	20 (11.4)
How often did you search for information about a patient on social media?	110 (62.5)	43 (24.4)	22 (12.5)	1 (0.6)	0 (0.0)
How often did you take a photograph with a patient during hospitalization?	155 (88.1)	16 (9.1)	5 (2.8)	0 (0.0)	0 (0.0)
How often did you post photographs of patients on social media?	170 (96.6)	4 (2.3)	1 (0.6)	0 (0.0)	1 (0.6)
How often did you use a privacy screen to protect an immobile patient's privacy during nursing care?	8 (4.5)	34 (19.3)	37 (21.0)	39 (22.2)	58 (33.0)
How often did you use a privacy screen during medical procedures on an unconscious patient?	13 (7.4)	24 (13.6)	35 (19.9)	54 (30.7)	50 (28.4)
How often did you close the patient's room door during nursing care or medical procedures?	2 (1.1)	9 (5.1)	24 (13.6)	47 (26.7)	94 (53.4)
During diagnostic and therapeutic procedures, how often did other staff enter the patient's room?	10 (5.7)	47 (26.7)	83 (47.2)	28 (15.9)	8 (4.5)
How often did you inform patients before diagnostic or therapeutic procedures?	3 (1.7)	4 (2.3)	12 (6.8)	51 (29.0)	106 (60.3)
How often did you use social media to communicate with patients?	153 (86.9)	15 (8.5)	6 (3.4)	2 (1.1)	0 (0.0)
How often did you search an acquaintance's medical records/documentation during a break?	90 (51.1)	59 (33.5)	24 (13.6)	2 (1.1)	1 (0.6)
How often did you behave unprofessionally toward patients of a different religion?	156 (88.6)	5 (2.8)	3 (1.7)	1 (0.6)	11 (6.3)
How often did you discuss patients and their diagnoses privately with friends?	65 (36.9)	66 (37.5)	37 (21.0)	7 (4.0)	1 (0.6)
How often did you comment on a patient's appearance with colleagues?	75 (42.6)	65 (36.9)	31 (17.6)	5 (2.8)	0 (0.0)
How often were better-dressed patients given priority during diagnostic or therapeutic procedures?	151 (85.8)	20 (11.4)	4 (2.3)	1 (0.6)	0 (0.0)
How often did ethical principles guide your professional practice?	0 (0.0)	0 (0.0)	3 (1.7)	47 (26.7)	126 (71.6)

Note. 1- never; 2- rarely; 3- sometimes; 4- often; 5- always

Statistically significant sex differences were observed. Women reported significantly more frequent adherence to patient privacy ($P = 0.05$), contact with

patients' family members ($P = 0.04$), closing the room door during nursing care or medical procedures ($P = 0.04$), and informing patients before performing

diagnostic and therapeutic procedures ($P = 0.008$). In contrast, men reported significantly more frequent unprofessional behaviors, including discussing patients and their diagnoses privately among friends ($P = 0.01$), searching acquaintances' records during

breaks ($P = 0.002$), commenting on patients' appearance in front of colleagues ($P = 0.02$), and giving priority to better-dressed patients during diagnostic and therapeutic procedures ($P = 0.01$) (Table 3).

Table 3. Nursing students' opinions on maintaining patient privacy according to sex

Question	Median (IQR)		P-value*
	Male	Female	
How often did you give more attention to younger patients than to older patients?	2 (1 – 2)	2 (1 – 3)	0.08
How often did you respect patient privacy?	5 (4 – 5)	5 (5 – 5)	0.05
How often did you respect the privacy of patients with disabilities?	5 (4 – 5)	5 (4 – 5)	0.72
How often did you have contact with patients' family members?	3 (2 – 4)	4 (3 – 4)	0.04
How often did you search for information about a patient on social media?	1 (1 – 2)	1 (1 – 2)	0.20
How often did you take a photograph with a patient during hospitalization?	1 (1 – 1)	1 (1 – 1)	0.14
How often did you post photographs of patients on social media?	1 (1 – 1)	1 (1 – 1)	0.15
How often did you use a privacy screen to protect an immobile patient's privacy during nursing care?	4 (2 – 5)	4 (3 – 5)	0.64
How often did you use a privacy screen during medical procedures on an unconscious patient?	4 (3 – 4)	4 (3 – 5)	0.51
How often did you close the patient's room door during nursing care or medical procedures?	4 (3 – 5)	5 (4 – 5)	0.04
During diagnostic and therapeutic procedures, how often did other staff enter the patient's room?	3 (2 – 3)	3 (2 – 3)	0.90
How often did you inform patients before diagnostic or therapeutic procedures?	4 (4 – 5)	5 (4 – 5)	0.008
How often did you use social media to communicate with patients?	1 (1 – 1)	1 (1 – 1)	0.91
How often did you search an acquaintance's medical records/documentation during a break?	2 (1 – 3)	1 (1 – 2)	0.002
How often did you behave unprofessionally toward patients of a different religion?	1 (1 – 1)	1 (1 – 1)	0.27
How often did you discuss patients and their diagnoses privately with friends?	2 (1 – 3)	2 (1 – 2)	0.01
How often did you comment on a patient's appearance with colleagues?	2 (1 – 3)	2 (1 – 2)	0.02
How often were better-dressed patients given priority during diagnostic or therapeutic procedures?	1 (1 – 2)	1 (1 – 1)	0.01
How often did ethical principles guide your professional practice?	5 (4 – 5)	5 (4 – 5)	0.28

Note. *Mann-Whitney U test; 1- never; 2- rarely; 3- sometimes; 4- often; 5- always

Statistically significant age-related differences were observed. Older respondents more often reported giving greater attention to younger patients ($P = 0.002$), whereas respondents aged 19–24 more often reported respecting the privacy of disabled pa-

tients ($P = 0.03$). Respondents aged 30–34 also more frequently reported having contact with patients' family members ($P = 0.01$), while respondents aged ≥ 30 more often reported commenting on patients' appearance ($P = 0.05$) (Table 4).

Table 4. Nursing students' opinions on maintaining patient privacy in relation to age

Question	Median (interquartile range)				P-value*
	19 – 24	25 – 29	30 – 34	≥ 35	
How often did you give more attention to younger patients than to older patients?	2 (1 – 3)	2 (1 – 3)	1.5 (1 – 2.75)	2.5 (2 – 3.75)	0.002
How often did you respect patient privacy?	5 (5 – 5)	5 (5 – 5)	5 (4 – 5)	5 (4 – 5)	0.19
How often did you respect the privacy of patients with disabilities?	5 (5 – 5)	5 (4 – 5)	5 (4.25 – 5)	5 (4 – 5)	0.03
How often did you have contact with patients' family members?	3 (2 – 4)	3 (2 – 4)	4 (3.25 – 4)	4 (3 – 4)	0.01
How often did you search for information about a patient on social media?	1 (1 – 2)	1 (1 – 2)	1 (1 – 2)	1 (1 – 2)	0.86
How often did you take a photograph with a patient during hospitalization?	1 (1 – 1)	1 (1 – 1)	1 (1 – 1.75)	1 (1 – 1)	0.15
How often did you post photographs of patients on social media?	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	0.28
How often did you use a privacy screen to protect an immobile patient's privacy during nursing care?	4 (3 – 5)	4 (3 – 5)	3 (2 – 4)	4 (3 – 5)	0.71
How often did you use a privacy screen during medical procedures on an unconscious patient?	4 (3 – 5)	4 (3 – 5)	4 (2 – 4)	4 (2.25 – 4)	0.22
How often did you close the patient's room door during nursing care or medical procedures?	5 (4 – 5)	4 (4 – 5)	5 (3.25 – 5)	4 (3.25 – 5)	0.16
During diagnostic and therapeutic procedures, how often did other staff enter the patient's room?	3 (2 – 3)	3 (2.5 – 3)	3 (2.25 – 3)	3 (2 – 3)	0.81
How often did you inform patients before diagnostic or therapeutic procedures?	5 (4 – 5)	4 (4 – 5)	4 (4 – 5)	5 (4 – 5)	0.08
How often did you use social media to communicate with patients?	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	0.84
How often did you search an acquaintance's medical records/documentation during a break?	1 (1 – 2)	2 (1 – 2)	1.5 (1 – 2)	1 (1 – 2)	0.38
How often did you behave unprofessionally toward patients of a different religion?	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	0.49
How often did you discuss patients and their diagnoses privately with friends?	2 (1 – 2)	2 (1 – 2.5)	2 (1 – 2.75)	2 (1 – 3)	0.94
How often did you comment on a patient's appearance with colleagues?	1 (1 – 2)	2 (1 – 2)	2 (1 – 3)	2 (1 – 3)	0.05
How often were better-dressed patients given priority during diagnostic or therapeutic procedures?	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	0.10
How often did ethical principles guide your professional practice?	5 (4 – 5)	5 (4.5 – 5)	5 (4 – 5)	5 (4 – 5)	0.64

Note. Kruskal–Wallis test. 1 = never; 2 = rarely; 3 = sometimes; 4 = often; 5 = always.

Statistically significant differences according to the year of study were observed in contact with patients' family members ($P < 0.001$), searching for patient information on social media ($P = 0.006$), taking photographs with patients ($P = 0.009$), posting patients' photographs on social media ($P = 0.001$), informing

patients before diagnostic and therapeutic procedures ($P = 0.001$), commenting on patients' appearance ($P < 0.001$), and giving priority to better-dressed patients during diagnostic and therapeutic procedures ($P < 0.001$) (Table 5).

Table 5. Nursing students' opinions on maintaining patient privacy according to year of study

Question	Median (interquartile range)					P-value*
	1st year undergraduate	2nd year undergraduate	3rd year undergraduate	1st year graduate	2nd year graduate	
How often did you give more attention to younger patients than to older patients?	1 (1 – 1)	2 (1 – 3)	2 (1 – 3.5)	3 (2 – 4)	2 (1.25 – 3)	< 0.001
How often did you respect patient privacy?	5 (4 – 5)	5 (4 – 5)	5 (4 – 5)	5 (4 – 5)	5 (4 – 5)	0.99
How often did you respect the privacy of patients with disabilities?	5 (5 – 5)	5 (4 – 5)	5 (5 – 5)	4 (4 – 5)	5 (4 – 5)	< 0.001
How often did you have contact with patients' family members?	2 (1 – 3)	4 (3 – 4.25)	4 (3 – 4)	4 (3 – 4)	4 (3.25 – 4)	< 0.001
How often did you search for information about a patient on social media?	1 (1 – 1)	1 (1 – 2)	1 (1 – 2)	1 (1 – 2)	2 (1 – 2.75)	0.006
How often did you take a photograph with a patient during hospitalization?	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	1 (1 – 2)	0.009
How often did you post photographs of patients on social media?	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	0.001
How often did you use a privacy screen to protect an immobile patient's privacy during nursing care?	4 (2 – 5)	4 (2.75 – 4)	5 (3 – 5)	3.5 (3 – 5)	3.5 (2 – 4)	0.14
How often did you use a privacy screen during medical procedures on an unconscious patient?	4 (3 – 5)	4 (2.75 – 5)	4 (3 – 5)	4 (2 – 4.25)	4 (2 – 4)	0.18
How often did you close the patient's room door during nursing care or medical procedures?	4 (4 – 5)	5 (4 – 5)	5 (4 – 5)	4 (3.75 – 5)	4 (3 – 5)	0.08
During diagnostic and therapeutic procedures, how often did other staff enter the patient's room?	3 (2 – 4)	2 (2 – 3)	3 (2 – 3)	3 (2 – 3)	3 (3 – 3)	0.09
How often did you inform patients before diagnostic or therapeutic procedures?	4 (4 – 5)	5 (5 – 5)	5 (4 – 5)	4 (4 – 5)	5 (4 – 5)	0.001

Question	Median (interquartile range)					P-value*
	1st year undergraduate	2nd year undergraduate	3rd year undergraduate	1st year graduate	2nd year graduate	
How often did you use social media to communicate with patients?	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	0.19
How often did you search an acquaintance's medical records/documentation during a break?	2 (1 – 2)	1 (1 – 2)	1 (1 – 2)	2 (1 – 2)	2 (1 – 2)	0.49
How often did you behave unprofessionally toward patients of a different religion?	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	0.32
How often did you discuss patients and their diagnoses privately with friends?	2 (2 – 3)	2 (1 – 3)	2 (1 – 3)	1.5 (1 – 2)	2 (1 – 2)	0.32
How often did you comment on a patient's appearance with colleagues?	1 (1 – 2)	2 (1 – 2)	1 (1 – 2)	2 (1 – 3)	2 (2 – 3)	< 0.001
How often were better-dressed patients given priority during diagnostic or therapeutic procedures?	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	1 (1 – 1.25)	1 (1 – 2)	< 0.001
How often did ethical principles guide your professional practice?	5 (5 – 5)	5 (4 – 5)	5 (4.5 – 5)	5 (4 – 5)	5 (4 – 5)	0.25

Note. Kruskal–Wallis test. 1 = never; 2 = rarely; 3 = sometimes; 4 = often; 5 = always.

DISCUSSION

The results of this study indicate that the majority of participants respect patient privacy, rarely or never search for patient information on social media, and frequently or always adhere to ethical principles. Additionally, approximately half of the students reported checking their social media accounts several times daily. A study conducted in China demonstrated an association between social media use and behaviors related to patient privacy protection among nursing students [13]. A systematic review identified risks such as inappropriate content sharing, breaches of confidentiality, and the blurring of boundaries between personal and professional identity, which may lead to potential violations of patient privacy [14]. As future healthcare professionals, nursing students gain access to patient information during clinical training and process such information as part of their educational activities. Clinical practice represents a critical period in which students develop professional identity and moral values that shape their future careers [18].

The results of this study also showed that female participants demonstrated higher levels of respect for patient privacy, particularly during nursing care and medical procedures, emphasizing the importance of closing patients' room doors and using privacy screens. A study conducted in Australia reported that nursing students identified closing doors and using privacy screens as essential measures for preserving patient privacy and dignity [19]. Furthermore, the importance of adequate patient covering during nursing care has also been emphasized in previous studies [18, 20]. However, several factors may hinder consistent protection of patient privacy in clinical practice, including shared hospital rooms, increased workload, insufficient staffing levels, and limited time availability [21]. Multi-bed hospital rooms may allow other patients and healthcare professionals to overhear confidential conversations, which represents a challenge in protecting patient information [22].

In this study, female participants also communicated more frequently with patients and their family members and informed patients about planned procedures, contributing to the preservation of patient dignity and a sense of security. Kim et al. highlighted the importance of protecting confidential information, particularly in the context of verbal communication [23]. Despite technological advances, Rony et al. emphasized the importance of feedback and ensuring that technology complements rather than replaces a patient-centered approach to care [24].

Participants in this study agreed that age, physical appearance, socioeconomic status, and religious affiliation of patients did not influence their behavior with respect to patient privacy. Similarly, the results of a study by Sepehrirad et al. showed that nursing students with higher levels of moral sensitivity demonstrated greater respect for patient privacy [25]. Unlike the findings of this study, where sex was identified as a statistically significant variable, several other studies reported no association between sex and attitudes toward patient privacy protection [26, 27].

Regarding disclosure of patient information outside the hospital environment, male participants reported slightly more frequent sharing of information in informal settings, such as among friends, and reviewing acquaintances' medical records during breaks compared to female participants. These findings contrast with results reported in a study conducted in Ethiopia [28].

Most students in this study reported never searching for patient information on social media, taking photographs with patients, or posting patient photographs online, which is consistent with findings from previous studies [29, 30]. However, international studies also indicate that some nursing students share patient photographs on social media platforms [14, 31]. Wang et al. reported that nursing students frequently exchange patient-related information via social media, while 63.5% of students stated that they had occasionally shared identifiable patient information online [32]. In South Africa, nursing students demonstrated low levels of responsibility when using social media by recording and publishing photographs, audio, and video materials without anonymizing patient identity, directly violating patient privacy and confidentiality [33]. An interna-

tional survey conducted among health sciences students from eight universities in six countries (China, Canada, the United Kingdom, Australia, Mexico, and Ireland) showed that a considerable proportion of students (20.5%) reported that sharing photographs from clinical practice on social media was inappropriate [34].

A study conducted among Polish nursing students indicated that more than half of participants searched for patient information several times per year, mostly via Facebook, motivated by curiosity and the desire to better understand patients [35]. Increased risk of privacy violations among students who frequently use and update social media accounts may be explained by lower awareness of potential consequences and a greater need for social approval. At the same time, nursing students frequently use social media for academic purposes. O'Connor et al. reported that approximately half of students demonstrated an understanding of digital professionalism and expressed generally positive attitudes toward responsible use of social media, particularly for educational and professional purposes [36]. A high level of professionalism and ethical awareness is essential for personal and professional development as well as for the protection and advancement of the nursing profession. The findings of this study, which indicate a high level of responsibility and awareness regarding patient privacy protection, may reflect the effectiveness of educational programs that continuously emphasize confidentiality, professional responsibility, and respect for patients' rights as fundamental components of quality healthcare.

With regard to the year of study, first-year undergraduate students reported never commenting on patients' appearance, searching for patient information on social media, taking photographs with patients, or posting patient photographs online. Unlike the findings of this study, previous research has shown that senior students demonstrate greater responsibility in protecting patient privacy and using social media appropriately [37, 38]. These findings also differ from those reported by Abuhammad et al., who emphasized that increased knowledge among nurses significantly improves confidentiality-related behaviors [39]. Nursing education plays a key role in developing and maintaining professional values, with students highly valuing human dignity

and justice as core principles of their future professional practice [40]. Research conducted in China indicated that graduate nursing students demonstrated better patient privacy protection behaviors, which was explained by higher levels of moral sensitivity, empathy, and cognitive awareness regarding privacy protection [41].

In this study, second-year graduate students more frequently communicated with patients' family members and consistently informed patients before diagnostic and therapeutic procedures. Previous studies suggest that students with greater clinical experience demonstrate higher levels of awareness and more responsible behavior regarding patient privacy protection. Although differences are not observed across all aspects of behavior, clinical experience plays a crucial role in developing professional engagement and communication with patients' families [22, 42, 43]. Moore et al. reported that nursing students' attitudes toward patient privacy vary according to the year of study, with more mature attitudes observed at higher levels of education, suggesting gradual development of understanding through academic and clinical experience [44]. Even isolated unethical attitudes may significantly influence overall findings, further emphasizing the importance of continuous education in professional ethics and privacy protection.

Limitations and directions for future research

This study has several limitations. The sample included a higher proportion of female participants, which may affect the representativeness of the results. Additionally, the study was conducted at a single higher education institution, limiting the generalizability of the findings to the broader population of nursing students. The use of a self-reported questionnaire may also have resulted in socially desirable responses, potentially affecting the accuracy of reported attitudes regarding patient privacy protection.

Future research should include larger and more diverse samples from multiple higher education institutions. Longitudinal studies could provide insight into the development of nursing students' attitudes toward patient privacy throughout their education

and early professional careers. Furthermore, qualitative research could offer deeper insight into students' perceptions, experiences, and challenges related to protecting patient privacy in contemporary healthcare environments.

Implications for clinical practice and education

The results of this study highlight the importance of continuous development of nursing students' awareness regarding respect for patient privacy, particularly in the context of increasing digitalization. In clinical practice, nurses play a key role in protecting the confidentiality and security of patient health data; therefore, it is essential to ensure that students acquire adequate knowledge and competencies related to ethical and legal aspects of privacy protection during their education.

The findings also emphasize the need for additional educational content addressing the appropriate use of electronic health records and protection of personal health data. Integrating topics related to digital security, professional ethics, and patient privacy protection into nursing curricula may contribute to strengthening professional responsibility among future healthcare professionals. In addition to formal education, continuous professional development through workshops, seminars, and professional training is essential to ensure consistent protection of patient privacy in everyday clinical practice.

CONCLUSION

The results of this study indicate a high level of awareness among nursing students regarding the importance of protecting patient privacy and confidentiality in the context of increasing digitalization. Most participants demonstrated professionally and ethically responsible behavior, particularly in the area of data protection and social media use. Despite generally positive attitudes, statistically significant differences were identified in certain aspects of behavior according to sex, age, and year of study, indicating variations in professional awareness and

ethical reasoning. These findings highlight the importance of continuous education of nursing students regarding ethical principles, professional standards, and responsible use of digital technologies in healthcare. Systematic integration of topics related to privacy protection and digital ethics into educational programs may further strengthen professional identity and reduce potentially inappropriate behaviors in clinical practice.

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Declaration of Conflicting Interest

The authors declare no conflict of interest.

REFERENCES

1. Minen MT, Steglitz EJ, Sciortino R, Tourus J. Privacy issues in smartphone applications: An analysis of headache/migraine applications. *Headache*. 2018;58(7):1014-27. <https://doi.org/10.1111/head.13341>.
2. Klann Conduah AK, Ofoe S, Siaw-Marfo D. Data privacy in healthcare: Global challenges and solutions. *Digit Health*. 2025;11:20552076251343959. <https://doi.org/10.1177/20552076251343959>.
3. Shelat VG. Respecting privacy and upholding confidentiality: core ethical duties. *Singapore Med J*. 2025;66(12):685-9. <https://doi.org/10.4103/singaporemedj.SMJ-2025-147>.
4. Vujanić J, Prlić N, Lovrić R. Nurses's self-assessment of caring behaviors in nurse-patient interactions: A cross-sectional study. *Int J Environ Res Public Health*. 2020;17(14):5255. <https://doi.org/10.3390/ijerph17145255>.
5. Cohen IG, Mello MM. HIPAA and protecting health information in the 21st century. *JAMA*. 2018;320(3):231-2. <https://doi.org/10.1001/jama.2018.5630>.
6. Ibrahim AM, Abdel-Aziz HR, Mohamed HAH, Zaghamir DEF, Wahba NMI, Hassan GA, Shaban M, El-Nablaway M, Aldughmi ON, Aboelola TH. Balancing confidentiality and care coordination: challenges in patient privacy. *BMC Nurs*. 2024;23(1):564. <https://doi.org/10.1186/s12912-024-02231-1>.
7. Lin YP, Tsai YF. Maintaining patients' dignity during clinical care: a qualitative interview study. *J Adv Nurs*. 2011;67(2):340-8. <https://doi.org/10.1111/j.1365-2648.2010.05498.x>.
8. Xiang D, Cai W. Privacy protection and secondary use of health data: Strategies and methods. *Biomed Res Int*. 2021;2021:6967166. <https://doi.org/10.1155/2021/6967166>.
9. Wiles LL, Park EHE, Kim JJ. To Tell or Not to Tell: Nursing students' attitudes toward disclosing patients' protected health information. *Comput Inform Nurs*. 2018;36(3):115-7. <https://doi.org/10.1097/CIN.0000000000000428>.
10. Zargarán A, Ash J, Kerry G, Rasasingam D, Gokani S, Mittal A, Zargarán D. Ethics of smartphone usage for medical image sharing. *Indian J Surg*. 2018;80(3):300-1. <https://doi.org/10.1007/s12262-017-1710-3>.
11. Su J, Cao Y, Chen Y, Liu Y, Song J. Privacy protection of medical data in social network. *BMC Med Inform Decis Mak*. 2021;21(Suppl 1):286. doi: 10.1186/s12911-021-01645-0.
12. Ji Z, Zhao W, Lin H, Zhou X. Systematically understanding the immunity leading to CRPC progression. *PLoS Comput Biol*. 2019;15(9):e1007344. <https://doi.org/10.1371/journal.pcbi.1007344>.
13. Ns Chan D, Choi KC, Hy To M, Kn Ha S, Cc Ling G. Patient privacy protection among university nursing students: A cross-sectional study. *Nurs Ethics*. 2022;29(5):1280-92. <https://doi.org/10.1177/09697330221085777>.
14. Kohanová D, Sollárová A, Čakloš M, Zrubcová D, Kolarczyk E. Social media behaviour and patterns of use among nursing students: A systematized review. *Nurse Educ Pract*. 2025;83:104277. <https://doi.org/10.1016/j.nepr.2025.104277>.
15. Viskić J, Jokić D, Marelić M, Machala Poplašen L, Relić D, Sedak K, Vukušić Rukavina T. Social media use habits, and attitudes toward e-professionalism among medicine and dental medicine students: a quantitative cross-sectional study. *Croat Med J*. 2021;62(6):569-79. <https://doi.org/10.3325/cmj.2021.62.569>.

16. Farsi S, Sabbahi A, Sait D, Kabli R, Abduljabar G. Ethical use of social media and sharing of patient information by medical students at a university hospital in Saudi Arabia: Cross-sectional survey. *JMIR Med Educ*. 2025;11:e57812. <https://doi.org/10.2196/57812>.
17. Belani H. Understanding Privacy Basics in Healthcare. *Bilten Hrvatskog društva za medicinsku informatiku* (Online). 2022;28(2):4-14. <https://hrcak.srce.hr/285167>.
18. Hill B, Machin A, Derbyshire J, Wade J. Supporting the development of professional identity in nursing students. *Nurs Stand*. 2026;41(1):53-60. <https://doi.org/10.7748/ns.2025.e12605>.
19. Yilmaz SA, Celik SS. "Patient Privacy: A Qualitative study on the views and experiences of nurses and patients". *Austral J Adv Nurs* 2022;39(2). <https://doi.org/10.37464/2020.392.447>.
20. Adib-Hajbaghery M, Aghajani M. Patients dignity in nursing. *Nurs midwifery stud*. 2015;4(1):e22809. <https://doi.org/10.17795/nmsjournal22809>.
21. Akyuz E, Erdemir F. Surgical patients' and nurses' opinions and expectations about privacy in care. *Nurs Ethics*. 2013;20(6):660-71. <https://doi.org/10.1177/0969733012468931>.
22. Park YA, Kong EH. Nursing students' experiences of patient information protection during clinical practice: a qualitative study. *BMC Med Ethics*. 2026;27(1):13. <https://doi.org/10.1186/s12910-025-01366-3>.
23. Kim K, Han Y, Kim JS. Nurses' and patients' perceptions of privacy protection behaviours and information provision. *Nurs Ethics*. 2017;24(5):598-611. <https://doi.org/10.1177/0969733015622059>.
24. Rony, M.K.K., I.Kayesh, S.D.Bala, F.Akter, and M.R.Parvin. Artificial intelligence in future nursing care: Exploring perspectives of nursing professionals- A descriptive qualitative study. *Heliyon*. 2024;10(4):e25718. <https://doi.org/10.1002/hsr2.70006>.
25. Sepehrirad E, Heidarzadeh M, Asl ZE, Abbasian Z, Ashtari S. The relationship between moral sensitivity, ethical climate, and job strain with patient privacy from viewpoint of operating room staffs. *Iran J Nurs Midwifery Res*. 2021;26(2):183-7. https://doi.org/10.4103/ijnmr.IJNMR_22_20.
26. Derya İster, Emine. Attitudes of nursing students towards registration and protection of personal health data and related factors. *Turk J Bioeth*. 2022;9:95-104. <https://doi.org/10.5505/tjob.2022.37232>.
27. Atalıkogu Baskan S, Karakurt P, i Kasımoğlu N. Assessment of nursing student's attitudes towards recording and protecting patient's personal health data; A descriptive study. *Galic Med J*. 2021;28(3):E202133. <https://doi.org/10.21802/gmj.2021.3.3>.
28. Tegegne MD, Melaku MS, Shimie AW, Hunegnaw DD, Legese MG, Ejigu TA, Mengestie ND, Zemene W, Zeleke T, Chanie AF. Health professionals' knowledge and attitude towards patient confidentiality and associated factors in a resource-limited setting: a cross-sectional study. *BMC Med Ethics*. 2022;23(1):26. <https://doi.org/10.1186/s12910-022-00765-0>.
29. Sadd R. Student nurse attitudes and behaviours when using social network sites. *Stud Health Technol Inform*. 2019;264:1342-6 <https://doi.org/10.3233/SHTI190445>.
30. Duke VJA, Anstey A, Carter S, Gosse N, Hutchens KM, Marsh JA. Social media in nurse education: Utilization and e-professionalism. *Nurse Educ Today*. 2017;57:8-13. <https://doi.org/10.1016/j.nedt.2017.06.009>.
31. Barlow CJ, Morrison S, Stephens HON, Jenkins E, Bailey MJ, Pilcher D. Unprofessional behaviour on social media by medical students. *Med J Aust*. 2015;203(11):439. <https://doi.org/10.5694/mja15.00272>.
32. Wang Z, Wang S, Zhang Y, Jiang X. Social media usage and online professionalism among registered nurses: a cross-sectional survey. *Int J Nurs Stud*. 2019;98:19-26. <https://doi.org/10.1016/j.ijnurstu.2019.06.001>.
33. Nyangeni T, du Rand S, van Rooyen D. Perceptions of nursing students regarding responsible use of social media in the Eastern Cape. *Curations*. 2015;38(1):1496. <https://doi.org/10.4102/curationis.v38i2.1496>.
34. O'Sullivan E, Cutts E, Kavikondala S, Salcedo A, D'Souza K, Hernandez-Torre M, i sur. Social media in health science education: an international survey. *JMIR Med Educ*. 2017;3(1):e1. <https://doi.org/10.2196/mededu.6304>.
35. Zurzycka, P., Wojtas, K., Musiał, Z., Puto, G., and Czyżowicz, K. Searching for patient information in Internet resources by nursing and midwifery students. *Pol Ann Med*. 2025;32(2):181-5. <https://doi.org/10.1186/s12912-024-02592-7>.
36. O'Connor S, Odewusi T, Smith PM, Booth RG. Digital professionalism on social media: The opinions of undergraduate nursing students. *Nurse Educ Today*. 2022;111:105322. <https://doi.org/10.1016/j.nedt.2022.105322>.
37. Rukavina TV, Viskić J, Poplašen LM, Relić D, Maretić M, Jokić D, et al. Dangers and benefits of social media on e-professionalism of health care professionals: Scoping review. *J Med Internet Res*. 2021;23(11):e25770. <https://doi.org/10.2196/25770>.
38. Nason KN, Byrne H, Nason GJ, O'Connell B. An assessment of professionalism on students' Facebook profiles. *Eur J Dent Educ*. 2018;22(1):30-3. <https://doi.org/10.1111/eje.12240>.

39. 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;13:935-42. <https://doi.org/10.2147/JMDH.S269511>.
40. Kaya H, Işık B, Şenyuva E, Kaya N. Personal and professional values held by baccalaureate nursing students. *Nurs Ethics* 2017;24(6):716-31. <https://doi.org/10.1177/0969733015624488>.
41. Xia Y, Chen Q, Zeng L, Guo Q, Liu H, Fan S, Huang H. Factors associated with the patient privacy protection behaviours of nursing interns in China: A cross-sectional study. *Nurse Educ Pract.* 2022;65:103479. <https://doi.org/10.1016/j.nepr.2022.103479>.
42. Tadesse S, Alemayehu Y, Fekadu G. Knowledge and attitude of nursing students towards patient confidentiality in clinical settings: A cross-sectional study. *BMC Nursing*, 2020;19:63 <https://doi.org/10.1155/2020/2473469>.
43. Ulker T, Korkut S. Does nursing student's consciousness of privacy affect their attitudes to registration and preservation of personal health data? *Ordu Univer J Nurs Stud.* 2023;6(3):640-8. <https://doi.org/10.38108/ouhcd.1099347>.
44. Park HK, Jeong YW. Impact of nursing professionalism on perception of patient privacy protection in nursing students: Mediating effect of nursing informatics competency. *Healthcare (Basel).* 2021;9(10):1364. <https://doi.org/10.3390/healthcare9101364>.