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Knowledge and attitude of university nursing students towards forensic nursing and their influencing factors: a mixed-methods study

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Abstract

Background Forensic nursing, which merges healthcare and legal expertise to address trauma and violence, is vital yet often underrepresented in nursing education. Many nursing students lack knowledge in this field, underscoring the need for enhanced education to improve patient care and legal outcomes. This study aimed to assess university nursing students' knowledge and attitudes towards forensic nursing, as well as identify factors influencing their knowledge. A mixed-methods design was conducted at a Saudi nursing college with a convenience sample of 250 students. The data were collected using a structured questionnaire comprising two parts. The quantitative part included demographic and academic characteristics, knowledge and opinions on forensic nursing, knowledge of forensic evidence, and attitudes towards forensic nursing. The qualitative part consisted of four open-ended questions about factors affecting forensic knowledge. Data analysis involved inferential statistics and content analysis.

Results The study revealed that 80.4% of nursing students lacked prior knowledge of forensic nursing, and only 59.76% had some awareness of forensic evidence. A strong positive relationship was found between attitudes towards forensic nursing and knowledge of forensic evidence ($r=0.817, p < 0.001$), indicating that positive attitudes could predict 66.8% of the variance in forensic evidence knowledge. Key barriers included lack of support from upper management, insufficient resources, and concerns about faculty qualifications. Students recommended integrating forensic nursing into the curriculum, offering specialized programs, and promoting research and social media awareness campaigns.

Conclusions These findings underscore significant gaps in knowledge and misconceptions about forensic nursing among participants, emphasizing the critical need for education and awareness in this field. The study highlights the potential implications for integrating forensic nursing concepts into undergraduate curricula, enhancing faculty training, and utilizing diverse teaching modalities. Addressing these gaps will not only improve future nurses' competency in forensic nursing, but also contribute to better patient care.

Keywords Forensic nursing, Nursing student, Forensic evidence, Knowledge, Attitude, Nursing

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Background

Nursing plays a vital role within the healthcare system by delivering comprehensive and holistic care to the general population. The nursing profession has evolved to incorporate scientific advancements, with nursing education adapting accordingly (Machado et al. 2020; Kelishami et al. 2020). Forensic nursing is one of the forensic disciplines that contributes to the delivery of high-quality and secure care. This relatively new subfield applies forensic science and clinical nursing practice to scientifically analyze injuries and deaths resulting from criminal behavior or accidents (Kelishami et al. 2020).

Virginia A. Lynch, a forensic clinical nurse specialist, founded forensic nursing in the USA and worldwide, indicating that forensic nurses can treat medico-legal victims and perpetrators, bridging law and medicine. These nurses document injuries, collect biological fluids, and preserve assault-related clothing (Lynch 2011). The integration of forensic science principles into nursing practice has led to forensic nursing science, which combines forensic aspects of healthcare with the registered nurse's bio-psycho-social-spiritual education in investigating and treating victims and perpetrators of violence, criminal activity, and traumatic accidents (Mohamed 2023).

Forensic nursing science offers direct services and expert testimony, addressing clinical and legal aspects (Lynch 2011; Mohamed 2023). Unlike other forensic disciplines, it operates at the clinical/legal interface, providing care for victims and offenders, including medication management (Kent-Wilkinson 2009; Mohamed 2023). Over the years, forensic nursing has gained recognition in clinical practice but has been slow to integrate into nursing education (Strunk 2017). Given the prevalence of domestic violence and sexual assault, forensic nurses are crucial in addressing these issues in healthcare (Mohamed 2023).

As primary healthcare providers, nurses frequently encounter patients who have experienced violence or trauma (Mageto et al. 2017; McFadden 2021). They are often the first point of contact for patients and victims, playing a crucial role in preserving evidence, particularly in cases of physical, sexual, or social violence (Filmler et al. 2018). This unique position underscores the importance of nurses in the preservation, collection, and documentation of medico-legal evidence (Lynch 2011; Mohamed 2023). For instance, emergency departments often destroy important poisoning evidence such as stomach aspirate, vomitus, urine samples, and soiled cloth. Forensic nurses understand the importance of this evidence and assist in collecting, preserving, and maintaining the chain of custody for these samples (Meera & Singh 2017).

Despite its vital role, forensic nursing remains an unrecognized specialty. Nurses can contribute to resolving disputes by participating in forensic teams and should be adept at handling evidence to maintain its integrity (Özden et al. 2019; Ozsaker et al. 2020; Stevenson & Taylor 2020; Firuzi et al. 2022). However, there is a lack of emphasis on forensic nursing in nursing curricula, with many programs failing to incorporate forensic principles (Strunk 2017; McFadden 2021). To adequately prepare nurses for this field, universities must address these curriculum gaps (Kelishami et al. 2020; Souza et al. 2020).

Significance of the study

The literature review revealed a gap in nurses' knowledge and training in forensic sciences; as a result, forensic doctors typically handle cases of abuse, potentially leaving nurses ill-equipped to respond effectively in such situations. It is crucial for nurses to be well-versed in forensic nursing to provide specialized care to victims of violence. Nursing education plays a pivotal role in this regard by equipping future nurses with the necessary skills and knowledge (Özden et al. 2019; Emami et al. 2024).

In Saudi Arabia, general nurses frequently encounter forensic scenarios as part of their routine duties; likewise, specialized forensic nursing programs or training are not readily available to support them (Alsaif et al. 2014). The absence of forensic education may hinder forensic examinations, leading to incomplete examinations and incorrect clinical decision-making (Özden et al. 2019). Alsaif et al. (2014) argued that assessing nurses' forensic knowledge in Saudi Arabia can underscore the necessity for dedicated forensic nursing programs and the enhancement of overall forensic practice. Likewise, Henshall et al. (2020) emphasized that strengthening forensic nursing education can yield numerous benefits, including improved patient care quality, enhanced service accessibility, reduced healthcare system strain, increased nurse confidence, and heightened patient satisfaction.

Despite the rising demand for forensic nursing skills across various clinical settings (Padmakumari 2022), the literature underscores a deficiency in nurses' adequate knowledge and training in forensic sciences (Cunha et al. 2016). Previous studies investigating forensic nursing knowledge and practices among nurses revealed a common lack of skills in responding to victim-centered care (Mageto et al. 2017; Nazarloo et al. 2017; Sakalli & Aslan 2020; Silva et al. 2020). These studies also highlight a dearth of understanding among nurses regarding key forensic concepts, including identification, documentation, evidence collection, and interventions crucial for victim care (Nazarloo et al. 2017; Sakalli & Aslan 2020). Hence, it is vital for nurses to receive comprehensive

training in forensic nursing to deliver specialized care to victims of violence (Cunha et al. 2016).

Likewise, nursing students also require essential knowledge and clinical decision-making skills concerning forensic evidence (Firuzi et al. 2022). However, limited research has targeted undergraduate nursing students' perceptions of forensic nursing, revealing deficiencies in their understanding of its fundamental concepts (Kalayci et al. 2014; Topçu & Kazan 2018; Mohamed 2023). As the future nursing workforce, students should receive professional forensic knowledge and develop a positive disposition towards practicing in the forensic nursing field. By assessing students' knowledge, attitudes towards forensic nursing, and influencing factors, this study can help identify students' information needs and opinions regarding forensic nursing, educational requirements, and raise awareness about the topic. Consequently, educational institutions can plan tailored interventions and awareness sessions to enhance students' understanding, foster a positive attitude, and maximize their potential role in forensic nursing.

Aim of the study

This study aims to assess university nursing students' knowledge and attitude towards forensic nursing. Further to explore the influencing factors that could affect their forensic nursing knowledge from their perspectives.

Methods

Research design and setting

A mixed-methods approach, incorporating both quantitative and qualitative data, was conducted at the College of Nursing-Jeddah (CONJ), affiliated with King Saud bin Abdul-Aziz University for Health Sciences (KSAU-HS) in Saudi Arabia. The researcher collected quantitative data using a cross-sectional design and acquired qualitative data through open-ended questions to explore the factors influencing participants' knowledge and attitudes towards forensic nursing.

Sample and inclusion / exclusion criteria

The study focused on nursing students enrolled at CONJ during the academic year 2023–2024. The study specifically included third- and fourth-year undergraduate nursing students ($N=260$), excluding those in the preparatory year at the College of Sciences and Health Professions and intern nurses. This focus allowed for a specific examination of the knowledge and attitudes of currently enrolled nursing students, who represent the target demographic for curriculum development and educational interventions. To ensure a robust sample size, a minimum of 168 participants was targeted, calculated using the Raosoft sample size calculator with a 0.5

margin of error and a 95% confidence interval. However, to avoid missing data and ensure comprehensive insights, all eligible students were invited to participate. Ten students were included in a pilot study and subsequently excluded from the total number, resulting in a final convenience sample of 250 students, which exceeded the initial target.

Research instruments

Data were collected using a structured questionnaire that consists of two parts.

Part 1: Quantitative Data: *It includes four sections, as follows:*

Section 1: Students' demographic and academic variables, which include questions related to age, academic level, and whether they followed forensic medicine cases in the media, and these media. Responses in this section were framed in multiple response formats, such as multiple choice, yes, and no.

Section 2: Knowledge and opinion of forensic nursing concepts, this section includes 14 questions, 12 of which were adapted and modified from the study of Topçu and Kazan (2018) to evaluate the knowledge of forensic nursing concepts, roles, subjects, fields, forensic cases, and the education of forensic nursing. Responses to these questions used multiple formats, such as multiple choice and yes-or-no. In addition, the current researcher included two questions about forensic nursing subspecialties, each with a multiple-option response, and asked participants to rate their general knowledge of forensic nursing using a three-point Likert scale: knowledgeable (3), slightly knowledgeable (2), and not knowledgeable (1).

Section 3: Nursing students' knowledge of forensic evidence, this section was designed by Firuzi et al. (2022) to assess nursing students' knowledge of forensic evidence. It includes 17 items that require participants to respond on a 3-point Likert scale: correct (1), incorrect (0), and do not know (0). Participants received one point for each correct answer, with responses ranging from 1 to 17. The overall scores of this section are classified as insufficient (0–5), moderate (6–11), and sufficient (12–17).

Section 4: Nursing students' attitude towards forensic nursing, the current researcher developed this section to assess nursing students' attitudes towards forensic nursing, drawing from relevant literature. The section comprises 10 items, each with three distinct dimensions: The "Role of Nursing Education" dimension, which consists of three items, gauges students' views on the significance of forensic nursing education in their curriculum. The "Responsibility" dimension, comprising five items, evaluates students' sense of accountability in applying forensic nursing principles in their practice. The "In-Service

Training and Education” dimension, consisting of two items, underscores the perceived attitude towards the significance of continual education and training for practicing nurses in forensic nursing. Participants utilized a 3-point Likert scale to indicate their level of agreement with each item, ranging from “agree” (3), “unsure” (2), to “disagree” (1). Scores ranged from 10 to 30, with higher scores reflecting more positive attitudes towards forensic nursing.

Part 2: Qualitative Data: It includes four open-ended questions asking students about factors affecting the forensic knowledge and integration of forensic nursing into nursing curricula from students’ perspectives.

From your perspective, answer the following questions:

1. What are the factors that would increase undergraduate nursing students’ knowledge of forensic concepts?
2. What are the factors that would facilitate the integration of forensic concepts into undergraduate nursing curricula?
3. What are the barriers that influence undergraduate nursing students’ understanding of forensic concepts?
4. What are the barriers that would hinder the integration of forensic concepts into undergraduate nursing curricula?

Responses in Part 2 underwent content analysis and were summarized using frequency and percentage. Additionally, the findings were represented by selected sentences from the students.

Validity and reliability

Five academic experts validated the content of the study instruments in their English format before data collection. Additionally, the pre-testing phase, which involved 10 students, indicated no need for modifications to the final instruments. The study instruments demonstrated good internal consistency, with a Cronbach’s alpha value of 0.783 for the knowledge questionnaire and 0.852 for the attitude towards forensic nursing questionnaire, both statistically significant at $p \leq 0.05$.

Data collection

Following approval from the CONJ research committee and the King Abdullah International Medical Research Center Institutional Review Board (KAIMRC-IRB), the researcher administered the questionnaire to consenting nursing students. To accommodate the diverse preferences and accessibility of participants and maximize response rates, the researcher utilized both paper-based

and electronic questionnaire links, accompanied by comprehensive instructions. In the introduction section of the questionnaire, students were briefed on the two parts: quantitative and qualitative, emphasizing the importance of their perspectives on factors influencing forensic nursing knowledge and its integration in nursing curricula. On average, students spent approximately 25 min completing the questionnaire. Data collection took place over two months during the third semester of the academic year 2023–2024.

Ethical considerations

The study received approval from CONJ and KAIMRC (IRB Approval: NRJ23J/286/10). Before participation, participants were informed of the study’s purpose, emphasizing their right to refuse or withdraw without academic consequences. The researcher obtained informed consent from all participants and ensured data privacy and confidentiality.

Data analysis

The analysis of the quantitative data utilized the Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics, including means and standard deviation, summarized the results, while analysis of variance (ANOVA) compared means. Pearson’s correlation explored relationships between variables, and regression analysis (R^2) assessed the predictive capacity of the independent variable (attitude) for the dependent variable (knowledge). The predetermined significance level for p -values was set at $p \leq 0.05$.

Through content analysis of open-ended questions, the researcher obtained qualitative findings regarding facilitators and barriers influencing undergraduate nursing students’ knowledge of forensic concepts. While examples were provided in the response, the analysis involved a systematic examination of the students’ responses to identify common or recurrent themes. These themes, including barriers and facilitators, were depicted using frequency, percentage, and students’ statements.

Results

Participant characteristics

The majority of students (77.2%) were in their fourth year of study, while 26.8% were in their third year. When asked about their interest in forensic medicine or nursing, about two-thirds (68.8%) did not follow any related publications or programs, while 31.2% did. Among those who did follow, TV series was the most popular medium (63.2%), followed by the internet (54.7%) and Twitter (36.8%) (Table 1).

Table 1 Students' demographic and academic characteristics (N=250)

Demographic and academic characteristics	No.	%
Age (years) 20–25		
Min.–Max.	20.0–25.0	
Mean ± SD.	22.68 ± 1.30	
Academic year		
Third	57	22.8
Fourth	193	77.2
Followed publication or media program about forensic medicine or forensic nursing		
No	172	68.8
Yes	78	31.2
If yes, the media ^a (n=78)		
Journal	10	9.4
Internet	58	54.7
Tv series	67	63.2
Twitter	39	36.8

^a Multiple responses

General knowledge and opinions regarding forensic nursing among nursing students

Figure 1 reveals that the majority of nursing students (80.4%) had no prior knowledge about forensic nursing, while 19.6% reported some familiarity. Table 2 also shows that among those with knowledge, the internet was the primary information source (40.8%), followed by TV series (20.4%), television (20.4%), and Tiktok (18.4%). Most students (96.0%) had not received any formal instruction in forensic nursing, with only a small fraction (4.0%) having studied it as a topic in a

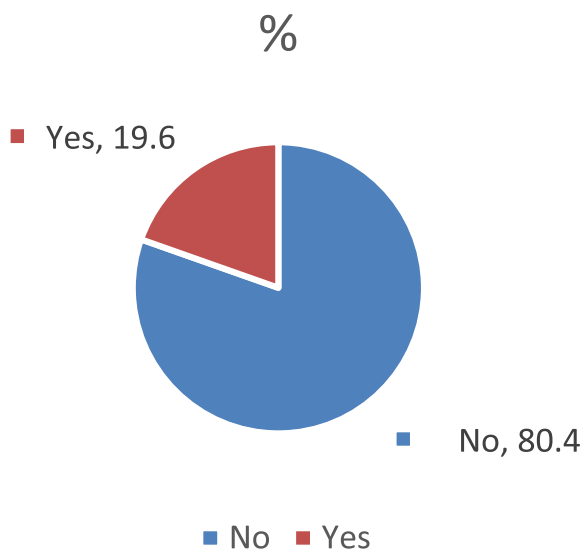


Fig. 1 Pie chart of prior knowledge about forensic nursing among nursing students

Table 2 General knowledge and opinions regarding forensic nursing among nursing students (N=250)

Knowledge and opinion about forensic nursing	No.	%
Prior knowledge about forensic nursing		
No	201	80.4
Yes	49	19.6
Source of this knowledge [#] (n=49)	(n=49)	
TV series	10	20.4
Internet	20	40.8
Tiktok	9	18.4
TV	10	20.4
Education about forensic nursing		
No I didn't	240	96.0
I had it as a subject in school	10	4.0
What are the forensic nurse's duties for you? [#]		
I don't know	97	38.8
Collection of evidence	143	57.2
Preservation of evidence	105	42.0
Identification of evidence	125	50.0
Record of evidence	144	57.6
Providing the delivery chain of evidence	104	41.6
Treating and caring of victims and arbitrator	132	52.8
Which subjects a forensic nurse should know? [#]		
I don't know	30	12.0
Primary health science	106	42.4
Law	201	80.4
Forensic medicine	162	64.8
Nursingethics/ bioethics	173	69.2
In which fields forensic nurses take roles? [#]		
I don't know	40	16.0
In hospitals	105	42.0
In police stations	123	49.2
In prisons	76	30.4
Forensic medicine institutions	201	80.4
In courts	67	26.8
In crime scene investigations	173	69.2
Have you ever met a forensic case?		
No	222	88.8
Yes	28	11.2
If yes please state it (n=28)		
Rape case without evidence	10	35.7
Murder	9	32.1
Child assaulting and abusing	9	32.1
Which are examples for forensic cases? [#]		
Traffic accidents	1	0.4
Malpractice	107	42.8
Poisonings	67	26.8
Suicide	172	68.8
Sexual crimes	202	80.8
Domestic violence	190	76.0
Gunshot injuries	189	75.6
Penetrating stab wounds	170	68.0

[#] Multiple responses

nursing ethics course. When asked about the duties of forensic nurses, nursing students displayed varied understanding, and the highest percentages were associated with records of evidence (57.6%), evidence collection (57.2%), treating and caring for victims and arbitrators (52.8%), and identification of evidence (50.0%). On the other hand, a notable percentage (38.8%) indicated that they did not know about the duties.

Moreover, participants identified key subjects that forensic nurses should be knowledgeable about, with the highest percentage indicating law (80.4%), followed by nursing ethics/bioethics (69.2%), and forensic medicine (64.8%). In responding to the question regarding the fields in which forensic nurses take on roles, the highest roles were attributed to forensic medicine institutions (80.4%), crime scene investigations (69.2%), police stations (49.2%), and hospitals (42.0%), among others. However, the majority (88.8%) reported no encounters with forensic cases, while 11.2% encountered instances such as rape cases without evidence (35.7%) and murders / child assaulting and abusing (32.1%). Additionally, participants recognized various examples of forensic cases, with

the highest percentages associated with sexual crimes (80.8%), domestic violence (76.0%), and gunshot injuries (75.6%).

Nursing students’ opinion of incorporating forensic nursing in education and career

Continuing with the results, Table 3 reveals that participants expressed strong support for incorporating forensic nursing education into nursing training, with 92.0% endorsing its inclusion. The level of such education varied, as evidenced by responses indicating preferences ranging from integrating it into school courses (11.6%) to post-graduation certified training (34.4%). Interestingly, while the majority of nursing students (88.8%) believed that forensic nursing should be a major branch in nursing education, and a small portion (11.2%) held differing opinions. Career aspirations in forensic nursing were evident, with 46.0% of participants expressing interest in pursuing this career path after graduation, while 7.6% expressed no interest. Additionally, a significant number of participants (46.4%) remained undecided. Among those interested in becoming forensic nurses, preferences for specific

Table 3 Nursing students’ opinion of incorporating forensic nursing in education and career

Forensic nursing in education and career	No.	%
Do you think nurses should have a forensic Nursing education?		
No	20	8.0
Yes	230	92.0
In which level do you think Forensic Nursing Education should be?		
It should be taught in the school courses as a few hours in a week	29	11.6
It should be given as a compulsory subject in the university	68	27.2
It should be given as elective lesson	67	26.8
After graduation, it should be given as a certificated training	86	34.4
Do you think that forensic nursing should be a major branch in nursing education?		
No	28	11.2
Yes	222	88.8
Would you like to be a forensic nurse after graduation?		
Yes	115	46.0
No	19	7.6
Not sure	116	46.4
If you would like to be a forensic nurse after graduation, which Forensic nursing subspecialties, you will select		
Clinical forensic nurse (CFN) in hospital	85	34.0
Forensic nurse investigator (FNI) in a medical-legal office	98	39.2
Forensic nurse examiner (FNE)	10	4.0
Sexual assault nurse examiner (SANE)	10	4.0
Forensic psychiatric nurse (FPN)	47	18.8
How knowledgeable do you feel on the topic of forensic nursing from your nursing education?		
Knowledgeable	9	3.6
Slightly knowledgeable	109	43.6
Not knowledgeable	132	52.8

subspecialties varied, with roles such as forensic nurse investigators (39.2%) and clinical forensic nurses (34.0%) being the most favored. Notably, while many participants expressed interest in forensic nursing, a significant portion felt inadequately knowledgeable on the topic, with 52.8% indicating a lack of knowledge from their nursing education.

Knowledge about forensic evidence according to academic level

Participants’ knowledge about forensic evidence was analyzed according to their total and their academic level, distinguishing between third-year and fourth-year students. Table 4 shows that total scores ranged from 0 to 17 across both groups, with a mean score of 10.16 ± 4.3 and a percentage score of 59.76%. See Supplementary Table 2 for detailed evidence. There was a statistically significant difference between the two academic levels ($t = 2.812, p = 0.006$). The fourth-year students had

a higher mean total score of 11.25 ± 2.81 , with a percentage score of 66.15%, than the third-year students, who had a mean total score of 9.84 ± 4.64 , with a percentage score of 57.88%. See Supplementary Table 1.

Attitude of nursing students towards forensic nursing

Table 5 illustrates that students demonstrated positive overall attitudes with a mean score of 2.70 ± 0.36 , corresponding to a percentage score of 85.10%. The highest average score was observed in the dimension of in-service training and education, with a mean score of 2.81 ± 0.40 and a percentage score of 90.30%. This was followed by nursing education and responsibility dimensions (Fig. 2). Also, see Supplementary Table 2 for items’ values. Additionally, Table 5 reveals no significant difference between third-year and fourth-year students concerning the overall attitude towards forensic nursing, as well as its dimensions.

Table 4 Knowledge about forensic evidence according to academic level (N = 250)

Knowledge about forensic evidence	Total (N = 250)	Academic year		t (p)
		Third year (n = 57)	Fourth year (n = 193)	
Total score (0–17)				
Min.–Max.	0.0–17.0	6.0–16.0	0.0–17.0	2.812 (0.006*)
Mean ± SD.	10.16 ± 4.33	9.84 ± 4.64	11.25 ± 2.81	
Mean percentage score % ± SD.	59.76 ± 25.45	57.88 ± 27.29	66.15 ± 16.54	

SD standard deviation, t Student t-test

* Statistically significant at $p \leq 0.05$

Table 5 Attitude of nursing students towards forensic nursing (N = 250)

Attitude of nursing students regarding forensic nursing	Total (N = 250)	Academic year		t	p
		Third year (n = 57)	Fourth year (n = 193)		
Nursing education					
Mean ± SD	2.69 ± 0.50	2.70 ± 0.40	2.69 ± 0.52	0.215	0.215
Mean percentage score % ± SD.	84.47 ± 24.77	85.09 ± 19.84	84.28 ± 26.09		
Responsibility					
Mean ± SD	2.67 ± 0.36	2.71 ± 0.33	2.65 ± 0.36	1.066	0.288
Mean percentage score % ± SD.	83.40 ± 17.86	85.61 ± 16.59	82.75 ± 18.21		
In-service training and education					
Mean ± SD	2.81 ± 0.40	2.87 ± 0.24	2.79 ± 0.43	1.813	0.072
Mean percentage score % ± SD.	90.30 ± 19.87	93.42 ± 12.07	89.38 ± 21.59		
Overall attitude					
Mean ± SD	2.70 ± 0.36	2.74 ± 0.31	2.69 ± 0.37	0.923	0.357
Mean percentage score % ± SD	85.10 ± 17.84	87.02 ± 15.52	84.53 ± 18.46		

SD standard deviation, t Student t-test

* Statistically significant at $p \leq 0.05$



Fig. 2 Bar chart of the percentage score of nursing students' overall attitude towards forensic nursing and its dimensions

Table 6 Simple Linear regression analysis for the effect of attitude towards forensic nursing on knowledge of forensic nursing evidence

	<i>r</i>	<i>R</i> ²	<i>F</i> (<i>p</i>)	<i>B</i>	<i>Beta</i>	<i>t</i>	LL–UL 95% CI
Attitude	0.817 (<0.001*)	0.668	497.933 (<0.001*)	0.991	0.817	22.314 (<0.001*)	0.903–1.078

r Pearson correlation, *R*² coefficient of determination, *B* unstandardized coefficients, *Beta* standardized coefficients, *F*, *p* *f*- and *p*-values for the model, *t* *t*-test of significance, *CI* confidence interval, *LL* lower limit, *UL* upper limit

* Statistically significant at *p* ≤ 0.05

Correlation between knowledge and attitude of nursing students regarding forensic nursing

The correlation and regression analysis in Table 6 revealed a strong positive correlation between the overall attitude towards forensic nursing and knowledge of forensic nursing evidence (*r*=0.817, *p*<0.001). This attitude could contribute to and predict 66.8% of the variance in knowledge of forensic evidence. See Supplementary Table 3 for more values.

Factors influence the knowledge and attitude of forensic nursing among nursing students

In response to the open-ended questions, undergraduate nursing students have highlighted several barriers and facilitators that affect their knowledge and attitude towards forensic concepts in nursing curricula. For detailed percentages on these factors, see Supplementary Table 4. Barriers include a lack of attention and support from higher management, a general lack of interest among faculty and students, insufficient availability of reliable resources, time constraints necessitating an earlier introduction of forensic concepts, the absence of law studies and specialized nursing literature, societal perceptions, concerns about faculty qualifications, fear or misconceptions about the field, and worries about

overwhelming students with additional nursing content. The students' statements embody some of these barriers.

We already have a lot of academic content, so adding forensic nursing content might be too much and we won't have time for it.

If no one, like teachers and students, cares about forensic nursing, then it's hard for us to learn about it.

If people don't like forensic nursing or think it's not important, then it's hard for us to learn about it and do it.

Some people might be scared of forensic nursing or just not know what it is, so they don't want to learn about it.

On the contrary, students pointed out various factors that could improve their knowledge of forensic nursing and related concepts. Suggestions included integrating forensic nursing into the curriculum, organizing specialized programs and workshops, providing accredited courses, offering practical training opportunities for forensic nurses, elective or compulsory courses in forensic nursing, attending in-service workshops and training programs, and engaging in research and social media awareness campaigns. Examples of students'

statements included some of these facilitators, as follows:

If we learn about forensic nursing during our regular classes, it will help us understand how important it is for patients and the law. I think if they teach us about forensic nursing before we graduate, everyone will know about it and be ready to do it.

I think going to workshops just for forensic nursing would be cool. We could learn a lot more about it, and maybe even try some hands-on stuff. If we take official courses in forensic nursing, it could show that we know what we're doing and we're good at it.

I believe that we and our teachers have a role in raising awareness; if we could do research and tell people on social media about forensic nursing, more people would understand how important it is.

Discussion

Nurses play a crucial role in patient care and support forensic investigations. This study assessed nursing students' knowledge and awareness of forensic nursing, offering valuable insights to enhance education and training in this vital field.

Knowledge and attitude towards forensic nursing

The study findings indicated that the majority of nursing students (80.4%) lacked prior knowledge about forensic nursing, with an even larger proportion (96.0%) reporting no formal instruction in this field. Additionally, a vast majority (88.8%) reported no encounters with forensic cases. When questioned about the duties of forensic nurses, 38.8% indicated that they did not know. Most nursing students did not follow any forensic medicine or nursing-related publications or programs, while a minority engaged with these topics mainly through TV series and the internet. Many students associate the duties of forensic nurses with evidence collection and victim care. Key subjects identified for forensic nursing knowledge included law, nursing ethics/bioethics, and forensic medicine. Students also had diverse perceptions of where forensic nurses work, attributing roles to forensic medicine institutions, hospitals, and police stations, among others. While many reported having no direct encounters with forensic cases, some had experienced rape cases without evidence or murders. Various examples of forensic cases recognized by the students included sexual crimes, domestic violence, and gunshot injuries.

The present findings align with previous research. Topçu and Kazan (2018) observed that most students lacked information and training in forensic nursing, were

unfamiliar with the duties of forensic nurses, and had not encountered forensic cases. However, a significant proportion (80.8%) discovered forensic nursing through publications or the internet. Ribeiro and Dixe (2020) similarly reported that nursing students had not undergone training in forensic nursing as part of their education and had limited exposure to forensic evidence collection and preservation during clinical training. Machado et al. (2019, 2020) also noted a lack of integration and knowledge of forensic nursing. Conversely, Cunha et al. (2016) reported good knowledge of forensic nursing practices among students. Older studies by Kalayci et al. (2014) and Şentürk and Büyükaslan (2013) highlighted deficiencies in students' understanding of forensic nursing, with most knowledge coming from seminars, magazines, and the internet.

Moreover, despite the reported knowledge level, the findings highlight misconceptions among participants regarding forensic evidence items, indicating areas where further education and clarification may be beneficial. Similarly, previous studies have shown that nursing students have inadequate knowledge of forensic nursing evidence. Özden et al. (2019) found that nurses involved in forensic cases often lack sufficient knowledge about evidence collection, storage, and the construction of evidence chains. Alsaif et al. (2014) and Simmons and Grandfield (2013) indicated that nurses have limited knowledge of forensic nursing and struggle with assessing forensic cases. Additionally, Şentürk and Büyükaslan (2013) indicated that all participating students acknowledged their insufficient knowledge in this area and expressed a desire for improvement, emphasizing the need for forensic nursing training. In this respect, Emami et al. (2024) stressed the vital role of nurses' expertise in forensic issues, warning that lacking skills can lead to legal issues and compromise care quality. Likewise, Özden et al. (2019) emphasized the crucial need for forensic nurses to proficiently collect evidence to ensure accurate evaluations.

Interestingly, the findings indicate positive attitudes among students towards forensic nursing, reflecting a favorable overall disposition. Students prioritize ongoing education and training, recognizing their importance for continuous learning and skill development in forensic nursing practice, which is consistent with previous research (Özden et al. 2019; Emami et al. 2024). These findings suggest that students may be aware of the evolving nature of forensic nursing practice and the need to stay informed about advancements, in addition to their positive attitudes towards nursing education and their ethical responsibilities in forensic nursing. This aligns with previous research emphasizing the importance of fostering positive attitudes towards forensic nursing

(Poosumang & Chatreewatanakul 2017), which includes attributes of forensic nurses, the value of the learning experience, understanding of forensic nurses' roles, and feelings about caring for victims, all contributing to the development of moral ethics among nursing students.

Barriers and facilitators influencing forensic nursing knowledge from students' perspectives

Generally, the study highlights significant gaps in forensic nursing knowledge and misconceptions among nursing students. Factors contributing to these gaps include the limited emphasis on forensic nursing in formal education, lack of exposure to real-life forensic cases, and potentially misleading portrayals in media and culture. Students' reported barriers, such as time constraints, faculty-related challenges, and personal apprehensions, further support these findings. This perspective aligns with the research of McFadden (2021) and Emami et al. (2024) who also identified similar obstacles, including faculty-related issues and student disinterest.

On the other hand, in agreement with previous researchers, our students have proposed various facilitators to address the knowledge gap and challenges in forensic nursing education. These include integrating forensic concepts into nursing curricula, organizing specialized programs and workshops, providing practical training, and promoting involvement in research and social media awareness campaigns. Multiple authors have emphasized the enhancement of forensic nursing education, citing benefits such as improved patient care quality, safety, and access, as well as increased nurse confidence and skill levels, resulting in higher patient satisfaction (Simmons & Grandfield 2013; Özden et al. 2019; Emami et al. 2024). They underscored the necessity of integrating forensic nursing into curricula and providing professional forensic nurses with thorough training, leadership qualities, and problem-solving skills to ethically manage forensic cases both nationally and internationally. Recommendations also include establishing collaboration protocols among healthcare, law enforcement, and forensic investigators.

Forensic nursing in education and practice

The current study's nursing students strongly supported integrating forensic nursing education into nursing training (92.0%), emphasizing its importance as a major branch of nursing education. The diverse preferences highlight the need for flexible educational approaches to meet aspiring forensic nurses' varied needs and expectations (Machado et al. 2020; Özden et al. 2019). These findings are consistent with Topçu and Kazan (2018), who found that the majority of students desired

specialized education in forensic nursing, with around 40% suggesting it be offered as an elective course.

Furthermore, the study highlighted the diverse roles available to nurses; 46.0% of nursing students expressed interest in pursuing forensic nursing careers post-graduation, favoring roles like forensic nurse investigators (39.2%) and clinical forensic nurses (34.0%). This result reflects the growing recognition of forensic nursing's crucial role in healthcare and legal systems (Özden et al. 2019; Machado et al. 2020). Similarly, Topçu and Kazan (2018) reported that many students expressed interest in forensic nursing careers upon graduation, indicating a need for guidance from educators and healthcare institutions. Previous research supports this result, showing that forensic nurses play crucial roles in medical-forensic examinations, evidence collection, and court testimony (Lynch 2011; Drake et al. 2018; Donaldson 2019). They also assist abuse victims and collaborate with multidisciplinary teams (Emami et al. 2024; Williams 2022). Furthermore, Özden et al. (2019) emphasized the importance of nurses recognizing criminal cases and being proficient in evidence handling while prioritizing patient care.

Knowledge and attitude about forensic evidence according to academic level

The analysis revealed significant differences in participants' knowledge about forensic evidence between third-year and fourth-year students, while no significant difference was found in their attitudes. This variation in knowledge could be attributed to students' progression in their academic journey, gaining more exposure to clinical scenarios and case studies. These findings align with previous research indicating that nursing students' knowledge and skills tend to increase as they advance through their academic and clinical experiences (Khalil & Abou Hashish 2022; Abou Hashish & Bajbeir 2018; 2022). Interestingly, there were no significant differences in attitudes towards forensic nursing between third-year and fourth-year students, suggesting a consistent level of positivity across different stages of nursing education. Previous studies found no significant influence of students' demographics on their knowledge level concerning forensic nursing (Topçu & Kazan 2018; Şentürk and Büyükaslan 2013).

Correlation between knowledge and attitude of nursing students regarding forensic nursing

The significant positive correlation between attitudes towards forensic nursing and knowledge of forensic nursing evidence highlights the interrelationship between these two constructs among nursing students.

As attitudes towards forensic nursing become more positive, students are likely to exhibit a greater interest in acquiring knowledge in this area. This aligns with previous research suggesting that attitudes play a crucial role in shaping individuals' willingness to engage in learning activities and acquire new knowledge (Humbe et al. 2023). Overall, these findings suggest that fostering positive attitudes towards forensic nursing is essential for promoting knowledge acquisition and competency development among nursing students. In agreement with previous research, the current study emphasizes the role of nursing institutions and educators in cultivating a supportive learning environment that encourages students to embrace forensic nursing education and practice with enthusiasm and dedication (Özden et al. 2019; Van Dyk et al. 2022). By promoting positive attitudes towards forensic nursing, educators can inspire students to become lifelong learners and advocates for excellence in forensic nursing care (McFadden 2021).

Strengths and limitations

This study makes a unique contribution to nursing literature by collectively measuring the knowledge of forensic nursing, forensic evidence, and attitudes towards forensic nursing among nursing students. By providing valuable insights that enrich the nursing literature in this field, our research enhances understanding of forensic nursing education and practice on a deeper level. Also, by shedding light on the factors influencing nursing students' knowledge and attitudes towards forensic nursing, the findings provide a foundation for educational institutions to develop tailored interventions to address students' needs effectively. However, the study is not without its limitations. Relying on self-reported data from nursing students introduces subjectivity and the potential for recall bias or inaccuracies. Furthermore, the limited generalizability of the findings, stemming from the single-institution sample including female nursing students, suggests the need for future research in diverse settings and populations. These limitations highlight the importance of further exploration to enhance the validity and applicability of the study's findings.

Conclusions

In conclusion, this study illuminates the concerning lack of knowledge and training in forensic nursing and evidence among senior nursing students, highlighting the urgent necessity to integrate forensic nursing into the curriculum to meet the increasing demand for forensic nursing careers. Despite their limited knowledge, nursing students displayed a positive attitude towards

forensic nursing, emphasizing the significance of continuous education and responsibility in shaping their perceptions. Significantly, a notable correlation between attitude and knowledge suggests that fostering a positive attitude could stimulate greater interest and involvement in this field. Moreover, the study identified various barriers and facilitators influencing students' knowledge and attitude, emphasizing the imperative to address these factors for a comprehensive understanding of forensic concepts. Bridging these educational and training gaps can motivate nursing students to pursue forensic nursing as a prospective career path, thereby elevating the standard of forensic nursing practice in healthcare settings.

Implications of the study

Implications for nursing education

The insights provided by students, such as the recommendation to integrate forensic nursing into the curriculum, highlight the potential transformative effects on nursing education. Nursing colleges and faculty members have a pivotal role in shaping these changes by advocating for the integration of forensic concepts. By prioritizing the development of an understanding of basic forensic concepts necessary for entry-level nursing practice, faculty members can enhance the quality of education. Furthermore, fostering interdisciplinary collaboration and incorporating innovative learning modalities can improve clinical reasoning and deepen students' understanding of forensic nursing concepts. Integrating basic forensic nursing competency into student learning outcomes can significantly enhance their preparedness to care for vulnerable populations. Collaborative efforts and inter-professional education initiatives can create clinical opportunities and simulation exercises that effectively teach forensic nursing concepts, enriching the educational experience for nursing students.

Implications for future research

For future research, conducting randomized controlled trials in educational settings could evaluate interventions aimed at enhancing nursing students' knowledge and attitudes towards forensic nursing, providing insights into their practical application in clinical practice. Exploring the impact of cultural and societal factors on nursing students' perceptions of forensic nursing could inform the development of tailored educational approaches. Additionally, developing educational materials and standardized assessments or competency frameworks for guiding and evaluating nursing students' proficiency in forensic nursing skills and knowledge would be beneficial.

Abbreviations

ANOVA	Analysis of variance
CI	Confidence interval
CONJ	College of Nursing-Jeddah
IRB	Institutional Review Board
KAIMRC	King Abdullah International Medical Research Center
KSAU-HS	King Saud bin Abdulaziz University for Health Sciences
R ²	Regression analysis
SPSS	Statistical Package of Social Sciences

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s41935-024-00404-2>.

Additional file 1: Supplementary Table 1. Knowledge about Forensic evidence items ($N = 250$). Supplementary Table 2. Attitude of nursing students regarding forensic nursing items ($N = 250$). Supplementary Table 3. Correlation between Knowledge and Attitude of nursing students regarding forensic nursing. Supplementary Table 4. Facilitators and barriers factors influencing the knowledge of forensic concepts among undergraduate nursing students.

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Authors' contributions

Ebtsam Aly Abou Hashish made all the substantial contributions to the conceptualization, methodology, software, data curation, and writing of the original draft preparation and final manuscript and correspondence.

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Availability of data and materials

Data is provided within the manuscript or supplementary information files.

Declarations

Ethics approval and consent to participate

The College of Nursing-Jeddah (CONJ) and King Abdullah International Medical Research Center (KAIMRC) approved the study with IRB approval No. (NRJ23J/286/10). Informed consent was obtained from all subjects.

Consent for publication

Not applicable.

Competing interests

The author declares that she has no competing interests.

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