Educating the future: Serbian healthcare students' knowledge and attitudes toward urinary incontinence

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Abstract

Introduction Urinary incontinence (UI) is a growing global health problem that affects both women and men of all ages and can seriously negatively impact quality of life. Healthcare professionals' knowledge and attitudes significantly influence UI prevention, diagnosis, and treatment. However, there is a notable lack of research exploring healthcare students' understanding and perceptions of UI. In many countries, they, as future healthcare professionals, must also have continence care competency before graduation. Therefore, the study aimed to assess the knowledge and attitudes of healthcare students toward UI.

Methods The study was designed as an observational, analytical, and comparative cross-sectional with 378 healthcare students in Serbia during the winter semester of the 2023/2024 academic year. A general questionnaire for obtaining sociodemographic data, the Urinary Incontinence Knowledge Scale (UIKS) and the Urinary Incontinence Attitude Scale (UIAS) were used as students' report measures. Kuder-Richardson Coefficient (K-R 20) showed high reliability of the UIKS at 0.83, while Cronbach's alpha coefficient was 0.62 for the UIAS.

Results The UIKS score was $16.6 \pm 3.9/30$. Healthcare students achieved the highest score in the domain of knowledge about the impact of UI on quality of life and the lowest in the domain of UI control. There is a significant difference in students' knowledge level concerning the study program and whether they had a course focusing on UI. The UIAS score was $45.1 \pm 4.6/60$, indicating a positive attitude to UI. A statistically significant positive but weak correlation was obtained between knowledge and student attitudes about UI.

Conclusions The study findings highlight a concerning gap in understanding UI among healthcare students despite their pivotal role as future healthcare professionals and underscore the urgent need for comprehensive educational strategies to bridge the knowledge gap and foster more positive attitudes toward UI and their implementation in clinical practice to improve patient health outcomes.

Keywords Urinary incontinence, Knowledge, Attitudes, Students, Questionnaire

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Introduction

Urinary incontinence (UI) is a growing global health and social problem that affects both women and men of all ages and can have a serious negative impact on quality of life. UI occurs twice as often in women, and it is estimated that 25–45% of women have problems with incontinence [1]. In addition, it is still an underreported and underdiagnosed problem because patients are often reluctant to seek support, especially male patients. The reason for this is primarily the unpleasant nature of this problem [2]. However, other factors such as an individual's personal experience with UI, the belief that UI is an inevitable and normal aspect of aging, or a lack of awareness about available UI treatment options may also contribute to not seeking healthcare professional assistance. Because of this, it often takes a long time before the patient consults a healthcare professional, which can have negative consequences that increase with age [3].

In addition, many studies confirmed that healthcare professionals, particularly at a primary healthcare level, knowledge, beliefs, values, and attitudes significantly influence the prevention, diagnosis, and treatment of UI [4–9]. Their knowledge and attitudes toward UI are crucial, as they can impact patient care and support systems [6, 10]. It is observed that they often missed adequate screening practices [8] and did not initiate discussions about continence problems with patients [11, 12]. Moreover, some healthcare professionals perceive UI as a low-priority need when providing healthcare services [13].

However, effective management of UI requires adequate knowledge and positive attitudes. Given that primary healthcare professionals will manage many patients with UI, they need more widespread access to clinical management procedures for UI [14]. In that sense, Serbia is not exactly up to date in the field. Therefore, to improve care for UI, several changes must be made. Our idea was to start with healthcare students as future healthcare professionals because, as a possible cause of insufficient knowledge, skill, and attitudes about UI, the lack of theoretical and practical content in the curriculum of medicine, nursing, and physiotherapists was often reported [15].

Namely, continence care is a skill that healthcare students require before graduation in many countries [16]. A better understanding of what they know about UI and how they feel about patients with incontinence is important to identify strategies to improve the curriculum [17, 18]. The study conducted among nursing students in China revealed that nursing students generally had little knowledge about the treatment of UI [18]. Witkoś et al. [17] reported that medical students in Poland had sufficient understanding of the theoretical aspect of UI, such as the definition and risk factors. However, their knowledge of preventive measures, diagnostic procedures, and conservative treatment methods for UI was insufficient.

It is possible that the limited training of healthcare students in managing patients with different subtypes of UI contributes to its underestimation and misunderstanding. Also, there is a notable lack of research exploring their comprehension and perceptions of UI. To address this knowledge gap, emphasise the importance of involving continence care education in healthcare students' curricula, and highlight the critical UI issues that future healthcare professionals should know, this study aimed to (1) evaluate the knowledge and attitudes of Serbian healthcare sciences students (medical, nursing and physiotherapy students) toward UI, (2) assess the difference in the knowledge level and attitudes about UI to the students' sociodemographic characteristics, and (3) determine the correlation between their knowledge and attitudes towards UI.

Methods

Study design and setting

The research was conducted as a descriptive, analytical, comparative, and correlational cross-sectional study at the Faculty of Medicine of the University of Novi Sad, Serbia, during the winter semester of the 2023/2024 academic year. The study adhered to Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

Sample and data collection

Of the 640 questionnaires distributed, 389 were collected (60.8% return rate). Furthermore, 11 incompletely filled questionnaires were considered invalid and excluded from the study; 378 were included in the analysis (59.1% response rate). Therefore, the overall convenience sample comprised $N = 378$ students ($n = 154$ medical students, $n = 129$ nursing students, and $n = 95$ physiotherapy students).

The study inclusion criteria were established on the curriculum, which implied that the students had undergone training in compulsory subjects that should include lectures on the treatment of UI, such as Fundamentals of Nursing, Family and Primary Health Care, Gynaecology and Obstetrics, Surgery, Neurology, and Medical Rehabilitation. Hence, nursing and physiotherapy students were included if they were in the second, third, or fourth year of bachelor's or master's studies, while medical students were included if they were in the fifth or sixth year of integrated studies. First-year nursing and physiotherapy students and medical students in the first four years of their studies were excluded.

The sample size was determined based on the total number of students from all study programs who met the

inclusion criteria ($n = 640$). Thus, using sample size software for cross-sectional studies, a sample of 240 students is required for a 95% confidence interval with a 0.05 margin of error. In order to compensate for the potential data loss of 20%, the sample needs a minimum of 290 students.

Data were collected using a paper version of the questionnaires distributed in the classroom after regular lectures. Before filling out the questionnaire, the students were informed about the study.

Student reported measures

A general questionnaire for obtaining sociodemographic data, the Urinary Incontinence Knowledge Scale (UIKS) [4] and the Urinary Incontinence Attitude Scale (UIAS) [5] were used as students' report measures.

The general questionnaire includes seven items for obtaining the following data: gender, study program, study year, previously completed school, whether they had or not lectures on urinary incontinence, interest in education about UI, and a family member diagnosed with UI.

The UIKS includes 30 items grouped into six domains of knowledge about UI: risk factors, symptoms, impact on quality of life, prevention, treatment, and symptom control [4]. Answers to the statements are closed-ended: true, false, and do not know. A correct answer is scored with 1, and an incorrect and do know with 0. The maximum total score is 30. A score greater than 24 ($> 80\%$) indicates good knowledge, from 18 to 24 average knowledge, and a score less than 18 ($< 60\%$) indicates poor knowledge. The internal consistency measure in previous research for the entire scale was 0.72.

The UIAS includes 15 items grouped into three domains of attitudes towards UI: lower urinary tract symptoms and prevention, followed by treatment and symptom control [5]. The items in the questionnaire are evaluated on a four-point Likert-type scale, where 1 = completely disagree, and 4 = completely agree. The possible cumulative score ranges from 15 to 60, with a higher score indicating more positive attitudes toward treatment in UI care. The scale contains seven positively and eight negatively worded items. In previous studies, the scale's internal consistency measure ranged from 0.65 to 0.70.

Permission to use both questionnaires was obtained from the author.

Translation procedure

A standard translation procedure, including forward, back translation, and reconciliation, was applied to ensure the linguistic validity of the questionnaire [19]. Namely, UIKS and UIAS were translated into Serbian by two independent experts, native Serbian speakers

proficient in English. Subsequently, a back-translation of the Serbian version of the questionnaires was also done by the other two independent experts, who had not anticipated previous translations. The experts (authors of this manuscript) have competencies for translation and professional knowledge in urology and nursing. After that, they verified the synonymy of the back-translation version and original instruments. All the translators and the Serbian language lector conciliated with the final versions of both questionnaires.

Face validity and reliability

A panel of experts consisting of two students and one lecturer from each study program was assembled to assess the face validity of the questionnaires. They were asked to evaluate whether the items in both questionnaires were clear, unambiguous, correctly written, and at an appropriate level of difficulty for the students. Additionally, they assessed whether the instructions on the questionnaire were adequately given. The percentage of "yes" responses was 97%, signalling that the final Serbian version of the questionnaire can be accepted [20] (Appendix 1).

To determine the reliability of UIKS, the Kuder-Richardson Coefficient (K-R 20) was used to measure the internal consistency of the dichotomous items and Cronbach's alpha (α) coefficient was used to assess the reliability of UIAS. K-R 20 showed high reliability of the knowledge scale at 0.83, while α was 0.62 for the attitude scale.

Data analysis

Data analysis was performed using descriptive and inferential statistics. The normality of the data distribution was assessed using the Kolmogorov-Smirnov test. Numerical characteristics are presented using descriptive statistics methods, such as mean values (arithmetic mean), measures of variability (standard deviation, minimum and maximum), and attributive characteristics by absolute and relative frequency. The significance of the differences was determined using the independent sample Student's t-test and the ANOVA with the appropriate follow-up test (post hoc test). Pearson's linear correlation coefficient (r) was used to determine the degree of association between students' knowledge and attitudes about UI. Statistical processing and analysis of the obtained results were performed using the software package IBM SPSS 28, and all tests were two-sided with a significance level of $p < 0.05$.

Ethics approval and consent to participate

The study was conducted following ethical principles for the protection of human subjects. Approval was obtained from the Faculty of Medicine Commission for the Ethics

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Table 1 Sociodemographic characteristics of healthcare students

Variable	Study program			
	Total	Medicine	Nursing	Physiotherapy
	n (%)	*n* (%)	*n* (%)	*n* (%)
Gender				
Male	103 (27.2)	99 (64.3)	110 (85.3)	66 (69.5)
Female	275 (72.8)	55 (35.7)	19 (14.7)	29 (30.5)
The course whose focus is UI				
Yes	287 (75.9)	113 (73.4)	120 (93.0)	54 (56.8)
No	91 (24.1)	41 (26.6)	9 (7.0)	41 (43.2)
Interest in learning more about UI				
Yes	297 (78.6)	119 (77.3)	110 (85.3)	68 (71.6)
No	81 (21.4)	35 (22.7)	19 (14.7)	27 (28.4)
Family member with a diagnosis of UI				
Yes	38 (10.1)	17 (11.0)	15 (11.6)	6 (6.3)
No	340 (89.9)	137 (89.0)	114 (88.4)	89 (93.7)
Previously finished school				
Secondary medical school	260 (68.8)	84 (54.5)	99 (76.7)	77 (81.1)
Grammer school	113 (29.9)	70 (45.5)	27 (20.9)	16 (16.8)
Other school	5 (1.3)	---	3 (2.3)	2 (2.1)

Table 2 Mean values and measures of variability on the UIKS for the whole sample

Domains	Min	Max	Mean	SD
UI Risk factors	0	5	2.6	1.2
UI Symptoms	0	5	3.5	0.8
Impact of UI on the quality of life	0	5	4.3	0.9
UI Prevention	0	5	2.4	1.4
UI Treatment	0	4	1.9	1.0
UI Control	0	5	1.8	1.0
Total score	1	24	16.6	3.9

Results

General characteristics of healthcare students

Most students, $n = 275$ (72.8%), were female, and the average age was M = 22.7 SD = 2.7. The youngest student was 19, and the oldest was 48 years. More than half of students previously completed secondary medical school $n = 260$ (68.8%), and $n = 5$ (1.3%) other schools, while $n = 113$ (29.9%) students completed high school. Also, $n = 287$ (75.9%) stated that within the study program, they had a course/s focused on UI, and almost as many $n = 297$ (78.6%) expressed an interest in learning more about UI. A family member diagnosed with UI had $n = 38$ (10.1%) students. The sociodemographic characteristics of students who participated in the study according to the study program are shown in Table 1.

Healthcare students' knowledge and attitudes about urinary incontinence

The total mean score on the UIKS was (M = 16.6, SD = 3.9) out of a maximum of 30. The highest mean score that students achieved in knowledge about the impact of UI on quality of life was (M = 4.3, SD = 0.9), and the lowest score was in the domain of knowledge of symptom control (M = 1.8, SD = 1.0) (Table 2).

The distribution of healthcare students' correct answers to the items from UIKS is shown in Table 3. These results indicate that no student knew that taking medication was not a sufficient and effective treatment for urinary incontinence (item 23). That surgical treatment could completely solve the problem of urinary incontinence was known by $n = 110$ (29.1%) students (item 25). In comparison, only $n = 32$ (8.5%) correctly answered that pads or diapers are not used to treat urinary incontinence (item 30) or that the frequency of UI cannot be reduced by restricting fluid intake $n = 154$ (40.7%).

Students' knowledge of UI prevention was also poor (Table 3.). Namely, less than half $n = 144$ (38.1%) knew that preventing smoking (item 19) and preventing obesity $n = 176$ (46.6%) could reduce the risk of UI (item 18). Only every fifth student $n = 74$ (19.6%) answered that urinary continence improves by treating constipation (item 16). Concerning risk factors, most students $n = 326$ (86.2%) knew that recurrent urinary tract infections can cause urinary infections (item 2). In comparison, only $n = 94$ (24.9%) students answered correctly that UI is not a normal phenomenon after childbirth (item 5) and that UI is not an integral part of ageing $n = 140$ (37.0%) (item 4). The highest percentage of correct answers (more than 90%) was given by students to the items from the domain

Table 3 The distribution of healthcare students' correct answers to the items from UIKS

	n	%
Risk factors		
1. Taking antihypertensive, antianxiety agents, or sleeping pills can lead to urinary incontinence	201	53.2
2. Recurrent urinary tract infection can cause urinary incontinence	326	86.2
3. Drinking alcohol or coffee can increase the risk of urinary incontinence	211	55.8
4. Urinary incontinence is a normal part of ageing	140	37.0
5. Urinary incontinence is a normal occurrence after childbirth	94	24.9
Symptoms		
6. Urinary incontinence is the condition of involuntary leakage of urine.	355	93.9
7. Urinary incontinence can happen with exertion, coughing or sneezing	345	91.3
8. Urinary incontinence can occur with frequent urgent sense, a sudden, strong desire to void and an inability to hold urine	311	82.3
9. Urinary incontinence can be periodic or continuous leakage of urine both day and night without the ability to perceive a full bladder	282	74.6
10. Urinary incontinence can be continuous loss of urine without the ability to sense the urge to void or control urine flow	29	7.7
Impacts		
11. Urinary incontinence can restrict the activities of daily living and sexual activities	347	91.8
12. Urinary incontinence can restrict social activities	347	91.8
13. Urinary incontinence can lead to psychological distress, such as anxiety, depression, and low self-esteem	353	93.4
14. Urinary incontinence can cause an economic burden	216	57.1
15. Urinary incontinence can change patients' lifestyle and decrease their quality of life	353	93.4
Prevention		
16. Avoiding constipation can promote urinary continence	74	19.6
17. Controlling diseases, such as diabetes mellitus, Parkinson's disease or dementia, can reduce the risk of urinary incontinence	202	53.4
18. Avoiding obesity can reduce the risk of urinary incontinence	176	46.6
19. Avoiding smoking can reduce the risk of urinary incontinence	144	38.1
20. Doing pelvic floor exercises can reduce the risk of urinary incontinence	321	84.9
Treatment		
21. Doing pelvic floor exercises can help with the treatment of urinary incontinence	345	91.3
22. Increasing the time interval between voiding episodes can improve urinary continence	180	47.6
23. Taking medications is an independent and effective treatment for urinary incontinence.	0	0.0
24. People with cardiac disease, hypertension, or diabetes mellitus can receive medicine treatment for urinary incontinence	113	29.9
25. Surgical treatment can solve the problem of urinary incontinence completely	110	29.1
Management		
26. Limiting fluid intake can reduce the frequency of urinary incontinence.	154	40.7
27. Going to the toilet more often can reduce the frequency of urinary incontinence	159	42.1
28. Reducing strenuous exercises can reduce the frequency of urinary incontinence	155	41.0
29. Scheduled toileting can reduce the frequency of urinary incontinence	196	51.9
30. Pads or diapers can be used to manage urinary incontinence	32	8.5

Table 4 Means and measures of variability on the UIAS for the entire sample

Domains	Min	Max	Mean	SD
UI Symptoms and Prevention	5	20	11.3	2.3
UI Treatment	8	20	15.1	1.9
UI Control	6	19	15.7	2.0
Total UIKS	31	57	45.1	4.6

of the impact of UI on the quality of life (items 11 to 15), except for item 14, that urinary incontinence can cause a financial burden.

The total mean score on the UIAS was (M = 45.1, SD = 4.6) out of a maximum of 60, indicating that students had positive attitudes. Students showed the most positive attitudes in the domain of UI control (M = 15.7, SD = 2.0) (Table 4).

An analysis of the items in the UI symptoms and prevention domain showed that 133 (35.2%) students thought discussing UI unpleasant, and 264 (69.8%) thought it unpleasant to have UI. Also, $n = 288$ (76.2%) students believed that UI could be prevented, while $n = 298$ (78.8%) believed that surgical treatment of UI was unnecessary and unsafe for older adults.

The differences in the students' knowledge levels and attitudes about UI are shown in Table 5. One-way analysis of variance (ANOVA) revealed a significant difference in students' knowledge level (mean score on the UIKS) concerning the study program (F = 22.907, df = 2, $p < 0.001$). Specifically, medical students had a higher mean UIKS score than nursing and physiotherapy students. Additionally, a significant difference was found (t = 3.447, df = 376, $p < 0.001$) in the student's knowledge

Table 5 Differences in healthcare students' knowledge (mean UIKS score) and attitudes toward UI (mean UIAS score) according to sociodemographic characteristics

Variable		UIKS			UIAS		
		Mean (SD)	t/F	p	Mean (SD)	t/F	p
Gender	Male	16.7 (4.1)	−0.213	ns	45.3 (4.7)	−0.495	ns
	Female	16.6 (3.9)			45.1 (4.5)		
Study program	Medicine	17.9 (3.5)	22.907	< 0.001	44.7 (4.8)	1.990	ns
	Nursing	16.5 (3.6)			45.1 (4.5)		
	Physiotherapy	14.6 (4.2)			45.9 (4.2)		
The course whose focus is UI	Yes	17.0 (3.6)	3.447	< 0.001	45.2 (4.5)	0.838	ns
	No	15.4 (4.6)			44.8 (4.6)		
Interest in learning more about UI	Yes	16.8 (3.6)	1.854	ns	45.3 (4.5)	0.917	ns
	No	15.9 (4.9)			44.7 (4.8)		
Family member with a diagnosis of UI	Yes	17.3 (3.3)	1.205	ns	45.6 (5.4)	0.625	ns
	No	16.5 (3.9)			45.1 (4.5)		
Previously finished school	Secondary medical school	16.6 (3.9)	0.300	ns	45.5 (4.6)	2.240	0.026
	Grammer school	16.5 (3.9)			44.4 (4.1)		

Abbreviations: F, One-way ANOVA, t, Student test

level (mean UIKS score) concerning whether they had a course whose focus was UI. Regarding the students' other characteristics, no significant differences were observed in their UI knowledge.

However, a significant difference in student attitudes about UI was noticed only in the previous school completed (t = 2.240, df = 376, *p* = 0.026). Concerning other students' characteristics, there were no significant differences in their attitudes about UI (Table 5).

Correlation between healthcare students' knowledge and attitudes about urinary incontinence

The correlation between students' knowledge and attitudes about UI was explored using the Pearson linear correlation coefficient (r). A statistically significant (*p* = 0.004) but weakly positive correlation (*r* = 0.146) between these two phenomena was found.

Discussion

The study results show that healthcare students in Serbia had low knowledge (16.6 ± 3.9/30) and positive attitudes about UI (45.1 ± 4.6/60). Although most students (75.9%) declared that within their study program, they took a course in which UI was the focus, the low level of knowledge indicates that UI may not have been given enough attention within the study programs. This result is consistent with a study by McClurg et al. [15], which showed that the average number of hours in medicine, nursing, midwifery, physical therapy, and occupational therapy curricula was 4.7, with 14% of program leaders reporting no continence care education.

Students had the lowest knowledge level in UI treatment (1.9 ± 1.0/5) and UI control domain (1.8 ± 1.0/5), whereby none of the surveyed students knew medication was a sufficient and effective treatment for urinary incontinence. The failure of conservative treatment or advanced UI due to previous inadequate treatment or late seeking assistance from health professionals requires surgical intervention [1, 21]. However, only 29.1% of students in our study knew that surgical treatment could completely solve the problem of UI, and also as many as 78.8% of students thought that surgical treatment of UI is unnecessary and unsafe for older adults. The opposite results were shown by Polish medical students, who mostly gave correct answers about the methods used in the surgical treatment of UI [17].

An analysis of knowledge levels in the UI control domain revealed that more than half of the students supposed that fluid restriction could reduce the frequency of UI, which was mistaken. Namely, extreme fluid restriction produces concentrated urine, which is assumed to irritate the bladder, leading to frequent and urgent need to urinate and urinary tract infection [22]. Maintaining adequate fluid levels is crucial. An adult's average daily fluid intake should be approximately 1,500 mL or 30 mL/kg of body weight. However, it can vary with age, health, activity level, and weather conditions. Insufficient fluid intake can also contribute to constipation, while excessive fluid intake can increase problems with urinary continence and voiding [23].

Our students showed an insufficient level of knowledge in the domain of prevention (2.4 ± 1.4/5) and risk factors for UI (2.6 ± 1.2/5). Less than half of the students knew that preventing obesity and smoking can reduce the risk of UI, and similar results were obtained by assessing the knowledge of UI among medical students in Poland [17]. Obesity and smoking are significant preventable risk factors for UI. Obesity is assumed to increase the risk of stress urinary incontinence (SUI) by increasing intra-abdominal pressure, leading to chronic pelvic floor stress.

At the same time, smoking is considered a preventable risk factor for SUI due to frequent episodes of coughing and for overactive bladder syndrome (OAB) due to bladder irritation by nicotine and toxins excreted in the urine [22].

Concerning other risk factors, most students in our study considered UI a normal occurrence after childbirth and an integral part of ageing, comparable with other studies' results [18, 24]. Furthermore, a comparative study of future health professionals' knowledge of risk factors for SUI revealed differences in their understanding. Medical students with the highest percentage indicated genetic factors and obesity, nursing and midwifery students pregnancy and childbirth, while physiotherapy students were the only ones who identified two opposite factors: insufficient physical activity and excessive exercise [25]. Another study also confirmed that physiotherapy students emphasise significant physical exertion as a risk factor for SUI [26]. However, all healthcare student groups were unaware of mental factors and neurological diseases as risk factors for SUI [25].

Although the frequency of UI increases with ageing, a partially negative and outdated attitude that UI is an integral part of ageing may influence the involvement of future health professionals in continence care, or they do not consider it a priority. This attitude leads to delayed treatment and consequences for the physical and psychosocial well-being of patients with UI and their family members [27, 28].

This research determined that students' knowledge of UI differs depending on the study program. In order to understand the problems and treatment of UI, among other issues, knowledge of courses such as anatomy, physiology, pathophysiology, pharmacology, and surgery, which students of integrated medical studies learn far more extensively than nursing and physiotherapy students, is necessary. This fact can explain the difference in knowledge among the study programs included in this research.

Ostaszkiewicz et al. [29]. reported that the knowledge and understanding of UI among healthcare professionals affects their service provision to people with UI and that lack of knowledge is a barrier to effective UI treatment. In our study, most students (78.6%) were interested in learning more about UI. Given that the care of patients with UI must essentially have a multidisciplinary approach, there is a recommendation for applying an interprofessional active-learning strategy in order to enable better outcomes for complex health problems such as UI and strengthen teamwork in patient-centred care [30].

Our study revealed that healthcare students had positive attitudes about UI, regardless of the low knowledge level achieved on the knowledge scale about UI. Students showed the most positive attitudes in the domain of UI control. However, in the domain of symptoms and prevention of UI, most students felt that discussing and having UI is unpleasant. Also, most students believed UI treatment was frustrating. Although various factors, such as culture or university lectures, can significantly influence students' attitudes towards UI, our study's results are comparable to those reported among students in Hong Kong [18] and the United States of America [31]. These results suggest that lecturers who transfer their knowledge about UI to students are obligated to convey positive attitudes toward UI to students as future healthcare professionals.

The difference in attitudes about UI between female and male students was not statistically significant. Cheng et al. [18] obtained the opposite result, where male students showed more negative attitudes about UI than female colleagues. The authors of this study state that these gender differences in attitude may also explain why men with UI are less likely to seek assistance from healthcare professionals regarding treatment compared to women.

Our study found a significant positive but weak correlation between knowledge and student attitudes about UI, which corresponded to a study conducted among nursing students in Hong Kong [18]. The results indicate that healthcare students who scored higher on the UI knowledge scale also have more positive attitudes toward UI, suggesting that enhancing continence care requires educational strategies that emphasise addressing the emotional aspects of incontinence management rather than just focusing on acquiring knowledge about UI.

Strengths and limitations of the study

This study has several strengths that contribute to its value in advancing knowledge and improving healthcare education. First, it addresses an important yet underexplored topic critical for enhancing the care provided to patients with UI. Second, the study includes participants from three different healthcare programs (medicine, nursing, and physiotherapy), enabling comparisons across disciplines and offering insights into the varied educational needs of future healthcare professionals. Third, validated instruments, such as the UIKS and the UIAS, ensure the reliability and validity of the data collected. Additionally, the study achieved a sufficient response rate (59.1%), enhancing its representativeness within the context of a single institution.

However, some potential limitations of the study's methodology can be noted, which limit the generalizability of the results. First, this is a cross-sectional design with non-probability sampling (convenience sample), which may prevent determining cause-effect relationships. Second, the study was conducted at only one university, which may not fully represent students from

other institutions. Third, pharmacy students were not included in the sample despite their important role in patient care, particularly in medication management and patient education. Including pharmacy students in future research would allow a more comprehensive comparison of knowledge and perceptions across all healthcare-related disciplines.

Conclusion and recommendations

The findings highlight a concerning gap in understanding UI among students despite their pivotal role as future healthcare professionals. While students expressed interest in learning more about UI, their knowledge levels were low across various domains. Students exhibited the lowest knowledge levels in areas crucial for effective UI management, such as treatment modalities and symptom control. However, significant attitude variations were observed based on the student's previously finished school, suggesting the influence of educational background and experience on their perceptions.

The findings of this study highlight the importance of preparing new healthcare graduates to provide fundamental care in an empathetic, culturally sensitive, and patient-centred manner. This preparation can be achieved through experiential learning and comprehensive interprofessional educational strategies. By learning and practising collaboration, medical, nursing, and physiotherapy students can bridge knowledge gaps and foster a positive attitude towards UI. Such interventions are essential for developing the clinical skills of healthcare students, enabling them to implement and enhance patient continence care and improve the quality of life for individuals living with UI.

Abbreviations

UI	Urinary incontinence
UIKS	The Urinary Incontinence Knowledge Scale and
UIAS	The Urinary Incontinence Attitude Scale
K-R 20	Kuder-Richardson Coefficient
SUI	Stress urinary incontinence
OAB	Overactive bladder syndrome
STROBE	The Strengthening the Reporting of Observational Studies in Epidemiology guidelines
M	Mean
SD	Standard deviation
F	One-way ANOVA
t	Student test

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12909-025-06688-9.

> Supplementary Material 1

Author contributions
Dragana Milutinović: Conceptualization, study design, supervision, data analysis, original draft writing, and substantive revisions. Dragana Simin: Data collection, analysis, and original draft writing. Marijana Ostoić and

Sonja Golubović: Data collection and original draft writing. Dragana Živković: Conceptualization, study design, supervision, original draft writing, and substantive revisions. All authors have approved the final version for submission.

Data availability
The data supporting this study's findings are available upon request from the corresponding author.

Declarations

Ethics approval and consent to participate
The study was conducted following ethical principles for the protection of human subjects. Approval was obtained from the Faculty of Medicine Commission for the Ethics of Clinical Research, the University of Novi Sad, Serbia 01–39/239/1 of September 9, 2022. Students received a written statement explaining the purpose of the study, anonymous and voluntary participation, and a guarantee that (non)participation in the study will not affect their further education. Informed consent to participate was obtained from all students who participated in the study.

Consent for publication
Not applicable.

Conflict of interest
The authors of this manuscript have no conflict of interest to report.

Clinical trial number
Not applicable.

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