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NURSES' PERCEPTIONS, KNOWLEDGE, AND EXPERIENCES OF ADVERSE EVENTS IN CLINICAL PRACTICE

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ABSTRACT

Background: Patient safety is a fundamental component of high-quality healthcare, and the reporting of adverse events is a crucial mechanism for risk identification and preventing error recurrence in clinical practice.

Methods: A cross-sectional study was conducted among nurses and nursing technicians in clinical practice in Croatia between March 4 and April 7, 2025. Data were collected using a structured, author-designed questionnaire distributed via Google Forms, applying a snowball sampling method. Participation was voluntary and anonymous, and only fully completed questionnaires from eligible respondents were included in the analysis. The questionnaire comprised four sections: sociodemographic characteristics, perceptions of adverse events, knowledge of adverse event definitions and reporting systems, and personal experiences with adverse events, including reporting practices and preventive measures.

Results: Statistically significant differences in knowledge of adverse events were observed with respect to age ($p = 0.021$), level of education ($p = 0.004$), and job position ($p = 0.014$), with higher knowledge levels more frequently identified among older participants, those with graduate or postgraduate education, and those in managerial roles. Higher knowledge levels were significantly associated with key aspects of clinical practice, including more frequent reporting of adverse events ($p = 0.010$), greater exposure to adverse events ($p = 0.030$), witnessing unreported events ($p = 0.015$), implementation of preventive measures ($p = 0.013$), and perceived pressure not to report ($p = 0.034$). Additionally, a significant association was found between the frequency of education and reporting behavior ($p = 0.007$), indicating that repeated participation in educational programs contributes to increased reporting of adverse events.

Conclusions: The findings highlight the need for ongoing education for healthcare professionals, strengthened institutional support, and a work environment that encourages reporting without fear of sanction. Improving reporting systems and promoting a culture of safety may contribute to more effective prevention of adverse events, enhanced patient safety, and improved overall healthcare quality.

Keywords: *education, nurses, adverse events, reporting, patient safety.*

INTRODUCTION

According to the World Health Organization, patient safety is defined as the prevention and reduction of risks, errors, and harm associated with healthcare delivery (1). Although closely related, patient safety represents a narrower construct within the broader concept of healthcare quality, which also includes effectiveness, accessibility, and patient satisfaction. In the Republic of Croatia, patient safety is regulated through legislative mechanisms that define quality standards, accreditation procedures, and supervision of healthcare practices (2).

Adverse events are incidents that occur during healthcare provision and may result in patient harm, including injury, complications, disability, or death (3). They arise from multifactorial causes, including human error, systemic failures, organizational deficiencies, and unpredictable clinical complications (4). Their incidence is substantial,

affecting up to 10% of hospitalized patients, with approximately half considered preventable. In Croatia, adverse events are classified into unexpected and other categories, each subject to structured reporting obligations to the Ministry of Health (5). Unexpected adverse events are rare but severe and require immediate action, encompassing critical incidents such as wrong-site surgery, severe pharmacological errors, or neonatal and maternal complications (6). Other adverse events, monitored through periodic reporting, include indicators such as hospital-acquired infections, postoperative complications, patient falls, and adverse drug reactions (7).

Adverse events represent a significant burden for healthcare systems, contributing to worsened clinical outcomes, prolonged hospitalization, increased costs, and mortality (8). Their occurrence is strongly influenced by organizational and structural factors, including inadequate staffing, poor communication, lack of standardized procedures, and insufficient coordination among healthcare teams (8, 9). High workload extended working hours, and burnout among healthcare professionals further increase the likelihood of errors, with evidence indicating that prolonged shifts significantly elevate risk (4).

Beyond clinical consequences, adverse events may lead to legal proceedings, financial losses, and erosion of patient trust, as well as long-term psychological effects for affected patients (8). Nurses play a critical role in early detection and prevention, as most adverse events are preceded by identifiable warning signs. Preventive strategies include adherence to safety protocols, accurate medication administration, infection control measures, and patient education, supported by effective interprofessional collaboration (10, 11).

Organizational context remains a key determinant of patient safety. Factors such as nurse-to-patient ratios, managerial support, and working conditions directly influence both the incidence of adverse events and reporting behaviors. A lack of supportive work environments may discourage reporting and compromise safety (12, 13). Indeed, underreporting is a persistent issue, often driven by fear of sanctions or legal consequences. Promoting a safety culture that emphasizes transparency, ethical accountability, and non-punitive reporting is therefore essential (14, 15).

Communication failures constitute a major contributor to adverse events, with more than 60% of incidents linked to ineffective information exchange within healthcare teams. Standardized communication tools, such as SBAR (S - Situation, B – Background, A – Assessment, R – Recommendation) and closed-loop communication, have been shown to improve coordination and reduce errors (16, 17). Furthermore, structured reporting systems enable systematic analysis of adverse events through root cause analysis, facilitating the development of corrective and preventive measures while ensuring confidentiality and encouraging reporting (18, 19).

Transparency in disclosing adverse events to patients and families—characterized by timely, honest, and empathetic communication—represents a critical ethical component of patient safety, despite ongoing challenges related to legal and reputational concerns (20, 21).

Adverse events, although often preventable, persist due to structural limitations, communication failures, and cultural barriers to reporting. Effective mitigation requires not only technical and procedural interventions but also the development of a supportive safety culture, continuous education, and transparent reporting systems. Such an integrated approach is essential for improving clinical outcomes, strengthening patient trust, and enhancing the overall quality of healthcare delivery.

The main objective of this study is to determine the significance of perception, education, and institutional support in shaping nurses' knowledge and reporting behavior related to adverse events in clinical practice.

METHODS

A cross-sectional study was conducted among nurses and nursing technicians employed in clinical practice in the Republic of Croatia between March 4 and April 7, 2025. Eligible participants were healthcare professionals engaged in direct patient care with relevant work experience in healthcare institutions. Data were collected using a structured, author-designed questionnaire administered via Google Forms.

The sampling strategy followed a snowball approach, whereby participants distributed the survey link to colleagues through social media and personal networks, enabling the inclusion of respondents with diverse professional backgrounds. Participation was voluntary and anonymous. Only fully completed questionnaires from eligible respondents were included in the final analysis, while incomplete responses and those not meeting employment criteria were excluded.

The questionnaire comprised four sections. The first section collected sociodemographic data, including gender, age, level of education, years of professional experience, type of healthcare institution, job position, and shift-work status. The second section assessed participants' perceptions of adverse events in healthcare through seven questions with predefined response options (yes, no, not sure). The third section evaluated respondents' knowledge of adverse events through six questions addressing definitions, examples, and reporting systems. Knowledge levels were categorized as follows: excellent knowledge (6 correct

answers), good knowledge (5 correct answers), basic knowledge (4 correct answers), and insufficient knowledge (3 or fewer correct answers). The fourth section included questions on personal experiences with adverse events, with predefined response options. All items were closed-ended, and some questions allowed multiple responses.

The questionnaire was specifically developed by the authors for the purposes of this study, drawing upon relevant legislative frameworks governing patient safety and quality of care, as well as the practical expertise of healthcare professionals working in hospital quality management departments.

This study was conducted in accordance with the fundamental ethical principles of scientific research. At the beginning of the questionnaire, participants were provided with an informed consent form detailing the study's purpose and objectives, data collection procedures, the guarantee of anonymity, and the voluntary nature of participation. Participants were told that they could discontinue participation in the questionnaire at any time without consequences. No personal data that could enable participant identification was collected, thereby ensuring anonymity. The collected data were used exclusively for research purposes and were presented in aggregate.

Categorical variables are presented as absolute and relative frequencies. Differences between categorical variables were examined using the chi-square test (χ^2). All p-values were interpreted as two-sided, and statistical significance was set at $\alpha = 0.05$. Statistical analyses were performed using IBM SPSS Statistics for Windows, version 26.0 (IBM Corp., Armonk, NY, 2019).

RESULTS

A total of 136 participants took part in the study. As shown in Table 1, most respondents were female (81.6%), whereas males accounted for 18.4% of the sample. The most represented age group was 26–35 years, accounting for 39.0% of participants. Regarding education, most respondents had completed an undergraduate degree (50.7%), while 26.5% had completed secondary school. Regarding professional experience, the largest proportion of participants (32.4%) reported more than 20 years of experience, and none reported less than 1 year. The most significant proportion of respondents were employed at a clinical hospital center (39.7%), followed by a clinical hospital (19.9%) and a general hospital (14.7%). Regarding job position, the majority of participants (68.4%) were employed as general care nurses or nursing technicians. Most respondents reported shift work (64.7%).

Table 1. Sociodemographic characteristics of the participants.

		N	%
Sex	Male	25	18.4
	Female	111	81.6
	I don't want to answer	0	0,0
	Total	**136**	**100**
Age	18-25 years	19	14.0
	26-35 years	53	39.0
	36-45 years	29	21.3
	46-55 years	26	19.1
	56 years and more	9	6.6
	Total	**136**	**100**
Level of education	Secondary school education	36	26.5
	Bachelor of Nursing	69	50.7
	Master's degree in nursing	23	16.9
	Specialist postgraduate study	8	5.9
	Doctoral study	0	0.0
	Total	**136**	**100**
Work experience	Less than one year	0	0.0
	1-5 years	32	23.5
	6-10 years	27	19.9
	11-20 years	33	24.3
	More than 20 years	44	32.4
	Total	**136**	**100**
Type of healthcare institution	General hospital	20	14.7
	Clinical hospital	27	19.9
	Clinical hospital center	54	39.7
	Special hospital	7	5.1
	Community health center	15	11.0
	Others	13	9.6
	Total	**136**	**100**
Workplace	Staff Nurse	93	68.4
	Nurse Manager (Ward)	12	8.8
	Clinical Nurse Manager (Department)	6	4.4
	Director of Nursing	5	3.7
	Others	20	14.7
	Total	**136**	**100**
Shift work	Yes	88	64.7
	No	48	35.3
	Total	**136**	**10**

Data presented in Table 2 indicates that 78.7% of respondents believe that adverse events in healthcare are inevitable, while 87.5% state that reporting such events is essential for patient safety. When asked whether to promote a safety culture and open reporting, 49.3% of respondents answered affirmatively. Anonymous reporting as a means of increasing the number of reports was supported by 78.7% of participants. In addition, 69.1% of respondents believe that nurses avoid adverse events for fear of sanctions, and 91.2% believe that adverse events often result from excessive workloads and staff shortages.

Table 2: Respondents' perception of adverse events.

		N	%
Do you think adverse events in healthcare are inevitable?	Yes	107	78.7
	No	15	11.0
	I'm not sure	14	10.3
	Total	**136**	**100**
Do you think reporting adverse events is essential for patient safety?	Yes	119	87.5
	No	5	3.7
	I'm not sure	12	8.8
	Total	**136**	**100**
Do you feel that your institution promotes a culture of safety and open reporting of adverse events?	Yes	67	49.3
	No	38	27.9
	I'm not sure	31	22.8
	Total	**136**	**100**
Do you think that the adverse event reporting system in your institution allows for quick and easy reporting?	Yes	64	47.1
	No	42	30.9
	I'm not sure	30	22.1
	Total	**136**	**100**
How much do you think anonymous reporting of unwanted events would increase the number of reports?	Yes	107	78.7
	No	10	7.4
	I'm not sure	19	14.0
	Total	**136**	**100**
Do you think that nurses/technicians avoid reporting adverse events due to fear of sanctions?	Yes	94	69.1
	No	18	13.2
	I'm not sure	24	17.6
	Total	**136**	**100**
Do you think that adverse events are often the result of overload and a lack of staff?	Yes	124	91.2
	No	5	3.7
	I'm not sure	7	5.1
	Total	**136**	**100**

Analysis of respondents' knowledge of adverse events indicates that 55.1% correctly defined an adverse event as harm caused to a patient by a medical intervention or medication, whereas 41.2% misinterpreted it as any disruption during treatment without consequences. Only 0.7% associated adverse events were exclusively associated with patient death.

Regarding the classification of adverse events, most respondents (81.6%) correctly identified unexpected adverse events as a category, while 66.9% recognized events affecting healthcare staff. However, only 39.0% identified events that were intercepted before harm occurred, indicating gaps in conceptual understanding

Among specific adverse events, patient falls (92.6%) and medication administration errors (83.1%) were most frequently identified, followed by pressure ulcers (66.2%) and hospital-acquired infections (53.7%). In contrast, significantly fewer respondents identified sepsis (26.5%), adverse drug reactions (33.1%), or system-related issues such as staff shortages (16.2%) as adverse events.

Knowledge of unexpected adverse events was relatively high, with 83.8% recognizing death or severe harm due to incorrect pharmacotherapy and 79.4% identifying surgery on the wrong patient. However, 14.7% of patients were incorrectly classified as having dissatisfaction as an unexpected adverse event.

Nearly all respondents (97.8%) correctly identified patient safety improvement and prevention of recurrence as the primary purpose of reporting adverse events, while none associated reporting with punitive measures (Table 3).

Respondents' knowledge of adverse events was categorized into four levels based on the number of correct responses: insufficient knowledge (≤3 correct answers), basic knowledge (4 correct answers), good knowledge (5 correct answers), and excellent knowledge (6 correct answers). This categorization enabled a more precise differentiation of knowledge levels and facilitated subsequent analyses of associations between knowledge and sociodemographic and professional variables.

Table 3: Respondents' knowledge of adverse events.

		N	%
How is an adverse event defined in healthcare?	Any situation that interferes with the normal course of treatment, but without consequences	56	41.2
	Harm caused to the patient due to a medical intervention or medication	75	55.1
	Only events resulting in patient death	1	0.7
	Complications of the disease that were inevitable	4	2.9
List the categories of adverse events in healthcare.	Sentinel adverse event	111	81.6
	Near miss	53	39.0
	An event following a surgical procedure complication	42	30.9
	Adverse events towards staff	91	66.9
	I don't know.	18	13.2
Indicate which of the following is an adverse event	Patient falls in the hospital	126	92.6
	Sepsis	36	26.5
	Pressure injury	90	66.2
	Nurses' dissatisfaction	29	21.3
	Lack of staff	22	16.2
	Incorrect use of medication	113	83.1
	Side effect of the drug	45	33.1
	Hospital infection	73	53.7
	Discharge of a patient without a discharge letter	52	38.2
	Patient's self-initiated departure from home	32	23.5
How is an unexpected adverse event defined?	Unexpected death or serious physical or mental injury unrelated to the natural course of the disease	93	68.4
	Any side effects of the drug	3	2.2
	Complication of the surgical procedure	35	25.7
	Patient dissatisfaction with treatment	5	3.7
Why is it important to report adverse events?	Improving patient safety and preventing recurrence of the same events	133	97.8
	Finding and sanctioning responsible persons	0	0
	Fulfillment of administrative obligations of healthcare institutions	3	2.2
	Reducing the financial costs of the institution	0	0
Mark an unexpected adverse event	Surgery on the wrong patient	108	79.4
	Death or serious health damage due to incorrect pharmacotherapy	114	83.8
	Transfusion reaction due to ABO incompatibility	91	66.9
	Patient dissatisfaction with healthcare service	20	14.7

Analysis of respondents' experiences with adverse events showed that all participants received education on adverse events and their reporting, with the majority (80.1%) attending training only once and 19.9% participating multiple times. Most respondents (69.9%) reported encountering adverse events several times in their professional careers, 13.2% once, and 16.9% had no prior experience.

A total of 62.5% of respondents reported having reported an adverse event, whereas 37.5% had never submitted a report. Notably, a high proportion of participants (67.7%) reported witnessing adverse events that were not reported, most frequently on multiple occasions (51.5%).

Following adverse events, 62.5% of respondents implemented preventive measures in collaboration with colleagues and superiors, while 16.9% independently modified their work practices. However, 20.6% reported taking no action, either due to lack of opportunity or perceived lack of necessity.

Regarding institutional practices, only 17.6% of respondents reported that analyses of adverse events were conducted regularly, 25.0% reported occasional analyses, and 12.5% indicated that such analyses were rare. A substantial proportion (44.9%) were unaware of how analyses were conducted in their institutions.

Concerning reporting pressures, 9.6% of respondents reported being directly instructed not to report adverse events, while 16.9% experienced indirect pressure. Although the majority (61.8%) reported no such experiences, these findings suggest barriers to transparent reporting in clinical settings (Table 4).

Table 4: Respondents' experiences with adverse events.

		N	%
Have you received training on adverse events and their reporting?	Yes, several times	27	19.9
	Yes, once	109	80.1
	No	0	0.0
	Total	**136**	**100**
Have you encountered an adverse event during your career?	Yes, once	18	13.2
	Yes, several times	95	69.9
	No	23	16.9
	Total	**136**	**100**
Have you ever reported an adverse event?	Yes	85	62.5
	No	51	37.5
	Total	**136**	**100**
Have you ever witnessed an adverse event that was not reported?	Yes, several times	70	51.5
	Yes, once	22	16.2
	No	44	32.4
	Total	**136**	**100**
Did you implement any preventive measures after the adverse event to reduce the risk of such events recurring?	Yes, in agreement with superiors and colleagues	85	62.5
	Yes, I changed my approach to working independently.	23	16.9
	No, because I didn't have the opportunity or support to do so.	18	13.2
	No, because I didn't think it was necessary.	10	7.4
	Total	**136**	**100**
How often are analyses of reported adverse events conducted at your institution?	Regularly, after every significant event	24	17,6
	Occasionally, but not after every event	34	25,0
	Rarely is there a systematic approach to analysis	17	12,5
	I don't know.	61	44,9
	Total	**136**	**100,0**
Have you ever been forced/indirectly encouraged not to report an adverse event?	Yes, they directly told me not to report it.	13	9,6
	Yes, I felt indirect pressure	23	16,9
	No, I've never been in that situation.	84	61,8
	I don't know.	16	11,8
	Total	**136**	**100,0**

According to the data presented in Table 6, no statistically significant differences in knowledge levels were identified according to gender (p = 0.644) or shift work (p = 0.195). Statistically significant differences in knowledge were observed according to age (p = 0.021), education level (p = 0.004), and job position (p = 0.014). The highest level of knowledge (excellent) was achieved more frequently by participants aged ≥45 years and those with graduate or postgraduate education. In addition, respondents in managerial positions (head nurses/nursing managers) achieved higher scores than general care nurses. Length of professional experience and type of healthcare institution were not statistically significantly associated with knowledge level (p = 0.178; p = 0.636).

Table 6: Comparison of the level of knowledge of respondents according to sociodemographic characteristics.

		Level of knowledge								P*
		Insufficient		Basic		Good		Excellent		
		N	%	N	%	N	%	N	%	
Sex	Male	0	0.0	10	23.3	8	15.4	7	18.4	0.644
	Female	3	100.0	33	76.7	44	84.6	31	81.6	
	I don't want to answer	0	0.0	0	0.0	0	0.0	0	0.0	
	Total	**3**	**100.0**	**43**	**100.0**	**52**	**100.0**	**38**	**100.0**	
Age	18-25 years	1	33.3	10	23.3	7	13.5	1	2.6	0.021
	26-35 years	0	0.0	17	39.5	21	40.4	15	39.5	
	36-45 years	1	33.3	6	14.0	15	28.8	7	18.4	
	46-55 years	0	0.0	8	18.6	9	17.3	9	23.7	
	56 years and more	1	33.3	2	4.7	0	0.0	6	15.8	
	Total	**3**	**100.0**	**43**	**100.0**	**52**	**100.0**	**38**	**100.0**	
Level of education	High school	2	66.7	16	37.2	14	26.9	4	10.5	0.004
	Bachelor of Nursing	1	33.3	19	44.2	32	61.5	17	44.7	
	Master of Nursing	0	0.0	6	14.0	6	11.5	11	28.9	
	Postgraduate specialist study	0	0.0	2	4.7	0	0.0	6	15.8	
	Doctoral study	0	0.0	0	0.0	0	0.0	0	0.0	
	Total	**3**	**100.0**	**43**	**100.0**	**52**	**100.0**	**38**	**100.0**	
Work experience	Less than one year	0	0.0	0	0.0	0	0.0	0	0.0	0.178
	1-5 years	1	33.3	15	34.9	11	21.2	5	13.2	
	6-10 years	0	0.0	9	20.9	12	23.1	6	15.8	
	11-20 years	0	0.0	7	16.3	11	21.2	15	39.5	
	More than 20 years	2	66.7	12	27.9	18	34.6	12	31.6	
	Total	**3**	**100.0**	**43**	**100.0**	**52**	**100.0**	**38**	**100.0**	
Type of healthcare institution	General hospital	0	0.0	9	20.9	7	13.5	4	10.5	0.636
	Clinical hospital	1	33.3	6	14.0	14	26.9	6	15.8	
	Clinical hospital center	1	33.3	20	46.5	20	38.5	13	34.2	
	Special hospital	0	0.0	1	2.3	2	3.8	4	10.5	
	Community health center	1	33.3	3	7.0	5	9.6	6	15.8	
	Other	0	0.0	4	9.3	4	7.7	5	13.2	
	Total	**3**	**100.0**	**43**	**100.0**	**52**	**100.0**	**38**	**100.0**	
Workplace	Staff Nurse	3	100-0	34	79.1	39	75.0	17	44.7	0.014
	Nurse Manager (Ward)	0	0,0	3	7.0	6	11.5	3	7.9	
	Clinical Nurse Manager (Department)	0	0.0	1	2.3	0	0.0	5	13.2	
	Director of Nursing	0	0.0	0	0.0	1	1.9	4	10.5	
	Others	0	0.0	5	11.6	6	11.5	9	23.7	
	Total	**3**	**100.0**	**43**	**100.0**	**52**	**100.0**	**38**	**100.0**	
Shift work	Yes	3	100.0	30	69.8	35	67.3	20	52.6	0.195
	No	0	0.0	13	30.2	17	32.7	18	47.4	
	Total	**3**	**100.0**	**43**	**100.0**	**52**	**100.0**	**38**	**100.0**	

*chi square test; p>0.05

According to the data presented in Table 7, statistically significant differences in the total number of correct responses were observed with respect to experience in reporting adverse events (p = 0.010), number of encounters with adverse events (p = 0.030), witnessing non-reporting of adverse events (p = 0.015), implementation of preventive measures (p = 0.013), and perceived pressure not to report an event (p = 0.034). Participants with higher knowledge levels reported adverse events more frequently, were more likely to witness non-reporting, and were more likely to implement preventive measures. In addition, among respondents with excellent knowledge, indirect pressure not to report an event was reported more frequently. Education showed a borderline association with knowledge level (p = 0.052), whereas the frequency of institutional analyses was not statistically significant (p = 0.213).

Table 7: Comparison of the level of knowledge of respondents about experiences of adverse events.

		Level of knowledge								P*
		Insufficient		Basic		Good		Excellent		
		N	%	N	%	N	%	N	%	
Have you received training on adverse events and their reporting?	Yes, several times	1	33.3	5	11.6	8	15.4	13	34.2	0.052
	Yes, once	2	66.7	38	88.4	44	84.6	25	65.8	
	No	0	0.0	0	0.0	0	0.0	0	0.0	
	Total	**3**	**100.0**	**43**	**100.0**	**52**	**100.0**	**38**	**100.0**	
Have you encountered an adverse event during your career?	Yes, once	0	0.0	6	14.0	7	13.5	5	13.2	0.030
	Yes, several times	3	100.0	23	53.5	42	80.8	27	71.1	
	No	0	0.0	14	32.6	3	5.8	6	15.8	
	Total	**3**	**100.0**	**43**	**100.0**	**52**	**100.0**	**38**	**100.0**	
Have you ever reported an adverse event?	Yes	1	33.3	19	44.2	36	69.2	29	76.3	0.010
	No	2	66.7	24	55.8	16	30.8	9	23.7	
	Total	**3**	**100.0**	**43**	**100.0**	**52**	**100.0**	**38**	**100.0**	
Have you ever witnessed an adverse event that was not reported?	Yes, several times	1	33.3	20	46.5	27	51.9	22	57.9	0.015
	Yes, once	1	33.3	3	7.0	15	28.8	3	7.9	
	No	1	33.3	20	46.5	10	19.2	13	34.2	
	Total	**3**	**100.0**	**43**	**100.0**	**52**	**100.0**	**38**	**100.0**	
Did you implement any preventive measures after the adverse event to reduce the risk of such events recurring?	Yes, in agreement with superiors and colleagues	3	100.0	18	41.9	41	78.8	23	60.5	0.013
	Yes, I changed my approach to working independently	0	0.0	8	18.6	7	13.5	8	21.1	
	No, because I didn't have the opportunity or support to do so.	0	0.0	10	23.3	4	7.7	4	10.5	
	No, because I didn't think it was necessary.	0	0.0	7	16.3	0	0.0	3	7.9	
	Total	**3**	**100.0**	**43**	**100.0**	**52**	**100.0**	**38**	**100.0**	
How often are analyses of reported adverse events conducted at your institution?	Regularly, after every significant event	0	0.0	6	14.0	11	21.2	7	184	0.213
	Occasionally, but not after every event	1	33.3	6	14.0	13	25.0	14	36.8	
	Rarely is there a systematic approach to analysis	0	0.0	4	9.3	8	15.4	5	13.2	
	I don't know.	2	66.7	27	62.8	20	38.5	12	31.6	
	Total	**3**	**100.0**	**43**	**100.0**	**52**	**100.0**	**38**	**100.0**	
Have you ever been forced/indirectly encouraged not to report an adverse event?	Yes, they directly told me not to report it.	0	0.0	5	11.6	4	7.7	4	10.5	0.034
	Yes, I felt indirect pressure	0	0.0	2	4.7	11	21.2	10	26.3	
	No, I've never been in that situation.	1	33.3	32	74.4	32	61.5	19	50.0	
	I don't know.	2	66.7	4	9.3	5	9.6	5	13.2	
	Total	**3**	**100.0**	**43**	**100.0**	**52**	**100.0**	**38**	**100.0**	

*chi square test; p>0.05

Among participants, those who had attended educational programs multiple times (27.1%) reported more frequent adverse events. In contrast, 92.2% of participants who had never reported an adverse event attended such education only once. This difference was statistically significant ($p = 0.007$), suggesting an association between educational frequency and the reporting of adverse events.

DISCUSSION

The findings indicate a significant association between the perceived importance of adverse event reporting and patient safety knowledge. Participants who considered reporting essential achieved higher knowledge scores, suggesting that attitudes toward safety are closely linked to cognitive competence in this domain. This is consistent with previous research demonstrating a positive relationship between knowledge of patient safety and attitudes toward reporting (22, 23). Recent studies further confirm that patient safety competencies, particularly knowledge, are directly associated with reporting behavior and safety-related practices (24, 25).

In the present study, nearly all participants recognized the importance of reporting adverse events, which aligns with findings that reporting is perceived as an integral component of professional responsibility in healthcare (8, 26). However, a subgroup of participants with lower knowledge levels was less likely to recognize the importance of reporting, suggesting that insufficient knowledge may contribute to underestimating reporting as a preventive strategy. Similar findings have been reported in previous studies, in which a lack of awareness and inadequate knowledge were identified as barriers to reporting (8, 23, 26). Recent evidence indicates that knowledge deficits and uncertainty remain key contributors to underreporting across healthcare systems (27).

Although the overall level of knowledge in this study was satisfactory, inconsistencies were observed, particularly in recognizing adverse events without immediate consequences and in understanding reporting procedures. These findings are consistent with previous studies showing that healthcare professionals often fail to identify near-miss events or events without harm as reportable (23, 26). Such gaps are clinically significant, as failure to report these events limits opportunities for system-level learning and prevention.

Importantly, insufficient knowledge emerged as a key factor limiting reporting behavior. Participants who were uncertain about definitions or reporting criteria were less likely to report adverse events. This is consistent with the literature identifying lack of knowledge as one of the most common reasons for underreporting (8, 23). Moreover, recent data suggest that only a small proportion of adverse events—often estimated at 5–10%—are reported, largely due to uncertainty, administrative burden, and lack of awareness of reporting requirements (27).

Education was identified as a significant determinant of reporting behavior. Participants who had undergone formal education or repeated training in patient safety were more likely to report adverse events and demonstrated greater confidence in using reporting systems. These findings are consistent with studies showing that targeted educational interventions improve both knowledge and reporting frequency (28). For example, structured educational programs have been shown to increase reporting rates in the short term, although their effects diminish without continuous reinforcement (26). Recent research further supports the role of education in strengthening safety competencies and promoting proactive reporting behavior (24).

Professional experience was also associated with knowledge levels. Participants with longer work experience demonstrated higher levels of patient safety knowledge, likely reflecting cumulative clinical exposure and experiential learning (29, 30). However, some studies suggest that younger healthcare professionals may possess stronger theoretical knowledge due to more recent education (29, 31). The present findings support a complementary relationship between theoretical knowledge and practical experience, both of which are necessary for effective patient safety practice.

Institutional factors were found to play a crucial role in shaping reporting behavior. Participants who perceived their work environment as supportive and non-punitive reported adverse events more frequently, whereas those who perceived a culture of blame were more hesitant to report. These findings are consistent with studies demonstrating that organizational culture and managerial support are key determinants of reporting behavior (8, 32). Recent evidence further confirms that a negative safety culture and a lack of institutional support are associated with lower reporting rates and a higher incidence of adverse events (27).

Fear of sanctions, lack of trust in the system, and perceived negative consequences remain significant barriers to reporting. These findings align with studies identifying fear-based organizational climates as a primary cause of underreporting (8, 26). Recent research has similarly emphasized that fear, blame culture, and insufficient reporting systems are among the most important barriers to transparent reporting (33).

Procedural barriers were also identified, including complex reporting systems and administrative burden. These findings are consistent with international studies indicating that cumbersome reporting processes reduce reporting frequency, particularly for less severe events (8). Conversely, institutions that provide feedback and use reported data to improve systems foster greater engagement with reporting systems (24, 30).

LIMITATIONS

This study has several limitations. A questionnaire designed by the authors was used, and no validation procedures were conducted, which may affect the reliability and validity of the findings. Additionally, the sample size was relatively small, limiting the generalizability of the results. Furthermore, the study employed a cross-sectional design, which precludes conclusions about causal relationships.

It is recommended that future researchers use validated measurement instruments, larger, more representative samples, and longitudinal study designs to enable a more comprehensive understanding of the phenomena under investigation.

CONCLUSION

The results of a study conducted among nurses and nursing technicians in the Republic of Croatia indicate that perception, education, and professional experience significantly influence the level of knowledge and the behavior of healthcare professionals regarding the reporting of adverse events in clinical settings.

The data obtained have direct applicability to the planning and implementation of measures to improve patient safety. Above all, the findings confirm the need for regular, systematic education for nurses and nursing technicians on recognizing and reporting adverse events. Educational programs should include practical examples, clear explanations of reporting regulations, and an emphasis on the preventive value of reporting. At the same time, education can help reduce barriers, such as fear of negative consequences and uncertainty about reporting procedures.

It is also necessary to establish a work environment in which reported events are viewed as a source of information for improvement rather than as grounds for individual blame. Such an approach fosters a professional practice that encourages learning from real-life situations and reduces the likelihood of error recurrence.

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