Learning Challenges and Self-Reported Clinical Confidence in Pediatric Nursing Among Undergraduate Nursing Students: A Cross-Sectional Study

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ABSTRACT

Background: Pediatric clinical skills acquisition is the foundational component of undergraduate nursing education, enabling them to provide competent care. To evaluate learning challenges and self-reported confidence among undergraduate nursing students developing pediatric clinical skills

Methods: A cross-sectional study surveyed 214 undergraduate nursing students. A structured questionnaire assessed demographic characteristics, institutionally associated barriers, learning challenges, student's confidence, and perceived competence using Likert-scale items. Statistics were performed using SPSS at the significance level of ≤0.05.

Results: The participants included senior female (183, 85.5%, aged ≥20 years) Bachelor of Science in Nursing (BSN) students (123, 57.5%) with a non-significant difference in pediatric clinical skills participation vs. no participation (105, 49.1% vs 109, 50.9%, p=0.78) and mixed exposure to pediatric clinical skills training (Yes: 94, 43.9% vs No: 120, 56.1%, p=0.07). Most nursing students were also neutral as to the effect of institutional factors on learning (86, 40.2%), hands-on practice (61, 28.5%), supervision (52, 24.3%), time allocation (59, 27.6%), hospital policies (61, 28.5%), and simulation-based learning (62, 29%), although institutional barriers were not perceived significantly to learning.

Conclusion: Undergraduate nursing students previously trained demonstrated positive self-reported confidence and preparedness in pediatric clinical skills; however, challenges indicated the need of supervised clinical exposure.

Keywords: Pediatric nursing, undergraduate nursing students, clinical skills, nursing education

INTRODUCTION

The pediatric population is a significant proportion of healthcare users worldwide, and preventable childhood illness remains a major contributor to mortality, with 7.4 million global deaths occurring in low and middle-income countries.[1] The most common causes of these deaths are infections, gastrointestinal problems, and respiratory associated problems.[2] In addition, malnutrition is another important contributor to child mortality.[3] Among healthcare providers, nurses serve as frontline healthcare providers in primary healthcare centers, hospitals, neonatal intensive care units, emergency departments, outpatient clinics, pediatric wards, community centers, and schools.[4] Their responsibilities extend beyond direct patient care to include developmental assessment, growth monitoring, health promotion, medication administration, immunization, coordination of multidisciplinary care, and family education.[5] Therefore, the competence of newly graduated nurses in pediatric clinical practice directly influences safety of patient, quality of care, and health outcomes.

Acquiring clinical skills is one of the most important components of undergraduate nursing education, as such skills can be helpful in solving problems in changing patients' situations.[6] Because nursing is a practice profession, nursing students have to be provided with opportunities to develop their nursing skills.[7] Particularly, pediatric nurses play a crucial role in the care of children, their knowledge and skills enable them to provide health education and personalized care to children, handle emergencies, coordinate medical teams, and offer emotional support, which ultimately results in the recovery and healthy development of children.[8,9] Unlike adult patients, pediatric patients differ significantly in physiology, anatomy, developmental stages, pharmacology, and disease presentation, making pediatric nursing a specialized area that demands focused education and more supervised clinical experience, making pediatric nursing a specialized area that demands more focused education and supervised clinical experience.[10] Consequently, undergraduate nursing curricula around the world place considerable emphasis on developing pediatric competencies to

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ensure that graduating nurses are capable of delivering evidence-based, safe, and family-centered care.

Despite the importance of acquiring clinical skills during undergraduate pediatric education, nursing students frequently encounter several challenges. Among these challenges, pediatric acquisition is limited by clinical exposure, and this may be due to short rotation lengths, overcrowded hospital placements, and strict patient safety protocols.[11] Consequently, many nursing students complete pediatric rotations with insufficient opportunities to independently perform critical clinical skills.[12] Insufficient clinical exposure may adversely affect competence, confidence, and preparedness for professional practice after graduation. Pediatric clinical care requires unique communication, examination, and decision-making skills that differ substantially from adult practice. Many undergraduate health professional programs provide limited structured exposure to pediatric patients, often due to overcrowded clinical settings, time constraints, ethical concerns, and limited trained faculty. As a result, nursing students frequently report low confidence and inadequate competence in managing pediatric patients. Understanding the barriers to effective pediatric clinical skills teaching is essential to inform curriculum reform, strengthen clinical supervision, and promote safer, higher-quality pediatric care. The present study aimed to evaluate the key institutional barriers, learning challenges faced by undergraduate nursing students, and self-reported confidence and perceived competence in developing pediatric clinical skills during clinical training.

METHODOLOGY

This cross-sectional study design was followed to investigate the learning challenges associated with acquiring pediatric clinical skills among undergraduate nursing student from January to June 2026. A cross-sectional study design is helpful in investigating measures of outcomes and exposures in the participants of the study at the same time, and such a study design is also appropriate for population-based surveys.[13]

This study was conducted at the first affiliated hospital of Xinjiang Medical University, Urumqi. The undergraduate Bachelor of Science (BSN) in Nursing curriculum consists of classroom-based theoretical instruction integrated with laboratory skills training and supervised clinical placements in healthcare settings, and students undertake progressively more complex clinical responsibilities as they advance through the nursing program under the supervision of qualified nursing faculty.

The targeted study population was nursing students enrolled in the BSN program, and students from different academic years were enrolled. However, certain inclusion and exclusion criteria were set for the selection of nursing students. Inclusion criteria included students enrolled in the undergraduate program who had attended pediatric nursing theory courses or pediatric clinical placements. Likewise, exclusion criteria included postgraduate nursing students, registered nurses, and those who had not started any pediatric courses.

For the sample size calculation, a formula was used;[14] $n=Z2*p*(1-p)/d2$ while, n is the required sample size, Z=Z-score at the desired confidence level (1.96 for 95% confidence interval), p=Expected proportion/prevalence (0.17), which gives the maximum required sample size, and d=Margin of error (0.05). After calculations, 217 study participants were requested, however, 3 participants were not eligible for inclusion in the study. Therefore, 214 students were selected, and the response rate was 100%.

A convenience sampling approach, a non-probability research method, was used, in which participants can be chosen because they are nearby and easy to approach. Eligible nursing students were approached during their lectures or clinical sessions and invited to participate until the required sample size was achieved. Data were collected by adopting a self-administered structured questionnaire,[15] comprising five sections covering demographic items, institution-associated barriers, learning challenges and factors in pediatric clinical skills, students' confidence, and perceived competence (Supplementary questionnaire). Each statement was rated on a five-point Likert scale, ranging from 1: strongly disagree, 2: disagree, 3: neutral, 4: agree, to 5: strongly agree. Higher response categories therefore indicated greater agreement with the item. The Likert-scale items were analyzed individually rather than combined into composite domain scores. The obtained data were analyzed using descriptive statistics to summarize participant's characteristics and responses to the Likert-scale items. Categorical variables were presented as frequencies and percentages. For comparisons between participant's groups, Pearson's chi-square test was used to examine whether the distribution of responses across the Likert-scale categories differed between groups. Inferential tests for meaningful comparisons, such as training exposure versus challenge/confidence outcomes, was also performed. All data were analyzed using IBM SPSS Statistics (version 28) at the significance level of 0.05. Meanwhile, participants responded to all items, and there was no missing data, therefore, no need to manage missing data during analysis.

Ethical approval was obtained from the Institutional Review Board (IRB) of The First Affiliated Hospital of Xinjiang Medical University (K202604-11). All procedures were performed in accordance with the principles outlined in the Helsinki Declaration. Participation was entirely voluntary, and informed consent was obtained from all included study participants. Collected data were anonymized to protect participant's confidentiality.

RESULTS

Demographic characteristics

There were 214 nursing students who were involved in the study. The sample was dominated by females who were ≥20 years old and were not married. Over 50% of the respondents were pursuing the BSN program, with the rest being predominantly diploma students, with the fourth-year students being the majority of the group by academic-year group. Roughly 50% of the participants had attended a pediatric clinical skills training workshop before, but fewer had attended a workshop specifically focusing on pediatric clinical skills. Clinical exposure was also quite ranging with 0-6 months less experienced and over 2 years of experience recorded by students (Table 1).

Table 1. Summary of demographic characteristics of study participants (N=214)

Variable	Categories	Frequency	% age
Gender	**Male**	31	14.5
	Female	183	85.54
Age (Years)	<20	20	9.3

	≥20	194	90.7
Marital status	Single	205	95.8
	Married	9	4.2
	Divorced	0	0
Study Program	Diploma	80	37.4
	BSN	123	57.5
	Others	11	5.1
Academic year	1	0	0
	2	51	23.8
	3	60	28
	4	103	48.1
Have you participated in any pediatric clinical skills training workshop?	Yes	105	49.1
	No	109	50.9
Previous experience related to pediatric clinical skills	Yes	94	43.9
	No	120	56.1
Clinical training experience	<6 months	86	40.2
	6-11 months	63	29.2
	1-2 years	24	11.2
	>2 years	41	19.2

Institutional barriers

Perceived institutional influence differed in terms of influence on acquisition of pediatric clinical skills of students. On the whole, the respondents tended to disagree rather than agree that poor clinical equipment, lack of instructor supervision, and less time of training were significant barriers to their learning. Access to more ambivalent perceptions about limitations created by hospital policies and impact of high student numbers during clinical rotations had a notable influence, which suggests that these issues might influence the opportunities of some students to have hands-on practice. The presence of simulation laboratories proved an issue too, but the answers were spread over the categories of the agreement instead of showing a consistent view of the participants (Table 2).

Table 2. Institutionally associated barriers

Item	Responses [n (%)]				
	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
Limited availability of clinical equipment affects my ability to learn pediatric skills	15 (7)	77 (36)	86 (40.2)	20 (9.3)	16 (7.3)
A large number of students in clinical rotation limit hands-on practice opportunities.	28 (13.1)	61 (28.5)	61 (28.5)	59 (27.6)	5 (2.3)
Lack of supervision from clinical instructors affects my learning of pediatric procedures.	41 (19.2)	95 (44.4)	52 (24.3)	26 (12.1)	0 (0)
Time allocated for pediatric clinical training is insufficient.	23 (10.7)	99 (46.3)	59 (27.6)	33 (15.4)	0 (0)
Hospital policies sometimes restrict students from performing pediatric procedures.	40 (18.7)	68 (31.8)	61 (28.5)	40 (18.7)	5 (2.3)
Lack of simulation laboratories affects preparation for pediatric clinical practice.	18 (8.4)	71 (33.2)	62 (29)	63 (29.4)	0 (0)

Learning challenges

Students were found to have had a number of barriers related to the acquisition of pediatric clinical skills, with the flow of responses varying widely based on past pediatric clinical skills education of various areas (Table 3). Untrained students tended to claim more difficulty with pediatric procedures, anxiety when performing the skill, and felt more limited in clinical exposure. The perceived supervision, communication with pediatric patients, and the translation of theoretical knowledge into clinical practice were also seen to be different between trained and untrained students. Conversely, perceived power of collaboration of pediatric patients, the availability of clinical practice, and usefulness of simulation laboratories were not significantly different in the two groups. The two groups studied also tended to perceive the educational value of instructor demonstrations, feedback, and observing experienced nurses, but the perceptions were stronger based on the prior training experience. Table 3 presents the responses at the item level in their entirety together with the between-group significance tests.

Table 3. Summary of learning challenges faced by trained and untrained nursing students in acquiring pediatric clinical skills.

Item	Responses [n (%)]					p-value
	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	
I find it difficult to perform pediatric clinical procedures during training.	28 (13.1)	45 (21)	86 (40.2)	50 (23.4)	5 (2.3)	<0.05

Any training (Yes)	24 (22.9)	19 (18.1)	42 (40)	20 (19)	0 (0)	
Any training (No)	4 (3.7)	26 (23.9)	44 (40.4)	30 (27.5)	5 (4.6)	
I feel anxious when performing pediatric clinical skills in front of instructors.	28 (13.1)	56 (26.2)	78 (36.4)	48 (22.4)	4 (1.9)	<0.05
Any training (Yes)	24 (22.9)	35(33.3)	36 (34.3)	10 (9.5)	0 (0)	
Any training (No)	4 (3.7)	21 (19.3)	42 (38.5)	38 (34.9)	(4 (3.7)	
Limited clinical exposure makes it difficult to learn pediatric skills.	28 (13.1)	39 (18.2)	89 (41.6)	48 (22.4)	10 (4.7)	<0.05
Any training (Yes)	24 (22.9)	22 (21)	44 (41.9)	15 (14.3)	0 (0)	
Any training (No)	4 (3.7)	17 (15.6)	45 (41.3)	33 (30.3)	10 (9.2)	
Lack of supervision affects my ability to learn pediatric procedures.	36 (16.8)	49 (22.9)	80 (37.4)	44 (20.6)	5 (2.3)	<0.05
Any training (Yes)	32 (30.5)	19 (18.1)	33 (31.4)	21 (20)	0 (0)	
Any training (No)	4 (3.7)	30 (27.5)	47 (43.1)	23 (21.1)	5 (4.6)	
Communication with pediatric patients is challenging.	19 (8.9)	31 (14.5)	63 (29.4)	76 (35.5)	25 (11.7)	<0.05
Any training (Yes)	19 (18.1)	14 (13.3)	27 (25.7)	40 (38.1)	5 (4.8)	
Any training (No)	0 (0)	17 (15.6)	36 (33)	36 (33)	20 (18.3)	
I find it difficult to apply theoretical knowledge in pediatric clinical settings.	33 (15.4)	49 (22.9)	68 (31.8)	54 (25.2)	5 (2.3)	<0.05
Any training (Yes)	24 (24)	35 (35)	19 (19)	22 (10)	0 (0)	
Any training (No)	9 (8.3)	14 (12.8)	49 (45)	32 (29.4)	5 (4.6)	
Pediatric patients' cooperation affects my ability to practice clinical skills.	13 (6.1)	23 (10.7)	78 (36.4)	80 (37.4)	20 (9.3)	0.55
Any training (Yes)	9 (8.6)	9 (8.6)	38 (36.2)	39 (37.1)	10 (9.5)	
Any training (No)	4 (3.7)	14 (12.8)	40 (36.7)	41 (37.6)	10 (9.2)	
Clinical instructors provide clear demonstrations of pediatric procedures.	9 (4.2)	4 (1.9)	62 (29)	115 (53.7)	24 (11.2)	<0.05
Any training (Yes)	9 (8.6)	0 (0)	27 (25.7)	59 (56.2)	10 (9.5)	
Any training (No)	0 (0)	4 (3.7)	35 (32.1)	56 (51.4)	14 (12.8)	
Feedback from instructors helps improve my pediatric clinical skills.	5 (2.3)	4 (1.9)	45 (21)	112 (52.3)	48 (22.4)	0.05
Any training (Yes)	5 (4.8)	0 (0)	23 (21.9)	53 (50.5)	24 (22.9)	
Any training (No)	0 (0)	4 (3.7)	22 (20.2)	59 (54.1)	24 (22)	
I receive sufficient opportunities to practice pediatric procedures during clinical rotation.	10 (4.7)	20 (9.3)	96 (44.9)	65 (30.4)	23 (10.7)	0.71
Any training (Yes)	5 (4.8)	11 (10.5)	46 (43.8)	29 (27.6)	14 (13.3)	
Any training (No)	5 (4.8)	9 (8.3)	50 (45.9)	36 (33)	9 (8.3)	
Observing experienced nurses helps me learn pediatric clinical skills.	5 (2.3)	0 (0)	64 (29.9)	102 (47.7)	43 (20.1)	<0.05
Any training (Yes)	5 (4.8)	0 (0)	22 (21)	49 (46.7)	29 (27.6)	
Any training (No)	0 (0)	0 (0)	42 (38.5)	53 (48.6)	14 (12.8)	
s	5 (2.3)	0 (0)	77 (36)	104 (48.6)	28 (13.1)	0.14
Any training (Yes)	5 (4.8)	0 (0)	36 (34.3)	50 (47.6)	14 (13.3)	
Any training (No)	0 (0)	0 (0)	41 (37.6)	54 (49.5)	14 (12.8)	

Self-reported confidence and perceived competence

The perceptions of confidence and competence in clinical practice with pediatrics were found to be mostly positive among students, but the differences between those who had and those who did not have previous training were apparent. Past training was closely linked with increased confidence in communicating with pediatric patients and their families, recognizing typical pediatric health issues,

describing medical management, helping with pediatric procedures, and doing simple pediatric nursing procedures. Students who were trained also indicated that they perceived more practical nursing improvement and readiness to work with children in the clinical practice. Nevertheless, there were no significant differences in terms of confidence when applying basic pediatrics procedures and the perceived capability of applying theoretical knowledge to clinical practice based on prior training. The answers on the practice in terms of infection-control methods were marginal in the aspect of statistical significance, implying a potential weakened connection to previous training (Table 4).

Table 4. Summary of trained and untrained nursing student's confidence and confidence in acquiring pediatric clinical skills.

Item	Responses [n(%)]					p-value
	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	
I feel confident performing basic pediatric clinical procedures.	0 (0)	10 (4.7)	59 (27.6)	98 (45.8)	47 (22)	0.26
Any training (Yes)	0 (0)	5 (4.8)	27 (25.7)	44 (41.9)	29 (27.6)	
Any training (No)	0 (0)	5 (4.6)	32 (29.4)	54 (49.5)	18 (16.5)	
I feel comfortable communicating with pediatric patients and their families.	0 (0)	9 (4.2)	61 (28.5)	102 (47.7)	42 (19.6)	0.01
Any training (Yes)	0 (0)	0 (0)	33 (31.4)	48 (45.7)	24 (22.9)	
Any training (No)	0 (0)	9 (8.3)	28 (25.7)	54 (49.5)	18 (16.5)	
I am confident in identifying common pediatric health problems.	0 (0)	9 (4.2)	58 (27.1)	101 (47.2)	46 (21.5)	0.02
Any training (Yes)	0 (0)	0 (0)	32 (30.5)	49 (46.7)	24 (22.9)	
Any training (No)	0 (0)	9 (8.3)	26 (23.6)	52 (47.7)	22 (20.2)	
I am confident in explaining medical management to pediatric patients.	0 (0)	18 (8.4)	73 (34.1)	81 (37.9)	42 (19.6)	<0.05
Any training (Yes)	0 (0)	0 (0)	37 (35.2)	44 (41.9)	24 (22.9)	
Any training (No)	0 (0)	18 (16.5)	36 (33)	37 (33.9)	18 (16.5)	
I feel confident assisting in pediatric medical procedures.	10 (4.7)	27 (12.6)	77 (36)	72 (33.6)	28 (13.1)	<0.05
Any training (Yes)	0 (0)	9 (8.6)	31 (29.5)	51 (48.6)	14 (13.3)	
Any training (No)	10 (9.2)	18 (16.5)	46 (42.2)	21 (19.3)	14 (12.8)	
I believe I have adequate skills to perform basic pediatric nursing procedures.	0 (0)	14 (6.5)	90 (42.1)	79 (36.9)	31 (14.5)	<0.05
Any training (Yes)	0 (0)	0 (0)	42 (40)	54 (51.4)	9 (8.6)	
Any training (No)	0 (0)	14 (12.8)	48 (44)	25 (22.9)	22 (20.2)	
I can apply theoretical knowledge in pediatric clinical practice.	5 (2.3)	0 (0)	60 (28)	117 (54.7)	32 (15)	0.08
Any training (Yes)	0 (0)	0 (0)	31 (29.5)	55 (52.4)	19 (18.1)	
Any training (No)	5 (4.6)	0 (0)	29 (26.6)	62 (56.9)	13 (11.9)	
My pediatric clinical training has improved my practical nursing skills.	0 (0)	5 (2.3)	75 (35)	102 (47.7)	32 (15)	0.04
Any training (Yes)	0 (0)	0 (0)	32 (30.5)	54 (51.4)	19 (18.1)	
Any training (No)	5 (4.6)	0 (0)	43 (39.4)	48 (44)	13 (11.9)	
I am able to follow proper infection control practices while treating pediatric patients.	0 (0)	5 (2.3)	73 (34.1)	94 (43.9)	42 (19.6)	0.05

Any training (Yes)	0 (0)	5 (4.8)	31 (29.5)	45 (42.9)	24 (22.9)	
Any training (No)	0 (0)	0 (0)	42 (38.5)	49 (45)	18 (16.5)	
I feel prepared to handle pediatric patients during clinical practice.	0 (0)	0 (0)	99 (46.3)	84 (39.3)	31 (14.5)	0.02
Any training (Yes)	0 (0)	0 (0)	40 (38.1)	51 (48.6)	14 (13.3)	
Any training (No)	0 (0)	0 (0)	59 (54.1)	33 (30.3)	17 (15.6)	

DISCUSSION

This paper aimed to evaluate learning challenges and self-reported confidence among undergraduate nursing students developing pediatric clinical skills. Although institutional barriers were not universally perceived as major obstacles, overcrowded clinical placements and limited access to simulation-based learning emerged as the most commonly identified institutional challenges affecting pediatric clinical skills acquisition. Our findings indicate that previous pediatric training was associated with differences in several perceived learning challenges and learning-support experiences, particularly procedural difficulty, anxiety, clinical exposure, supervision, communication, application of theoretical knowledge, and learning through observation. Our findings also showed that trained students demonstrated more favorable response patterns for several confidence and preparedness domains, particularly assisting with pediatric procedures, perceived adequacy of basic nursing skills, practical skill improvement, and preparedness for pediatric clinical practice.

Similar institutional barriers were observed in a cross-sectional study, which was performed among nursing students in the clinical training stage, and variation was observed in their perceived challenges, which were associated with instructors, health workers, students, the place, and time.[12] In contrast, other institutional barriers, such as limited clinical learning exposure opportunities, lack of educational infrastructure, and lack of experienced instructors, were also highlighted in the same narrative review.[16] A recent study also found that nursing students communicated dissatisfaction regarding insufficient support from registered nurses during their clinical training and reported unsupportive instances from specific faculty nursing staff.[17] Other barriers include disconnection between real-world clinical application and academic coursework, as well as the critical need for knowledgeable, and supportive instructors to facilitate effective learning transfer.[18]

Moreover, unfamiliar and poorly organized hospital environment further contributes to student stress and hinders clinical focus[19]. Another important factor for effective learning transfer is effective supervision, which is an essential component of clinical skills acquisition among nursing students that supports successful outcomes and patient safety.[20,21] Meanwhile, increasing student enrollment with a proportional expansion of clinical placement capacity can reduce opportunities for supervised procedural practice. Additionally, pediatric wards often accommodate a limited number of patients, and concerns regarding ethical considerations and patient safety may restrict student's opportunities to perform procedures independently. Consequently, although the overall institutional environment appears favorable, optimizing students to clinical instructor ratios and expanding simulation facilities may significantly improve learning experiences. Simulation strategies for acquiring clinical skills in performing pediatric procedures such as nasogastric tube insertion, intramuscular injection, and urinary catheterization can be improved.[22]

Our findings further identified several important challenges, like perceived learning challenges and learning-support experiences, particularly procedural difficulty, anxiety, clinical exposure, supervision, communication, application of theoretical knowledge, and learning through observation. These findings reflect the complex nature of pediatric nursing, where nursing students must integrate psychomotor skills, clinical reasoning, communication, and professional judgment, while caring for pediatric population with diverse clinical and developmental needs. Pediatric patients often present unique physiological and anatomical characteristics, making routine procedures technically more demanding than those performed in adults. Furthermore, fear of harming pediatric patients may contribute to increased anxiety and reluctance to participate actively in clinical care. Similar challenges, such as difficulty communicating with children and their families, and emotional pressure, were highlighted in a systematic review.[23] A qualitative study also highlighted challenges, such as emotional struggles in clinical exposure, theory-practice gaps, role of ambiguity and lack of confidence, communication and confidence, physical strain, workload, career disappointment, and academic pressure in nursing students.[24] Another qualitative study also generated communication as a key theme, which can play important role between patients and their parents and is also helpful in delivering quality healthcare.[25] Notably, effective communication can be affected by a lack of information about care, lack of respect, and the inability to tend to their emotional needs. Therefore, more focus is needed on communication skills and on creating interactive environments where nursing students can express the challenges, they face.[26,27]

The discrepancy between theoretical understanding and perceived preparedness deserves particular attention. Nursing students generally believed that they possessed adequate knowledge and expressed confidence in independently performing pediatric clinical skills. Similar findings have been reported in other studies, where nursing students or trained nurses often demonstrated satisfactory knowledge.[28,29] Education

and training programs should prioritize integration of theory and practical sessions through structured clinical mentoring.

Our findings have important clinical implications; first, pediatric curricula should increase opportunities for more supervised clinical practice by strengthening partnerships with community health services, pediatric hospitals, and primary healthcare facilities. This diversification of placement of nurses for clinical training would expose students to a broader range of pediatric conditions and help them acquire clinical skills. Second, a simulation-based learning environment should be provided, which can enhance the student's preparedness and confidence in performing pediatric procedures. Third, communication skills should be focused on standardized patient encounters and family-centered simulations.

Despite our study providing valuable information. However, several limitations should also be acknowledged. The cross-sectional study design limits causal inference regarding the association between educational experiences and competency development and may have introduced possible selection bias. The study relied on a self-administrated questionnaire, which may be influenced by recall, social desirability bias and fear-of-evaluation bias possible social-desirability and fear-of-evaluation bias because students reported their own competence and their clinical learning environment. Data collection was based on a single institution, which may limit the generalizability of findings. Notably, preparedness and confidence of the nursing students were not validated through objective measures. Future longitudinal, multicenter studies are warranted to validate the findings of the present study using different validation scales and compare the preparedness, confidence, and competence over time.

CONCLUSION

Undergraduate nursing students reported challenges, such as overcrowded clinical placements and limited access to simulation-based learning, which emerged as the most commonly identified institutional barriers affecting pediatric clinical skills acquisition. Our study further demonstrated that undergraduate nursing students with prior training differed in several perceived learning challenges and learning support experiences. Furthermore, these trained undergraduate nursing students showed more self-reported confidence and perceived competence, particularly in assisting with pediatric procedures, perceived adequacy of basic nursing skills, practical skill improvement, and preparedness for pediatric clinical practice. Strengthening competency-based curricula through clinical exposure and simulation-based training can enhance the preparedness and confidence of nursing students.

Ethical Approval

Ethical approval was obtained from the Institutional Review Board (IRB) of The First Affiliated Hospital of Xinjiang Medical University (K202604-11).

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions

Conceptualization: Muhammad Imran Arif, Zhiyuan Wang
Methodology: Liang Ru, Ayesha Sarfraz
Data Collection: Muhammad Imran Arif, Junaid Sarfraz
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All authors agree to be accountable for all aspects of the work, ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Informed Consent

Written informed consent was obtained from all participants before data collection

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Conflict of Interest

None

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Grammarly AI tools was used solely for language editing and improving the clarity of the manuscript.

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