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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Child Health and Illness Nursing/Çocuk Sağlığı ve Hastalıkları Hemşireliği

Examining the Self-Efficacy Levels of Nursing Students in Medication Administration for Children: A Quasi-Experimental Pre-test Post-test Study

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ABSTRACT

Purpose: This study aimed to examine the self-efficacy levels of nursing students in pediatric medication administration before and after receiving theoretical instruction on medication administration in children and completing clinical practice within the Pediatric Nursing course.

Methods: This study adopted a quasi-experimental design with pre-test and post-test measurements. The study was conducted during 2024–2025 academic year with 63 third-year nursing students enrolled in the Pediatric Nursing course at Ankara Medipol University. Data were collected using the Socio-Demographic Information Form and the Nursing Student Self-Efficacy Scale for Pediatric Medication Administration. Differences were considered statistically significant at $p < 0.05$.

Results: The educational intervention significantly increased the self-efficacy scores for pediatric medication administration ($p<0.001$), as well as the Medication Preparation and Medication Administration subscale scores ($p<0.001$).

Conclusions: The integration of theoretical and clinical training on pediatric medication administration within the Pediatric Nursing course effectively improved the self-efficacy levels of nursing students.

Keywords: Child, nursing student, pediatric medication administration, self-efficacy.

ÖZET

Amaç: Bu çalışma, Çocuk Sağlığı ve Hastalıkları Hemşireliği dersi kapsamında verilen çocuklarda ilaç uygulamaları konulu teorik eğitim öncesinde ve sonrasında hemşirelik öğrencilerinin çocuklara ilaç uygulama konusundaki öz-yeterlilik düzeylerini incelemeyi amaçlamıştır.

Yöntemler: Araştırmada yarı deneysel ön test-son test araştırma deseni kullanılmıştır. Çalışma, 2024–2025 eğitim yılında Ankara Medipol Üniversitesi'nde Çocuk Sağlığı ve Hastalıkları Hemşireliği dersine devam eden 63 hemşirelik öğrencisi ile yürütülmüştür. Veriler, sosyo-demografik bilgilerini içeren form ve Hemşirelik Öğrencileri İçin Çocuklarda İlaç Uygulama Öz-Yeterlilik Ölçeği aracılığıyla toplanmıştır. Çalışmada, $p<0.05$ değeri istatistiksel olarak anlamlı kabul edilmiştir.

Bulgular: Eğitim sürecinin ardından, hemşirelik öğrencilerinin çocuklarda ilaç uygulamaya yönelik öz-yeterlilik puanlarında istatistiksel olarak anlamlı bir artış gözlenmiştir. Bu artış, öğrencilerin ilaç hazırlama ve ilaç uygulama becerilerine ilişkin alt boyutlarda da belirgin bir iyileşme şeklinde kendini göstermiştir ($p<0.001$).

Sonuç: Pediatrik ilaç uygulamalarına yönelik teorik bilgi ve klinik deneyimin birlikte verilmesi, hemşirelik öğrencilerinin çocuklarda ilaç uygulamaya yönelik öz-yeterlilik düzeylerini etkili bir şekilde artırmıştır.

Anahtar Kelimeler: Çocuk, hemşirelik öğrencisi, pediatrik ilaç uygulama, öz-yeterlilik.

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Medication administration is a high-risk procedure in nursing practice (1-3). Nurses are responsible for preparing, administering, and monitoring the effects of medications according to established principles of safe medication administration (4). Undergraduate nursing education integrates theoretical knowledge with practical training, including laboratory exercises, clinical practice, and simulations, to enhance students' competence and self-efficacy in medication administration (2,5,6). This approach has been associated with reductions in medication errors and improvements in patient care quality (6).

Pediatric medication administration requires specialized skills due to the incomplete physiological development of children, which increases the risk of adverse outcomes if medications are administered incorrectly (2,7,8). Accurate pediatric medication administration is critical, as errors may lead to severe or irreversible consequences. Repetition and practical experience in clinical settings have been shown to improve nursing students' self-efficacy in medication administration (2,7,8). However, nursing students often have limited opportunities for hands-on practice with pediatric patients and primarily participate as observers during medication administration (1).

Previous studies on nursing students' self-efficacy in pediatric medication administration have examined factors such as clinical decision-making, anxiety, motivation, tendency toward medical errors, and clinical comfort (2,9-11). However, limited research has directly evaluated changes in students' self-efficacy following structured theoretical instruction combined with clinical practice within a Pediatric Nursing course.

The aim of this study was to evaluate nursing students' self-efficacy in pediatric medication administration using a quasi-experimental pre-test post-test design following theoretical instruction and clinical practice in a Pediatric Nursing course.

Material and Methods

Study design

This study was conducted using a quasi-experimental single-group pre-test post-test design.

Population and sample

All 63 third-year nursing students enrolled in the Pediatric Nursing course at Ankara Medipol University Faculty of Health Sciences during the Fall semester of the 2024–2025 academic year voluntarily participated in the study. A separate power analysis was not conducted, as the entire accessible population was included. Effect sizes (Cohen's d and Hedges' g) were calculated to demonstrate the magnitude and strength of the intervention. The inclusion criteria were as follows: students who volunteered to participate in the study; students enrolled in the Nursing Department at Ankara Medipol University Faculty of Health Sciences (Turkish program); students enrolled in the Pediatric Nursing course focusing on medication administration in children; students who completed both pre-test and post-test assessments.

Educational content

The Pediatric Nursing course is conducted over 14 weeks, comprising 4 hours of theoretical instruction and 8 hours of clinical practice per week. The course is designed to provide students with the essential knowledge, skills, and attitudes necessary to support the healthy growth and development of children aged 0–18 years, taking into account their communication, family, and cultural characteristics. Additionally, this course aims to provide nursing care that protects, promotes, and restores health in cases of illness. Furthermore, this course was intended to contribute to the provision of holistic and evidence-based care for children and their families. Within the scope of this course, the topic of pediatric medication administration is delivered as a structured theoretical unit focusing on pediatric medication safety and safe medication administration. The content includes pediatric drug dose determination and calculation, pharmacodynamic and pharmacokinetic principles, and fundamental pharmacological processes such as absorption, distribution, metabolism, and elimination. Additionally, the topic addresses nursing management in pediatric medication administration and the preparation of children for procedures according to their developmental stages. The routes of administration, including oral, inhalation, ophthalmic, otic, nasal, topical, rectal, and parenteral methods, are theoretically presented.

Similar to other course contents, the topic of pediatric medication administration was prepared by the course instructor using fundamental pediatric nursing sources

(12-14). No additional expert opinion was sought, as the topic was developed within the scope of the course. The topic was covered in week 7 of the 14-week course with a total duration of three hours. The session consisted of approximately two hours of instructor-led theoretical teaching, including pediatric medication dosage calculation examples, followed by one hour of interactive case-based learning and medication dosage calculation exercises. It concluded with the analysis of a pediatric case. Students analyzed a pediatric case requiring medication dose calculations, identification of age-specific considerations, and selection of the appropriate medication administration route. The learning objectives of this session were to accurately calculate pediatric medication doses, identify age-specific considerations in medication preparation and administration, and apply safe medication administration principles in pediatric nursing practice. Teaching methods included a theoretical lecture supported by PowerPoint presentations, medication dosage calculation examples, interactive discussions, and case-based learning. Students were encouraged to discuss medication safety principles, dose calculations, and appropriate routes of administration using clinical examples. Educational materials consisted of course lecture slides, fundamental pediatric nursing textbooks (12-14), an instructor-developed case study, and medication dosage calculation exercises.

In clinical practice, the theoretical content was integrated through case presentations and observation. Students observed pediatric medication preparation and administration procedures performed in the clinical setting under the supervision of pediatric nursing instructors. During these observations, students discussed medication safety principles, pediatric dose calculations, age-specific considerations, and appropriate routes of pediatric medication administration using real clinical cases. Students also had the opportunity to observe the pediatric medication administration process and reinforce their theoretical knowledge through instructor-guided observation, case discussions, and reflection on clinical practice.

The assessment criteria were based on the performance of students in clinical practice. The criteria included the accurate calculation of doses in care plans and case presentations, as well as consideration of age-specific characteristics in pediatric medication administration. These elements were included as separate items in the clinical practice scoring. Students received formative feedback during clinical practice.

Data collection tools

Data were collected using a previously prepared 25-question form (1-3). The form includes both multiple-choice and Likert-type questions. The questions are divided into the following two sections: "Socio-Demographic Characteristics (9 questions)" and "Medication Administration Self-Efficacy Scale in Children-(MASES-C) for Nursing Students (16 questions)."

Socio-Demographic Characteristics: This section comprised six questions addressing the socio-demographic attributes and educational information of participants.

Medication Administration Self-Efficacy Scale in Children for Nursing Students (MASES-C): MASES-C, which was developed by Bektaş et al., is designed to assess the self-efficacy of nursing students in the preparation and administration of medications for pediatric patients (1). The tool contains 16 items rated on a five-point Likert scale, ranging from 1 ("Definitely Inadequate") to 5 ("Definitely Adequate"). The scale is divided into the following two subscales: medication preparation and medication administration to children. The total scores can vary from 16 to 80 without a specific cutoff point. Higher scores indicate higher levels of self-efficacy in pediatric medication administration. The scale does not comprise reverse-scored questions. The original study reported a Cronbach's alpha of 0.94 (1). In this study, the pre-test and post-test Cronbach's alpha values were as follows: total scale: 0.879 and 0.950, respectively; medication preparation subscale: 0.857 and 0.930, respectively; medication administration subscale: 0.761 and 0.909, respectively. These results indicate acceptable to excellent internal consistency across the total scale and subscales, confirming the reliability of the scale in the study sample.

Data collection

Data were collected from third-year students enrolled in the Pediatric Nursing course during the Fall semester of the 2024–2025 academic year in two separate stages. In the first stage, data were collected in the seventh week before the delivery of course content on pediatric medication administration. The pre-test questionnaire was administered face-to-face in the classroom at the university. In the second stage, data were collected in the fourteenth week after completion of the Pediatric Nursing course. The same questionnaire was re-administered face-to-face in the classroom at the university.

Students were informed about the purpose and scope of the study. Additionally, the students were informed that participation was voluntary. Eligible students (who met the inclusion criteria and provided informed consent) were included in the sample. The students completed the pre-test and post-test forms individually in the classroom at the university. No observations or group activities were conducted. Only a scale-based assessment method was used.

This study was conducted by the researcher from the Department of Nursing at Ankara Medipol University according to the ethical standards of the Declaration of Helsinki. The pre-test and post-test instruments focused on medication administration in pediatric care.

Data Analysis

The data were analyzed using SPSS version 26. The demographic features of the participants were represented using descriptive statistics, including frequency distribution and percentage. Before performing parametric analyses, the normality of the pre-test and post-test score distributions was assessed by examining skewness and kurtosis values. Scores that ranged from −1.5 to +1.5 were considered indicative of an approximately normal distribution, confirming the suitability of parametric tests (15). Paired samples t-tests were used to compare the pre-intervention and post-intervention mean scores obtained from the MASES-C, both for the overall scale and its two subscales (medication preparation and medication administration). Differences were considered statistically significant at $p < 0.05$.

Ethical Considerations

This study was approved by the Non-Interventional Clinical Research Ethics Committee of Ankara Medipol University (Date:27.11.2024, decision no: 143). All necessary institutional permissions were obtained from the Dean of the Faculty of Health Sciences and the Head of the Department of Nursing and included in the ethics application. Before data collection, participants provided informed consent after being briefed about the purpose of the study and were assured that the information obtained would be used exclusively in scientific contexts to contribute to the advancement of nursing education. The research was conducted in accordance with the ethical standards outlined in the Declaration of Helsinki.

Results

Table 1 shows the descriptive information on the socio-demographic characteristics of the students. Most students were female (92.1%) and rated their academic achievement as moderate (84.1%). The proportion of students who had not received training on child health was 92.1%. Meanwhile, the proportions of students who reported concerns regarding medication administration in children and expressed a fear of committing medical errors were 73.0% and 84.1%, respectively. The most commonly reported challenge was related to the medication preparation process (49.2%). Although all students indicated adherence to proper patient safety principles, only 27.0% expressed an intention to pursue a career in the field of child health following graduation.

Table 1. Socio-demographic characteristics (n=63)

		n (%)
Gender	Female	58 (92.1)
	Male	5 (7.9)
Academic achievement level	Moderate	53 (84.1)
	High	10 (15.9)
Previous training on child health	Yes	5 (7.9)
	No	58 (92.1)
Concern regarding medication administration in children	Yes	46 (73.0)
	No	17 (27.0)
Difficulty 1: Understanding the order	Yes	7 (11.1)
	No	56 (88.9)
Difficulty 2: Medication preparation	Yes	31 (49.2)
	No	32 (50.8)
Difficulty 3: Medication administration	Yes	19 (30.2)
	No	44 (69.8)
Difficulty 4: Communication with child and family	Yes	8 (12.7)
	No	55 (87.3)
Difficulty 5: Post-administration observation of the child	Yes	4 (6.3)
	No	59 (93.7)
Fear of medical error during medication administration in children	Yes	53 (84.1)
	No	10 (15.9)
Use of correct patient safety principles	Yes	63 (100.0)
Desire to work in child health after graduation	Yes	17 (27.0)
	No	46 (73.0)

Table 2 shows the pre-test and post-test scores on the MASES-C and its subscales. The mean total self-efficacy score of students in medication administration for children significantly increased from 50.63±10.17 (before educational intervention) to 59.52±11.33 (after intervention) (t=−5.435, p<0.001). Additionally, the medication preparation (t=−6.344, p<0.001) and medication administration subscale scores significantly improved after intervention (t=−3.475, p<0.001).

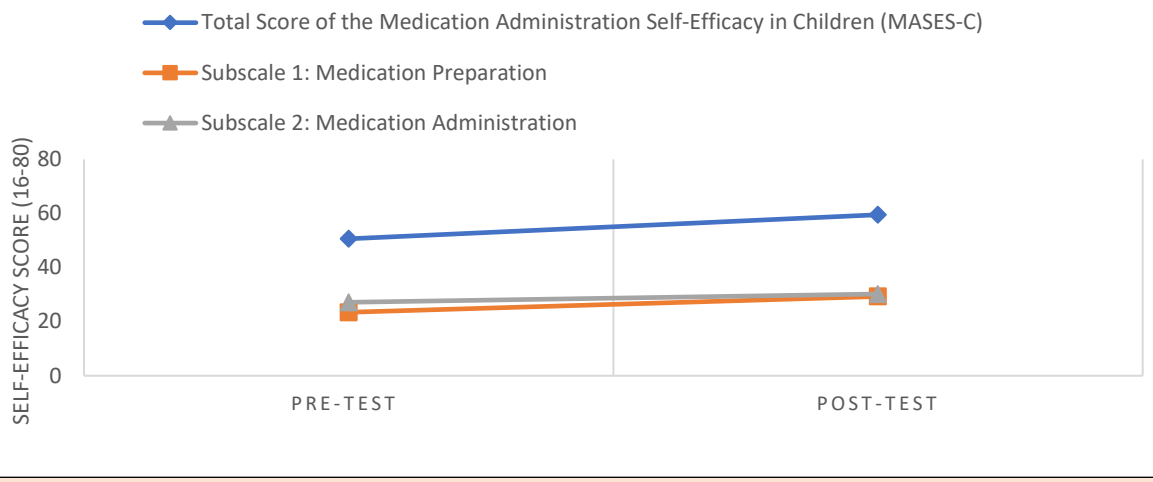


Figure 1. Comparison of pre- and post-test mean scores of the total and subscale scores of the MASES-C

Table 2. Comparison of Students' Pre-test and Post-test Scores on the MASES-C and Its Subscales (n=63)

Scale-Subscale	Mean±SD (Pre-test)	Mean±SD (Post-test)	Mean Difference	Test (t) p-value
MASES-C Total Score	50.63±10.17	59.52±11.33	-8.89	-5.435 **<0.001**
Subscale 1: Medication Preparation	23.47±6.15	29.30±6.09	-5.83	-6.344 **<0.001**
Subscale 2: Medication Administration	27.15±5.11	30.22±5.90	-3.06	-3.475 **<0.001**

Table 3. Effect Sizes for Students' Pre-test and Post-test Scores on the MASES-C and Its Subscales (n=63)

Scale / Subscale	Cohen's d	Hedges' g	Interpretation
MASES-C Total Score	0.68	0.67	Moderate–Large
Subscale 1: Medication Preparation	0.80	0.79	Large
Subscale 2: Medication Administration	0.44	0.43	Moderate

Note. Effect sizes were calculated for paired samples. Cohen's d = t / √n; Hedges' g corrects for small-sample bias.

Figure 1 presents the total scale score as well as the scores for its two subscales: Subscale 1 – Medication Preparation and Subscale 2 – Medication Administration. Mean scores increased from pre-test to post-test across all measures, indicating improved self-efficacy of students following the intervention.

As shown in Table 3, the total MASES-C score increased with a moderate-to-large effect (g=0.67). In the subscales, medication preparation exhibited a large effect (g=0.79), while medication administration exhibited a moderate effect (g=0.43).

Discussion

The findings of this study indicate that nursing students' self-efficacy scores for pediatric medication preparation and administration were higher after structured theoretical instruction combined with clinical practice. Greater improvement was observed in the medication preparation subdomain than in the medication administration subdomain (Table 3). Previous studies have reported that increased knowledge levels strengthen self-efficacy (11,16). Similarly, higher post-intervention self-efficacy scores were observed in the present study. The observed improvement in self-efficacy may reflect the complementary roles of theoretical instruction and supervised clinical experience. While classroom education provides the knowledge required for safe medication administration, opportunities to apply this knowledge in clinical settings may reinforce students' confidence through repeated practice and feedback. This interpretation is consistent with previous studies demonstrating that structured educational approaches, including mentorship and concept map-based learning, enhance self-efficacy by actively engaging students in the learning process (10,17). Additionally, face-to-face and practice-based teaching methods are reported to significantly improve self-efficacy in pediatric medication administration. In particular, face-to-face approaches yield higher effect sizes than other teaching methods (18). Studies using screen-based simulation interventions have reported improvements only in specific areas, such as dosage calculation, but not in overall knowledge or self-efficacy (19).

In this study, consistent and significant improvements were observed in both the medication preparation and medication administration subdomains. These improvements highlight the importance of integrating theoretical knowledge with clinical experience to improve student competence (20-22). Although clinical practice did not focus exclusively on pediatric medication administration, general clinical experience in pediatric care may have contributed to students' perceived self-efficacy (9). Although increased self-efficacy is considered an important educational outcome, confidence alone should not be interpreted as evidence of improved clinical performance. Educational programs should therefore aim to strengthen both students' confidence and their objective medication administration competence (23). The educational significance of these findings extends beyond improvements in self-efficacy scores. Developing confidence during undergraduate education may facilitate students' engagement in clinical learning, encourage active participation in medication-related procedures under supervision, and support the integration of theoretical knowledge with clinical practice (2,24).

In this study, 84.1% of students feared medical errors during pediatric medication administration. This fear may be attributed to the complexity of dosage calculation, challenges in communicating with children, and interactions with parents (10, 25-27). Additionally, 49.2% of participants identified the medication preparation stage as the most challenging step. Consistently, previous studies have reported that students require support during the medication preparation phase, as it involves technical precision (2,21). This fear may also reflect students' limited clinical experience and concerns about patient safety. Previous research has shown that medication administration is perceived as a complex procedure by nursing students, and anxiety may increase when students lack sufficient clinical experience and confidence. Educational strategies that combine supervised practice and simulation may help reduce this anxiety while promoting safe medication administration (28).

Although fear of medication errors may reduce students' confidence, it may also reflect an awareness of the potential consequences of medication errors in pediatric patients. Such awareness can be viewed as an important component of patient safety education and should be supported through structured supervision and feedback during clinical training (16). Thus, the comprehensive educational approaches employed in this study may contribute to patient safety by supporting nursing students' self-efficacy in pediatric medication preparation and administration (9).

Only 27% of students expressed a desire to work in the pediatric field after graduation. This suggests limited career interest in pediatrics and a perception of the challenging nature of the field. Pediatric nursing is a demanding area due to high responsibility, risk of errors, and emotional burden (29). However, students who voluntarily choose the profession have been reported to possess higher self-efficacy levels (22). Thus, intrinsic motivation positively influences the learning process (30). These findings suggest that the emotional challenges experienced by students during clinical practice affect both their self-efficacy and attitudes toward the pediatric

field. Therefore, providing supportive learning experiences during pediatric clinical practice may positively influence students' perceptions of pediatric nursing.

Practical Implications for Nursing Education

The findings of this study have important implications for undergraduate nursing education and future curriculum development. The improvement in nursing students' self-efficacy following structured theoretical instruction and clinical practice demonstrates that the current educational approach is effective in developing competence in pediatric medication administration. The findings also emphasize the importance of regularly evaluating educational strategies and adapting learning experiences to students' evolving learning needs. Given that many students reported anxiety and difficulties related to pediatric medication administration, additional support and constructive feedback from nursing faculty members and clinical nurse preceptors during clinical practice may further enhance students' self-confidence, clinical competence, and readiness to provide safe pediatric care after graduation.

Limitations

This study has some limitations. The findings of this study cannot be generalized as the study was conducted at a single university with a small and homogeneous sample comprising third-year nursing students. Additionally, the self-efficacy levels of students were measured through self-reporting, which may lead to bias. Furthermore, this study did not establish a control group.

Therefore, it cannot be concluded that the observed improvements were solely attributable to the educational intervention, as external factors may also have influenced the findings. Future studies with larger, more diverse samples, including control groups and long-term follow-ups, are important for verifying and expanding upon these findings. Despite these limitations, this study contributes to the literature by providing evidence on nursing students' self-efficacy in pediatric medication preparation and administration following structured theoretical instruction combined with clinical practice, highlighting the educational value of this approach.

Conclusion

This study contributes to nursing education in Turkey. In particular, this study directly measured the self-efficacy of nursing students in pediatric medication administration. Students' self-efficacy was directly assessed within the Pediatric Nursing course in the context of structured theoretical instruction and clinical practice. This study, which focused on the safe and effective administration of medication, demonstrated that the structured curriculum effectively improves the self-efficacy of students. The findings support the importance of competency-based approaches in pediatric nursing courses, which enhance the confidence of students in pediatric medication administration. This study offers a new perspective to the international literature on pediatric medication administration by directly measuring self-efficacy and integrating theoretical and clinical practice. In summary, the integration of structured theoretical education with supportive clinical practice is an effective strategy for improving the self-efficacy of nursing students in pediatric medication administration. Although simulation-based training and technology-supported learning materials are included in the nursing curriculum, diversifying these practices based on student needs and regularly evaluating their effectiveness may reinforce safe pediatric medication administration skills (11).

Declarations

Funding

No person/organization is supporting this study financially

Conflict of Interest

No conflict of interest was declared by the authors.

Ethics Approval

This study was approved by the Non-Interventional Clinical Research Ethics Committee of Ankara Medipol University (Date: 27.11.2024, decision no: 143).

Availability of Data and Material

Data can be shared if requested.

Author Contributions

Research idea: EBA, Design of the study: EBA, Acquisition of data for the study: EBA, Analysis of data for the study: EBA, Interpretation of data for the study: EBA, Drafting the manuscript: EBA, Revising it critically for important intellectual content: EBA, Final approval of the version to be published: EBA.

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