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**Original Article**

# Self-efficacy of Intervention in Improve Nurses Beliefs about Drug Errors


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**Abstract:**

**Background**: Medication errors are preventable events that may lead to inappropriate medication use or patient harm during prescribing, transcribing, dispensing, administration, or monitoring practices.

**Objective:** The aim of the study to assess the impact of a Health Belief Model-based intervention on improving nurses' self-efficacy and beliefs concerning medication dosage errors in pediatric wards.

**Methods:** A randomized controlled trial with a true experimental design was used for the program from October 1, 2024, to May 1, 2025. Five public healthcare facilities with pediatric wards were included in the study. More than 250 questioners were distributed to nurses from pediatric wards in Mosul hospitals at random. The nurses were then selected for the study by either giving the questioners to one and leaving one on or two, or the other way around, giving the questioners to pediatric ward nurses and leaving one. The researcher then received 165 questioners, and approximately 90 nurses did not fit the criteria. Lastly, there is a chance that there will be 26 male and 34 female pediatric ward nurses in the two groups, each holding a different position.30 nurses who consented to participate in the study were included in the sample, and 30 nurses who work in pediatric wards were included in the control group. The experimental and control groups were created by random assignment. Version 26 of the Social Science Statistical Package (SPSS) was used in the investigation to analyze the data. The statistical techniques used to analyze data and assess results.

**Results:** The finding show that the changes in nurses' knowledge regarding medication dosage errors across the study phases. The mean score during the Pre phase was 7.888 (Fair level), reflecting a need for improvement. After the intervention, the Post1 phase showed a significant increase to 17.444 (Good level), demonstrating its effectiveness. By the Post2 phase, the mean score slightly decreased to 17.333 but remained at a good level, indicating sustained knowledge retention.

**Conclusion:** This study concluded that the program was effective through the three tests that were conducted on nurses in hospitals, as they were tested first and their knowledge of the directions of incorrect drug doses was weak and unacceptable, while when the intervention, i.e. the training program, was conducted, their knowledge became good in the second test and the researchers continued to follow them after the program for two months. They were tested for the third time and it was found that they still retained the same information, i.e. their knowledge remained in a positive and high direction at the same time.



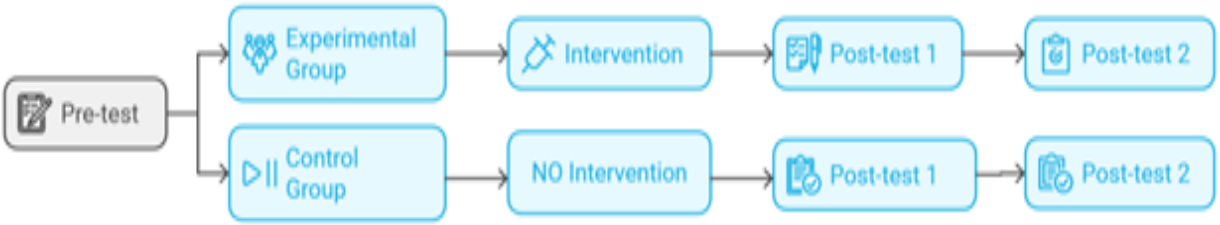
**Keywords:** Efficacy, Training Program, Knowledge, Medication Dosage Errors.

## Introduction:

Medication dosage errors are unintended deviations from the prescribed drug dose during prescribing, dispensing, or administration, which can lead to patient harm. These errors encompass overdoses, underdoses, omissions, or incorrect administration routes. Pediatric patients are particularly vulnerable due to their weight-dependent dosing and developmental physiology[1,2]. Factors contributing to these errors include miscommunication among healthcare providers, similarities in drug names or packaging, calculation mistakes, and insufficient training. To mitigate these risks, healthcare institutions have implemented computerized provider order entry (CPOE) systems, clinical decision support tools, and standardized medication protocols. Despite these advancements, medication errors remain a persistent issue, highlighting the need for effective educational interventions[3]. One of the most effective frameworks for understanding health-related behaviors and promoting safer practices is the Health Belief Model (HBM). Originally developed in the 1950s, the HBM aims to explain why individuals engage in health behaviors, emphasizing perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy. In the context of medication safety, HBM provides a psychological basis for improving adherence to safety protocols by enhancing nurses' awareness and beliefs regarding medication errors[4]. By integrating this model into educational interventions, nurses can develop a deeper understanding of the risks associated with medication errors and take proactive measures to prevent them. A key component of the HBM is self-efficacy, which refers to an individual's belief in their ability to perform specific tasks successfully[5]. In nursing practice, self-efficacy plays a crucial role in ensuring accurate medication administration. Nurses with high self-efficacy are more likely to follow safety protocols, double-check prescriptions, and seek clarification when needed, ultimately reducing the incidence of medication errors. Conversely, those with low self-efficacy may experience uncertainty, leading to a higher likelihood of errors[6-9]. Enhancing nurses' self-efficacy through structured training programs and supportive work environments is essential for improving patient safety and fostering a culture of accountability. By combining the principles of medication safety, the Health Belief Model, and self-efficacy, this study aims to assess the impact of an HBM-based intervention on improving nurses' confidence and adherence to safe medication practices. Through targeted education and reinforcement of best practices, healthcare institutions can significantly reduce medication errors, ultimately enhancing patient outcomes in pediatric wards.

## Materials and methods:

**Study Design**: The study utilized a true experimental design with a randomized controlled trial (RCT) to evaluate the effectiveness of a Health Belief Model-based intervention in enhancing nurses' self-efficacy and beliefs regarding medication dosage errors in pediatric wards. The study was conducted in pediatric wards of Mosul hospitals from October 1, 2024, to May 1, 2025, as shown in Figure 1




**Study Setting:** The focus of the current study was Mosul. The capital of the Nineveh governorate in northern Iraq is Mosul. Five public healthcare facilities with pediatric wards were included in the study: “Al-Khansaa Teaching Hospital, AL-Salam Teaching Hospital, Ibn AI-Atheer Teaching Hospital, Ibn-Sena Teaching Hospital”, which is on the left, and Al Mosul General Hospital, which is on the right.

**Study Sample**: A total of more than 250 questionnaires were randomly distributed to nurses working in pediatric wards across Mosul hospitals. The selection process followed a systematic approach, where questionnaires were given to some nurses while skipping others to ensure a randomized selection. Out of the distributed questionnaires, 165 were returned, but approximately 90 nurses did not meet the inclusion criteria. Additionally, 10 nurses who participated in the pilot study were excluded, and five healthcare workers withdrew from the study. Ultimately, the final sample consisted of 60 nurses, with 30 assigned to the experimental group and 30 to the control group. These groups were formed through random assignment to ensure the reliability of the study findings. Among the participants, 26 were male and 34 were female, occupying various positions within pediatric wards. The study aimed to assess the impact of the intervention on nurses' self-efficacy beliefs regarding medication dosage errors, exploring how their confidence in administering correct dosages was influenced by the training program

**Data Collection Tools**: Prior to the program's lectures, the researcher developed the tools, which include demographic data and nurses' beliefs regarding medication dosage errors in pediatric wards. The instrument is divided into two sections, each designed to assess different aspects related to self-efficacy and medication errors. The study includes both the experimental (study) group and the control group to evaluate the impact of the intervention. Part I: The demographic parameters encompass data related to the nurse's age, gender, educational attainment, overall years of service in pediatric wards, name of the hospital, and involvement in training courses relevant to the study topic. Part II: This section of the tool is based on a Likert scale and focuses on assessing nurses' beliefs regarding medication dosage errors. The tool is primarily constructed using information derived from preliminary study findings, a literature review, and expert opinions. This component consists of multiple items designed to measure the level of self-efficacy and confidence nurses have in preventing and managing medication dosage errors. Additionally, the questionnaire includes four specific questions that assess nurses' self-efficacy in handling medication dosage errors, ensuring a comprehensive evaluation of their confidence and perceived competence in this area.

**Data Collection Period:** The study was carried out at pediatric wards in a few Mosul hospitals over a six-month period, from September 16, 2024, to March 17, 2025.

**Analysis of statistical date:** Frequency and percentage analysis are used to calculate demographic characteristics using descriptive methods. The data value is estimated using both the mean and the standard deviation. A statistical measure of a random variable's degree of variability around its mean is the standard deviation (S.D.). An approach to descriptive statistical data analysis. Comparing two related samples using the paired T-test and the Fisher Exact Test for Equality of Variances

**Results:**

**Table (1): The result presents the statistical results of the demographic variables and homogeneity for both the sample study group and control group in the study**

| Test of Homogeneity | | | | | | |
|---|---|---|---|---|---|---|
| Demographic variables | Items | Groups | | | Type of test | P-value |
| | | | No. | % | | |
| Age | 20-29 | Control | 13 | 43 | Fisher's exact test | 0.999 |
| | | Study | 14 | 47 | | |
| | 30-39 | Control | 10 | 33 | | 0.779 |
| | | Study | 8 | 27 | | |
| | 40-49 | Control | 7 | 24 | | 0.999 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | Study | 8 | 26 | | |
| Gender | Male | Control | 12 | 40 | Fisher's exact test | 0795 |
| | | Study | 14 | 47 | | |
| | Female | Control | 18 | 60 | | 0795 |
| | | Study | 16 | 53 | | |
| Level of education | Secondary degree | Control | 6 | 20 | Fisher's exact test | 0.999 |
| | | Study | 7 | 23 | | |
| | Diploma degree | Control | 15 | 50 | | 0.295 |
| | | Study | 10 | 33 | | |
| | Bachler degree | Control | 9 | 30 | | 0.422 |
| | | Study | 13 | 44 | | |
| General years of experience in pediatric wards | 1-5 | Control | 16 | 53 | Fisher's exact test | 0.795 |
| | | Study | 18 | 60 | | |
| | 6-10 | Control | 7 | 23 | | 0.748 |
| | | Study | 5 | 17 | | |
| | 11-15 | Control | 3 | 10 | | 0.567 |
| | | Study | 2 | 7 | | |
| | 16-20 | Control | 2 | 7 | | 0.671 |
| | | Study | 4 | 13 | | |
| | 21-25 | Control | 2 | 7 | | 0.999 |
| | | Study | 1 | 3 | | |
| Training course | Yes | Control | 2 | 7 | Fisher's exact test | 0.671 |
| | | Study | 4 | 13 | | |
| | No | Control | 28 | 93 | | 0.671 |
| | | Study | 26 | 87 | | |

**Table (2) The statistical results for nurses focus on the scale of their beliefs regarding perceived self_efficacyfor study group**

| Axes | | Q | Scale (eff) | Pre Study | | | Post1 Study | | | Post2 Study | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | N (%) | M | Ass. | N (%) | M | Ass. | N (%) | M | Ass. |
| Dosage Errors in Pediatric Wards Based | Percieved Self-efficacy | Q1 | Not Agreement | 25(83) | 1.733 | Fair | 0(0) | 4.4 | Good | 0(0) | 4.466 | Good |
| | | | Neutral | 5(17) | | | 2(7) | | | 1(3) | | |
| | | | Agreement | 0(0) | | | 28(93) | | | 29(97) | | |
| | | Q2 | Not Agreement | 26(87) | 1.633 | Poor | 0(0) | 4.233 | Good | 0(0) | 4.366 | Good |
| | | | Neutral | 4(13) | | | 3(10) | | | 3(10) | | |
| | | | Agreement | 0(0) | | | 27(90) | | | 27(90) | | |
| | | Q3 | Not Agreement | 29(97) | 1.266 | Poor | 0(0) | 4.4 | Good | 0(0) | 4.4 | Good |
| | | | Neutral | 1(3) | | | 2(7) | | | 0(0) | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Agreement | 0(0) | | | 28(93) | | | 30(100) | | |
| | | Q4 | Not Agreement | 28(93) | 1.266 | Poor | 0(0) | 4.3 | Good | 0(0) | 4.333 | Good |
| | | | Neutral | 2(7) | | | 2(7) | | | 3(10) | | |
| | | | Agreement | 0(0) | | | 28(93) | | | 27(90) | | |
| Mean | | | | | 1.474 | Poor | | 4.333 | Good | | 4.391 | Good |

**Table (3) The statistical results for nurses focus on the scale of their beliefs regarding perceived self-efficacy for control group**

| Axes | | Q | Scale (eff) | Pre control | | | Post1 control | | | Post2 control | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | N (%) | M | Ass. | N (%) | M | Ass. | N (%) | M | Ass. |
| Nurses' Beliefs Scale on Medication Dosage Errors in Pediatric Wards Based on the Health Belief Model | Perceved Self-efficacy | Q1 | Not Agreement | 26(87) | 1.266 | Poor | 27(90) | 1.6 | Poor | 27(90) | 1.6 | poor |
| | | | Neutral | 4(13) | | | 3(10) | | | 3(10) | | |
| | | | Agreement | 0(0) | | | 0(0) | | | 0(0) | | |
| | | Q2 | Not Agreement | 21(70) | 2 | Fair | 21(70) | 2.2 | Fair | 22(73) | 2.066 | Fair |
| | | | Neutral | 3(10) | | | 3(10) | | | 3(10) | | |
| | | | Agreement | 6(20) | | | 6(20) | | | 5(17) | | |
| | | Q3 | Not Agreement | 24(80) | 1.533 | Poor | 24(80) | 1.766 | Fair | 27(90) | 1.5 | Poor |
| | | | Neutral | 4(13) | | | 4(13) | | | 1(3) | | |
| | | | Agreement | 2(7) | | | 2(7) | | | 2(7) | | |
| | | Q4 | Not Agreement | 28(93) | 1.133 | Poor | 28(93) | 1.4 | Poor | 28(93) | 1.4 | poor |
| | | | Neutral | 2(7) | | | 2(27) | | | 2(7) | | |
| | | | Agreement | 0(0) | | | 0(0) | | | 0(0) | | |
| Mean | | | | | 1.483 | Poor | | 1.741 | Fair | | 1.641 | poor |

N: Frequency, %: Percentage, M: Mean of total score, Poor= 0.00 – 1.6, Fair= 1.7 – 3.3, Good= 3.4 – 5

**Discussion:**

The demographic characteristics of the study group and the control group are thoroughly compared in this study. Age, gender, educational attainment, years of experience working in pediatric wards, and training course attendance are the main factors under analysis. Fisher's exact test is the statistical test used to compare the groups,

and the p-values are given to evaluate how homogeneous the two groups are. Since all p-values are higher than 0.05, which indicates that there are no significant differences between the groups, the results show that the study and control groups are demographically comparable across all variables. This implies that the two groups are a good fit, which is essential to guaranteeing the reliability of the study's conclusions. In the study group, 47% (14 nurses) and 43% (13 nurses) were between the ages of 20 and 29; in the control group, 33% (10 nurses) and 27% (8 nurses) were between the ages of 30 and 39; and in the study group, 24% (7 nurses) and 26% (8 nurses) were between the ages of 40 and 49 (Table 1). Additionally, it revealed that females made up 53% (16 nurses) of the study group and 60% (18 nurses) of the control group, while males made up 47% (14 nurses) and 40% (12 nurses) of the study group. In terms of education, 44% (13 nurses) of the study group and 30% (9 nurses) of the control group had bachelor's degrees, 33% (10 nurses) of the study group and 50% (15 nurses) of the control group had nursing institute degrees, and 23% (7 nurses) of the study group and 20% (6 nurses) of the control group had completed secondary school. Sixty percent (18 nurses) of the study group and fifty-three percent (16 nurses) of the control group had one to five years of experience in pediatric wards; seventeen percent (5 nurses) of the study group and twenty-three percent (7 nurses) of the control group had six to ten years; seven percent (2 nurses) of both groups had eleven to fifteen years; thirteen percent (4 nurses) of the study group and seven percent (2 nurses) of the control group had sixteen to twenty years; and three percent (1 nurse) of the study group and seven percent (2 nurses) of the control group had twenty-five years. Finally, whereas 87% (26 nurses) of the study group and 93% (28 nurses) of the control group had not previously attended training courses regarding medication dosage errors, 13% (4 nurses) of the study group and 7% (2 nurses) of the control group had attended work-related training courses. The findings of the study regarding nurses' perceived self-efficacy in addressing medication dosage errors (which is crucial) reveal significant improvements across three distinct phases: Pre-Study, Post1-Study and Post2-Study. However, the degree of enhancement varied; this suggests that while progress was made, challenges still exist. Although the data seems promising, it is essential to consider the potential for further growth because the healthcare landscape is constantly evolving[(10,11)].During the Pre-Study phase, the average score for perceived self-efficacy was classified as "Poor." This indicates that, before the intervention, nurses had low confidence in their ability to prevent medication errors. The majority of nurses did not agree that they felt capable of addressing medication errors, however, only a small percentage remained neutral. Although this phase highlights a critical gap in nurses' confidence, it underscores the need for targeted interventions to enhance their self-efficacy in medication safety practices, because addressing this issue is paramount[(12,13)].The observed low self-efficacy at this stage can be attributed to several factors: insufficient training, a lack of experience, or limited access to resources (and support systems). Nurses may not take any proactive measures to prevent errors if their confidence is low in their own capabilities. For example, they might skip double checking prescribed dosages, or questioning unclear prescriptions. The phase signified to an urgent need for closing the existing gap with specific intervention strategies to improve self-efficacy for nurses. Giving nurses the right knowledge, skills and support would allow interventions to empower them with feeling more competent in preventing medication errors, which would ultimately lead to a more patient-safe environment ([(14,15)]). This phase shows the need for self-efficacy development to be seen as a prerequisite in any initiative for medication safety practice enhancement. However, while this kind of intervention is critical, its use will depend on routine application and continuing evaluation; otherwise, the outcome will not be as envisaged.During the Post1-Study phase, the average score exhibited a remarkable increase, being categorized as "Good." This considerable

enhancement indicates that the intervention was effective in strengthening the self-efficacy of nurses. The intervention likely encompassed various strategies (such as training sessions, hands-on practice and feedback mechanisms) that empowered nurses to feel more confident in their abilities to prevent medication errors. The results imply that nearly all nurses concurred they felt capable of addressing medication errors, which signals a notable shift in their confidence levels. This phase underscores the effectiveness of the intervention in cultivating nurses' self-efficacy, a vital factor in enhancing medication safety. However, one must take into account that such improvements may also hinge on external factors; because the environment in which nurses function plays a significant role in their overall effectiveness[16-23].During the Post2-Study phase, the mean score improved further and remained within the "Good" category. This shows that the positive impact of the intervention was not only sustained (which is significant) but also slightly enhanced over time. The ongoing improvement suggests that the intervention had a lasting effect on nurses' self-efficacy, likely because of the reinforcement of skills and knowledge gained throughout the intervention. However, the fact that the score stayed in the "Good" range underscores the durability of the intervention's impact on nurses' confidence in addressing medication errors.From the perspective of a researcher, the findings are quite encouraging[24]. The significant improvement observed in the Post1-Study phase illustrates that the intervention effectively enhanced nurses' self-efficacy, a crucial factor for fostering proactive behavior in medication safety. The sustained and slightly elevated scores in the Post2-Study phase further underscore the long-term advantages of the intervention. However, the researcher stresses the necessity of continuous reinforcement (such as periodic training sessions or refresher courses) because this ensures that nurses retain their confidence and skills throughout time. The results suggest that targeted interventions can substantially enhance nurses' self-efficacy, leading to more proactive and safer medication practices in pediatric wards. Although the study highlights the vital role of self-efficacy in medication safety, it also demonstrates the effectiveness of these interventions in bolstering nurses' confidence and competence ' The control group showed no improvement, with their evaluation fluctuating from poor to fair and back to poor assessment.

**Conclusion:**

This study concluded that the program was effective in enhancing nurses' self-efficacy regarding medication dosage errors. Initially, the nurses' self-efficacy was assessed and found to be poor in the first test. However, after the intervention (the training program), their self-efficacy improved, with the second test showing a significant increase, categorized as good. The nurses were followed for two months after the program, and in the third test, they still retained the improvements, maintaining a positive and high level of confidence. This was further supported by the effect size analysis, which demonstrated a positive effect size. In contrast, the control group showed no improvement, with their self-efficacy remaining unchanged.

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