# Effect of Educational Guidelines on Nurses' Performance regarding Safe Use of High Alert Medications at Pediatric Intensive Care Units

**Seham Mohammed Abd Elaziz [1], Rasha Rady El Said [2] and Esraa Gamal Mohammed[3]**

*(1) Assistant professor of Pediatric Nursing, Faculty of Nursing, Benha University, Egypt and (2, 3) Lecturer of Pediatric Nursing, Faculty of Nursing, Benha University, Egypt*

## Abstract

**Background:** High-alert medications are most likely to significantly harm the children when improperly used as, the consequence of an error with these medications are significantly worse for children. So, nurses should be aware about dealing with these medications safely. **The study aim** was to evaluate the effect of educational guidelines on nurses' performance about safe use of high alert medications at pediatric intensive care units. **Study design:** A quasi- experimental approach with pre and post intervention. **Sample:** A convenient sample of all available nurses (n=66) and purposive sample of children (n=66) at Pediatric Intensive Care Units in Benha University Hospital and Benha Specialized Pediatric Hospital. **Tools of data collection: Tool (I): A structured interviewing questionnaire sheet:** It consisted of Part A: Personal characteristics of studied sample that include: 1- The studied nurses, 2- Children, Part B: Nurses' knowledge regarding safe use of high alert medications. **Tool II:** An Observational Checklist used to assess nurses' practice about safe use of high alert medications. **Tool III:** Likert scale for nurses' attitude regarding safe use of high alert medications in children. **Result:** There was a highly statistically significance of studied nurses' knowledge, practice and attitude regarding safe use of high alert medications in PICU at pre and post educational guidelines phases (p<0.000). **Conclusion:** Implementation of educational guidelines strengthened nurses' performance regarding safe use of high alert medications. **Recommendations:** Establishing standardized guidelines for nurses regarding safe use of high alert medications that should be available in each hospital to enhance nurses' performance at PICU.

**Keywords:** High alert medications, Safe use, Nurses' performance, Pediatric Intensive Care Units, Educational Guidelines**.**

## Introduction

The term High-Alert Medications (HAMs) defined as drugs that pose a greater risk of causing severe child harm when they are administered in error, which are thought to carry a more pronounced risk for harm. Due to pharmacokinetic and pharmacodynamics changes throughout development, children are more likely than adult to experience negative side effects from medication mistakes (**Schilling et al., 2022**)

High alert medications are classified to different categories, for example, but not limited: oral and parenteral chemotherapeutic agents, cardiovascular medications (e.g., adrenergic drugs), anticoagulants (e.g., warfarin and heparin), narcotics (e.g., fentanyl and morphine), neuromuscular blocking agents (e.g. succinylcholine and rocuronium), moderate and minimal sedations (e.g., midazolam and dormicum), insulin, inotropic drugs (e.g., digoxin and lanoxin), opioids, adrenergic antagonists, anti-arrhythmic drugs and electrolytes (e.g., 15% potassium chloride (KCl)). It frequently used in the Pediatric Intensive Care Unit (PICU), pediatric ward, and also at pediatric Emergency Room (ER) (**Mohamed & Abdalla, 2022**).

# Effect of Educational Guidelines on Nurses' Performance regarding Safe Use of High Alert Medications at Pediatric Intensive Care Units

Children are significantly at risk or have serious side effects from HAMs. The most frequent types of injury during the provision of medical care are called Adverse Drug Events (ADEs), which resulting from medication therapy. HAMs, adverse events are persistent, potentially fatal, irreversible, and may result in impairment or even death. These events can be prevented by safe use of medications (**Farag et al.,2017**).

High alert medication errors (MEs) are unintentional mistakes that can happen when medications are prescribed, dispensed, stored, prepared, and administered. It considered one of the top issues facing nurses around the world. As, 7.0% of medicine orders include prescription errors, compared to 0.1% to 2.7% for distribution errors and 19.0% globally for administration errors. Also, children in pediatric intensive care units have three times more risk for medication errors. (**Alves et al.,2021**).

The risk of high alert medication errors is partially explained by the fact that 60% of children receive prescriptions for high alert medications that are off-label, or not listed in the product monograph, and miscalculating of medication dosage. In addition to using the improper high alert medication, dose, route, time and residence also increases risk for misuse of high alert medication (**Nydert et al., 2020**). Moreover, the administration of high alert medications at a high rate could harm children especially administration of insulin, opiates and sedatives (**Alandajani et al.,2022**).

High alert medications errors also resulted from improper medication storage such as keeping look-alike and sound-alike medications with one another in the same location that may lead to confusion, keeping medications near other routine supplies in areas that easy to access, labeling medications without clear labels as high alert medications and clear medication information. Incomplete order of prescription with inappropriate abbreviations, verbal orders, and lack of independent double-check are some of the additional causes of mistakes (**Güneş et al., 2021**).

The safe use of high alert medications is a big global topic that is connected to safety and quality of childcare. It included safe use of high alert medications during storage, prescription, dispensing, preparation, and administration. It considered one of the most crucial challenges for nurses worldwide (**Abd-Elrahman et al., 2022**).

The precautions for safe use of high alert medications including safe storage of high-alert medications, keeping look-alike and sound-alike medications at different cabinets, different product labels on medicines, the use of legible, accurate, clear order of prescription with appropriate abbreviations, not accepting verbal orders, using reminders or alarms, performing independent double-check and bar-code systems. Together with appropriate medication rate, route, time, and dose (**National Medication Safety Committee of Singapore, 2021**).

The precautions of safe use depending on the category of high-alert medication. For instance, keeping insulin and heparin vials together can be confusing. Sedatives should be kept in double-locked cabinets by two different staff members, and inotropic drugs like digoxin should be kept apart from thyroxin to avoid confusion with medications that have similar appearances and sounds. Concentrated

electrolytes and neuromuscular blocking medications shouldn't be maintained in the same accessible area as other normal supplies. **(Pharmaceutical Services Programme of Malaysia, 2023).**

Nurses have a critical function in safe use of HAMs including safe storage, preparing, and administrating medications. In addition to reporting negative drug reactions, monitoring the effectiveness of medication, and counseling children or parents about their medications. So, Medication errors are more likely when nurses lack proper training and expertise in administration, storage, and dose calculation. of medication errors. Nurses' medication administration errors can seriously harm a child's health, and quality of life. Hence, improving nurses' knowledge and practices for safe administration of high alert medication is a crucial issue **(Zyoud et al., 2019).**

**Significance of the study.**

In the world, between 27% and 72% of Medication Errors (MEs) involve high-alert medications (HAM), The Institute for Safe Medication Practices (ISMP) estimates that the harm prevalence varying from 3.8% to 100% of MEs, with insulin having the greatest prevalence. Children are harmed by 16.8% of insulin administration errors, which result in 0.1% coma and 0.1% death. According to the errors' severity of high alert medications, there were 0.1% to 19.2% moderate, 0.2% to 15.4% serious, and up to 1.9% fatal for the children. Anesthetics, antibiotics, dopaminergic, and adrenergic medications all caused (4.5%) significant side effects including children death. In addition to, more than half of the errors (55.5%) that resulted from the use of numerous medicines harmed children, with 37.5% of those errors placing them at risk of death **(Alves et al., 2021).**

The Egyptian National Online Reporting System reported that 23% of drug mistakes in Egypt were produced in intensive care units. Drug administration, monitoring, and prescribing errors made up most cases (54%) of medication errors. Only 13% of observed errors result in harm to children; the majority were prospective (25%), avoidable (11%), or innocuous (51%) **(Shittaya et al., 2019).**

One of the primary responsibilities of nurses in the PICU is the administration of high alert medications, but medication errors were primarily caused by lack of nurses' knowledge and improper practices about high alert medications administration. In addition to, the pediatric nurse is the key to saving children because they are so susceptible to medication errors at their age. Thus, nurses must be aware of how to deal with high alert medications safely and effectively **(Mohamed & Abdalla, 2022).** From this point, this study was conducted in order to evaluate effect of educational guidelines on nurses' performance regarding safe use of high alert medications at pediatric intensive care units.

**Aim of the Study:**

This study aimed to evaluate the effect of educational guidelines on nurses' performance regarding safe use of high alert medications at pediatric intensive care units through:

1- Assessing nurses' knowledge, practice and attitude regarding safe use of high alert medications at pediatric intensive care units (PICU).

2-Designing and Implementing educational guidelines for nurses about safe use of high alert medications at pediatric intensive care units.

3- Evaluating the effect of educational guidelines on nurses' knowledge, practice and

attitude regarding safe use of high alert medications at PICU.

**Research hypothesis**:

Nurses' total knowledge, practice and attitude scores regarding safe use of high alert medications at pediatric intensive care units will be increased after the implementation of educational guidelines.

**Subjects and methods:**

**Study design**:

A quasi- experimental approach was used to conduct this study with pre and post intervention.

**Study settings:**

A pediatric intensive care unit served as the site for the current study, that located at Benha Specialized Pediatric Hospital, which affiliated to Egyptian Ministry of Health and populations and Benha University Hospital. Pediatric intensive care unit (PICU) at Benha Specialized Pediatric Hospital located in third floor and includes three rooms, the first is the isolation room had one bed, the second had 8 beds and the third had 4 beds. As regards PICU at Benha University Hospital located in fourth floor and includes two rooms, each room had 6 beds.

**Study subjects:**

The subjects included in the study consisted of the following:

**I:** A convenient sample of all available nurses (n=66) regardless their personal characteristic, who were working at the previous settings (31 nurses at Benha University Hospital and 35 nurses in Benha Specialized Pediatric Hospital).

**II:** A purposive sample of children (n=66) from the previously described settings throughout the study period under the

following criteria of inclusion: Age range from 6 months to 15 year and took high alert medication. The study excluded children suffering from surgical conditions.

**Tools of data collection:**

The following tools were used to collect data:

**Tool I: A structured Interviewing Questionnaire Sheet:** This tool was created by researchers based up on scientific literature review to collect data and written in a simple Arabic language. It consisted of the following:

**Part A: Personal characteristics of studied sample:**

**1-The studied nurses:** It consisted of 6 questions and all of which were multiple-choice. It included place of work, sex, age, educational level, years of experience and the attainment of previous training program regarding safe use of high-alert medications.

**2-Children:** It includes age, gender, diagnosis, weight and high alert medications prescribed for child (5 questions).

**Part B: Nurses' knowledge regarding safe use of high alert medications** (HAMs)**:** it was developed by researchers after reviewing of relevant literature based on **National Medication Safety Committee of Singapore, (2021)**, it is including the following sub parts.

1- **Nurses' knowledge regarding high alert medications**: It included of 6 questions with multiple choice to assess nurses' knowledge concerning HAMs as (definition, categories, precautions for safe storage, precautions during preparation and precautions for administration and factors that influence on safe use of HAMs).

**2- Nurses' knowledge regarding safe use of insulin in children:** It included of 10 questions (multiple choice) to assess nurses' knowledge regarding safe use of insulin in children such as(types ,indications of different

types of insulin, common errors of insulin administration, complications of insulin over dose, side effect of insulin under dose, safe storage of different types of insulin, precautions taken before insulin to ensure safe administration, role of nurse after insulin administration, signs of hypoglycemia and hyperglycemia).

**3- Nurses' knowledge regarding safe use of Fentanyl in children:** It included of 12 question (multiple choice) to assess nurses' knowledge regarding safe use of Fentanyl such as (category that fentanyl belong to, types of fentanyl, indications, contraindications, precautions for safe storage of different types of fentanyl ,role of nurse before fentanyl administration in children, precautions should be taken during administration of fentanyl patches in children, medications that increase risk of fentanyl, complication of un safe use of fentanyl, role of the nurse after fentanyl administration, symptoms of fentanyl over dose and role of nurse in case of fentanyl overdose in children).

**4- Nurses' knowledge regarding safe use of dormicum in children:** It included of 12 question (multiple choice) to assess nurses' knowledge regarding safe use of dormicum such as (brand name, types, indications, contraindications, drugs that increase risk of dormicum in children, safe storage, role of nurse before dormicum administration in children, safe dormicum administration in infants, side effects of dromicum in children, signs of dormicum overdose in children, role of nurse after dormicum administration and in case of dormicum overdose).

**5- Nurses' knowledge regarding safe use of adrenaline in children:** It included of 12 question (multiple choice) to assess nurses' knowledge regarding safe use of adrenaline such as (brand name, category, indications, contraindications, drugs that increase risk of adrenaline in children, safe storage, side

effects, precautions during adrenaline administration, signs and symptoms of adrenaline over dose in children, drugs that used in case of adrenaline overdose and role of nurse after adrenaline administration and in case of adrenaline overdose).

**6- Nurses' knowledge regarding safe use of digoxin in children:** It included of 10 questions (multiple choice) to assess nurses' knowledge regarding safe use of digoxin such as(indications, contraindications, precautions for safe storage, precautions before administration , factors increase incidence of digoxin toxicity ,symptoms of digoxin toxicity, side effects, drugs that interact with digoxin and role of nurse after digoxin administration and in case of digoxin overdose).

**Scoring system:**

The model key answers were used to compare the responses from the studied nurses, wherein the following grades were assigned: two for a correct and complete response, one for a correct but incomplete response, and zero for a wrong or unknown response. Over all knowledge ratings ranged from (0 - 124) point for total (62) questions for nurses' knowledge, as a result, the overall knowledge score was assigned the following classification:

- **Good:** ≥80% was ranged from (99 ≤ 124) points.

- **Average**: 60- <80% was ranged from (74 < 99) points,

- **Poor**: <60% was ranged from (0 < 74) points.

**Tool II**: **An Observational Checklists:** It was adapted from **Farag et al., (2017) and Drug Regulatory Authority of Pakistan, (2022),** it was used to assess nurses' practice about safe use of high alert medications at PICU and

contained 82 steps grouped under five main procedures namely, nurses' practice regarding safe use of insulin (23 steps), nurses' practice regarding safe use of Fentanyl injection (21 steps), nurses' practice regarding safe use of dormicum (10 steps), nurses' practice regarding safe use of adrenaline (IV form of Epinephrine) (12 steps) and nurses' practice regarding safe use of use digoxin (lanoxin) (16 steps)

Total of nurses' practice score was established by the researchers. Each item was checked as one grade for done and correct, and zero for not done. Accordingly, the total practice score was classified as the following:

- **Competent**: ≥80% of total nurses' practice score, ranged from (66- 82) points.
- **Incompetent:** <80% of total nurses' practice score, ranged from (0- < 66) points.

**Tool III: Likert scale for nurses' attitude regarding safe use of high alert medications in children.**

It was adapted from **Alandajani et al., (2022),** it is 3-point Likert scale used to measure nurses' attitude regarding safe use of high alert medications. It translated to Arabic and included (8) items regarding safe storage of high alert medications, safe storage of sound alike medications, order of medication prescription, safe drug administration, necessity of making independent double checks with another licensed nurse, availability of rescue medication in case of high alert medication overdose, observation of medications side effect after administration, and right documentation. Nurses response scored as agree had grade 2, uncertain had grade 1 and disagree had grade 0.

**Scoring system of nurses' attitude**
Total score of nurses' attitudes ranged from (0-16) points.
- **Negative attitudes** ($< 60\%$)
- **Positive attitudes** ($60 \% \leq 100\%$)

**Operational design**

The operational design included preparatory phase, content validity, reliability, ethical consideration, pilot study and field work.

**Preparatory Phase**

Using textbooks, papers, journals, and scientific periodicals, a review of the relevant historical and present national and international literatures was conducted in order to be acquainted with the several elements of the current study, and design data gathering tools. This phase took one month from the beginning of August 2022 to the end of August 2022.

**Content Validity**

It was judged by a jury of 3 experts (1 expert from Faculty of Nursing Menoufia University& 2 experts from Faculty of Nursing Benha University) who are professors in the field of Pediatric Nursing. The experts evaluated the study tools for clarity, simplicity, objectivity, comprehensiveness, relevance, and applicability. The experts agreed on content, but their opinion was elicited regarding the format, accuracy and paraphrasing of the tools and recommended minor language changes that make the statement and questions more precise and clearer. The experts' comments were done accordingly. This phase lasted one month from the beginning of September 2022 till the end of September 2022.

**Reliability:**

In order to test the internal consistency of the tools, the researchers applied tool's

reliability. Reliability of all tools items was assessed using Cronbach's alpha coefficient. It was (0.88) for nurses' knowledge assessment sheet, (0.91) for the nurses' practices and attitude scale confirmed with a Cronbach's alpha reliability coefficient of (0.78).

**Ethical Considerations:**

The Benha University Faculty of Nursing's Scientific Research Ethical Committee has approved the study's ethical conduct. Prior to collecting data, the nurses who were the subject of the study provided informed consent. The study's goal and anticipated results were explained to the nurses. The nurses were also given the assurance that the study was safe, that participating was optional, and that they had the freedom to leave the study at any moment without providing a reason. Additionally, nurses were given the assurance that only research purposes would be served by the data obtained, and that privacy and security would also be ensured. Respect was shown for the nurses under study in terms of ethics, values, culture, and beliefs. Before collecting data, parents' and children's verbal consent was gathered to ensure the study's safety.

**Pilot Study**

The feasibility, application, clarity, and validity of the research tools were evaluated in a pilot study along with an estimation of the time required for each tool (I, II, &III). It was conducted on (6) nurses and (6) children who were omitted from the current study to prevent sample bias and contamination and made up 10% of the total subjects studied. The final version of research tools was prepared after modifications that were made in light of the analysis from the pilot study.

**Field of work:**

The following phases were implemented to achieve the aim of the current study;
assessment, planning, implementation and evaluation phases. These phases were conveyed from the earliest starting point of October 2022 to the end of March 2023 covering 6 months.

**A-Assessment phase**

Nurse interviews were conducted during the assessment phase to gather baseline data. The researchers were accessible 4 days/week on a rotating basis; (Saturday, Monday, Tuesday, and Thursday) beginning at 11 AM and continuing until 1:30 PM. The researchers greeted each nurse, discussed the goals, duration, and activities of the study, and obtained written consent before the interview ever began. The questionnaire and Likert scale sheet were distributed by the researchers to the studied nurses, and they took 20 minutes to complete questionnaire that used to measure their knowledge and 10 minutes for Likert scale sheet that used to measure their attitude regarding safe use of high alert medications. Each nurse was observed individually during their actual practice of procedures to evaluate their practice level in relation to safe use of high alert medications for children at PICU and it took 30 minutes. Researchers took approximately 15 minutes to gather data on each child from their medical file.

**B- Planning phase:**

The educational guidelines were created by the researchers using baseline data from pre-test assessment and relevant literature review. The educational guidelines were created in accordance with identified needs and an assessment of relevant studies. Educational guidelines were constructed in a form of printed Arabic form and included different topics to enhance nurses' knowledge and practice in relation to safe use of high alert medication at PICU. Several techniques were used for teaching such as group discussion,

modified lecture, brain storming sessions, demonstration, and re-demonstration. In order to ensure that the nurses completely understood the aims and content of the guidelines, appropriate teaching materials were used, including handouts, audio-visual aids, role playing, and real instruments.

## C- Implementation phase:

Regarding the start of the program sessions, the studied nurses motivated for educational guidelines and notified of the time and location of sessions which were conducted at the pediatric lecture room for each hospital. The studied nurses were divided into 11group, each group consisted of 6 nurses, the educational guidelines taken about 7 hours for each group and were implemented according to nurse's readiness, distributed as the following; three sessions for theoretical part each session kept going from 30-45 minutes and (5) sessions for practical part, each session kept going 1 hours, 4 days/week in the morning shift. **Theoretical part**; **1st session** of educational guidelines included introduction to the educational guidelines, overview about high alert medications and knowledge concerning safe use of insulin in children, **2nd session** included knowledge concerning safe use of Fentanyl and Dormicum in children, **3rd session** included knowledge concerning safe use of Adrenaline and Digoxin in children. **Practical part concerned with application of skills regarding safe use of high alert medication for children at PICU ; 1st session** included nursing practice concerning safe use of insulin, **2nd session** included nursing practice regarding safe use of Fentanyl injection and Transdermal (T/D) patches, **3rd session** included nursing practice regarding safe use of dormicum, then **4th session** included nursing practice regarding safe use of Adrenaline (IV form of Epinephrine) and

finally, **5th session** focused on nursing practice regarding safe use of lanoxin (digoxin). These sessions were repeated to each subgroup of nurses.

## D- Evaluation phase:

The effectiveness of the educational guidelines was assessed at this phase. The identical tools that were utilized before to the guidelines were applied for the immediate post educational guidelines evaluation for all subjects.

## Administrative Design:

The directors of Specialized Pediatric Hospital and Benha University Hospital in Benha city received official permission from the Dean of Faculty of Nursing at Benha University. In order to conduct the study with the least amount of resistance, its nature, significance, and anticipated results were clearly explained.

## Statistical analysis:

The Statistical Package for Social Science (SPSS) version 21 for Windows, operating on an IBM compatible computer, was used to arrange, tabulate, and statistically analyze the acquired data. The use of descriptive statistics (e.g., percentages, frequency, mean and standard deviation). Tests of significance include the Chi-square test (X2) and correlation coefficient (r), both of which are used to assess the significance of qualitative variables and quantitative variables with normally distributed data, respectively. These tests were applied to test the study hypothesis. Reliability of the study tools was done using Cronbach's Alpha. A highly significant level value was considered when $p < 0.001$, a significant level value was considered when $p < 0.05$ and. No statistical significance difference was considered when $p > 0.05$.

**Results:**

**Table (1):** Shows that, 37.8% of the studied nurses' age ranged 30-<35years with the mean age 30.80±5.27 and years of experience was10- < 15 in the PICU with mean years of experience11.07±5.13 year. Regarding their level of education, more than half (54.6%) of them had technical institute of nursing. Regarding gender three quarters (75.0%) of them female and majority (86.3%) of them didn't attend training courses regarding HAMs.

**Table (2):** Reveals that, 45.5% of the studied children had age ranged from5-< 10 years with the mean age8.10±3.89 years and diagnosed diabetes mellitus with prescribed insulin for child, Regarding gender more than half (57.6%) of them female and (40.9%) have underweight.

**Table (3):** Clarifies that, (90.9%) of the studied nurses had incorrect answer pre-educational guidelines, while improved to (80.3%) of them had complete correct answer about high alert medication post educational guidelines. Moreover, there was a highly statistically significance in all items of studied nurses' knowledge about safe use high alert medication in PICU at pre and post educational guidelines phases (p<0 .000).

**Figure (1):** Illustrates that, nearly three quarters (72.3%%) of studied nurses had poor level of total knowledge pre-educational guidelines phase. While 89.3% of them had good knowledge regarding safe use high alert medication in PICU at post educational guidelines phases.

**Table (4):** Shows that, (87.8%) of the studied nurses had incompetent practice at pre-educational guidelines, while improved to (80.3%) of them had competent practice regarding safe use of Adrenaline post educational guidelines. Moreover, there was a

highly statistically significance in all items of studied nurses' practices about safe use high alert medication in PICU at pre and post educational guidelines phases (p<0 .000)

**Figure (2):** Shows that, the majority (89.4%) of studied nurses had incompetent level of total practice pre-educational guidelines phase. While the majority (83.3%) of them had competent practice regarding safe use of high alert medication in PICU at post educational guidelines phases.

**Table (5):** Reveals that, (80.3%) of the studied nurses had disagree attitude pre-educational guidelines, while improved to (71.3%) of them had agree attitude about observation side effect after administration of medications at post educational guidelines. Moreover, there was a highly statistically significance in all items of studied nurses' attitude about safe use of high alert medication in PICU at pre and post educational guidelines phases (p<0.001).

**Figure (3):** Shows that 83.4% of studied nurses had total negative attitudes pre-educational guidelines phase. While the most (94.0%) of them had positive attitudes regarding safe use high alert medication in PICU at post educational guidelines phases.

**Table (6):** Clarifies that, there was a highly statistical significance with positive correlation between total knowledge, total practice, and total attitudes scores about safe use high alert medication in PICU at pre and post educational guidelines phases (p<0.001).

# Effect of Educational Guidelines on Nurses' Performance regarding Safe Use of High Alert Medications at Pediatric Intensive Care Units

**Table (1): Distribution of the studied nurses according to their personal characteristics (n=66).**

| Items | No. | % |
|---|---|---|
| **Age (years)** | | |
| 20-<25 | 8 | 12.2 |
| 25-<30 | 18 | 27.3 |
| 30-<35 | 25 | **37.8** |
| ≥35 | 15 | 22.7 |
| **Mean ± SD 30.80±5.27 years** | | |
| **Educational qualification** | | |
| Secondary school nursing education | 11 | 16.7 |
| Technical institute of nursing | 36 | **54.6** |
| Bachelor degree in nursing science | 16 | 24.2 |
| Postgraduate in nursing science | 3 | 4.5 |
| **Years of experience in PICU** | | |
| <5 | 7 | 10.7 |
| 5-<10 | 19 | 28.8 |
| 10-<15 | 25 | **37.8** |
| ≥15 | 15 | 22.7 |
| **Mean ± SD 11.07±5.13 years** | | |
| **Gender** | | |
| Male | 18 | **25.0** |
| Female | 48 | **75.0** |
| **Attendance of training courses related to HAM in PICU** | | |
| Yes | 9 | 13.7 |
| No | 57 | **86.3** |

**Table (2): Distribution of the studied children according to their Personal characteristics (n=66).**

| Items | No. | % |
|---|---|---|
| **Age of the child** | | |
| 6 months -< 1year | 3 | 4.5 |
| 1- < 5 years | 10 | 15.2 |
| 5-< 10 years | 30 | **45.5** |
| 10 – ≤15 years | 23 | 34.8 |
| **Mean ± SD 8.10±3.89 years** | | |
| **High alert medications prescribed for child** | | |
| Insulin | 30 | **45.5** |
| Fentanyl | 12 | 18.1 |
| Dormicum | 9 | 13.6 |
| Lanoxin | 11 | 16.6 |
| Adrenaline | 4 | 6.2 |
| **Diagnosis** | | |
| Diabetes Mellitus | 30 | **45.5** |
| Respiratory Distress | 5 | 7.5 |
| Pneumonia | 8 | 12.3 |
| Neurogenic Disorders | 12 | 18.1 |
| Heart failure | 11 | 16.6 |
| **Gender** | | |
| Male | 28 | 42.4 |
| Female | 38 | **57.6** |
| **Child weight** | | |
| Over weight | 15 | 22.7 |
| Underweight | 27 | **40.9** |
| Adequate weight | 24 | 36.4 |

**Effect of Educational Guidelines on Nurses' Performance regarding Safe Use of High Alert Medications at Pediatric Intensive Care Units**

**Table (3): Distribution of the studied nurses according to their knowledge regarding safe use high alert medications for children in PICU at pre and post educational guidelines phases (n=66).**

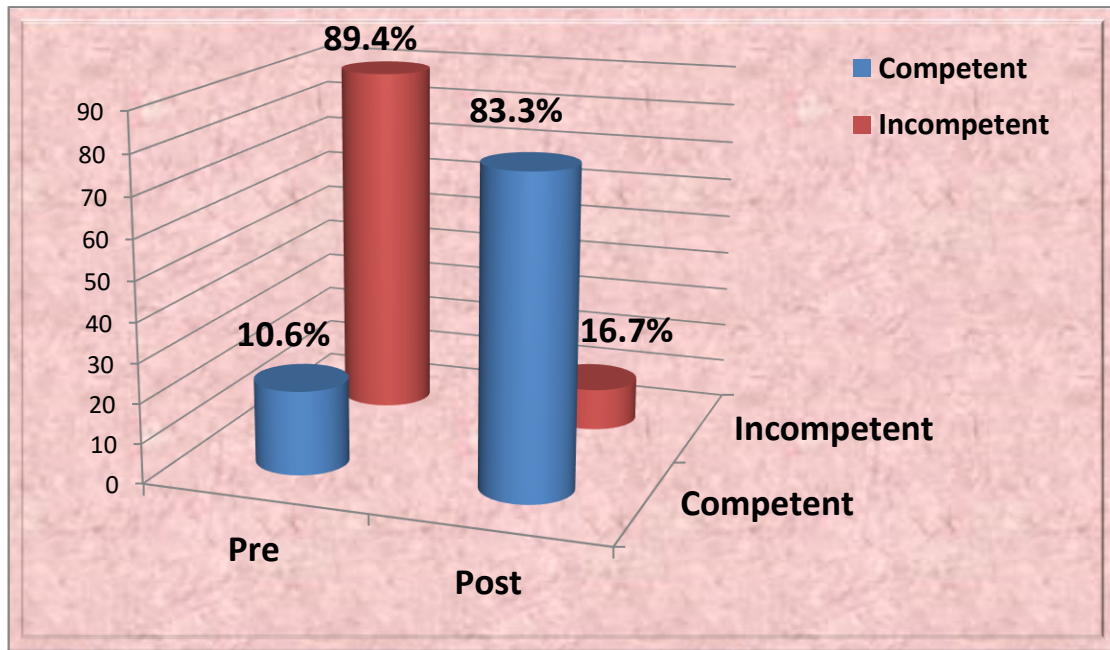| Items | Pre educational guidelines (n =66) | | | | | | Post educational guidelines (n =66) | | | | | | $X^2$ FET | P value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Complete correct answer | | Incomplete correct answer | | Unknown or wrong answer | | Complete correct answer | | Incomplete correct answer | | Unknown or wrong answer | | | |
| | NO. | % | NO. | % | NO. | % | NO. | % | NO. | % | NO. | % | | |
| High alert medications | 4 | 6.1 | 2 | 3.0 | 60 | **90.9** | 53 | **80.3** | 12 | 18.2 | 1 | 1.5 | 72.09 | 0.000 |
| Safe use of insulin | 8 | 12.1 | 8 | 12.1 | 50 | 75.8 | 54 | 81.8 | 8 | 12.1 | 4 | 6.1 | 70.12 | 0.000 |
| Safe use of Fentanyl | 8 | 12.1 | 11 | 16.7 | 47 | 71.2 | 53 | 80.3 | 9 | 13.6 | 4 | 6.1 | 62.18 | 0.000 |
| Safe use of Dormicum | 4 | 6.1 | 6 | 9.1 | 56 | 84.8 | 55 | 83.3 | 10 | 15.2 | 1 | 1.5 | 78.90 | 0.000 |
| Safe use of adrenaline | 6 | 9.1 | 7 | 10.6 | 53 | 80.3 | 59 | 89.4 | 7 | 10.6 | 0 | 0.0 | 65.54 | 0.000 |
| Safe use of digoxin | 5 | 7.6 | 6 | 9.1 | 55 | 83.3 | 52 | 78.8 | 12 | 18.2 | 2 | 3.0 | 74.47 | 0.000 |
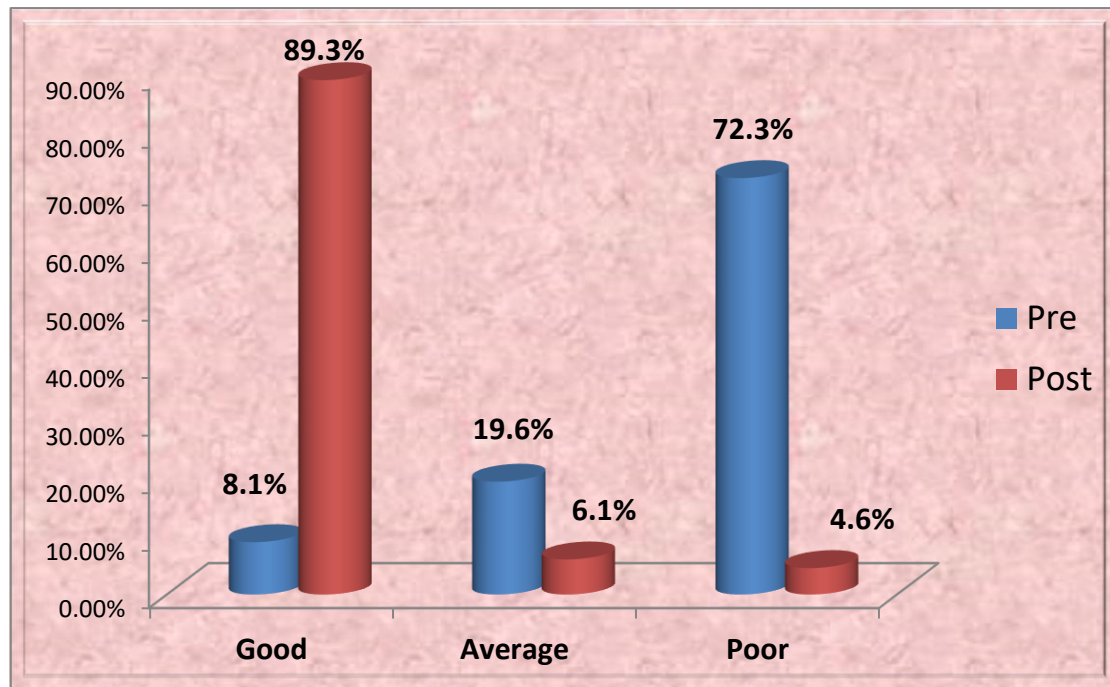
**Figure (1): Distribution of studied nurses' total knowledge score regarding safe use high alert medications in PICU at pre and post educational guidelines phases (n = 66)**

**Effect of Educational Guidelines on Nurses' Performance regarding Safe Use of High Alert Medications at Pediatric Intensive Care Units**

Table (4): Distribution of the studied nurses according to their practice regarding safe use of high alert medications for children in PICU at pre and post educational guidelines phases (n=66).

| Items | Pre- educational guidelines(n=66) | | | | Post- educational guidelines(n=66) | | | | $X^2$ FEET | p-value |
|---|---|---|---|---|---|---|---|---|---|---|
| | Competent | | Incompetent | | Competent | | Incompetent | | | |
| | No | % | No | % | No | % | No | % | | |
| Practice regarding safe use of insulin | 12 | 18.2 | 54 | 81.8 | 57 | 86.3 | 9 | 13.7 | 60.72 | 0.000 |
| Practice regarding safe use of Fentanyl | 21 | 31.8 | 45 | 68.2 | 58 | 87.8 | 8 | 12.2 | 45.80 | 0.000 |
| Practice regarding safe use of dormicum | 10 | 15.2 | 56 | 84.8 | 50 | 75.7 | 16 | 24.3 | 49.51 | 0.000 |
| Practice regarding safe use of Adrenaline | 8 | 12.2 | 58 | 87.8 | 53 | 80.3 | 13 | 19.7 | 61.87 | 0.000 |
| Practice regarding safe use lanoxin (digoxin) | 11 | 16.7 | 55 | 83.3 | 51 | 77.2 | 15 | 22.8 | 48.33 | 0.000 |

**Figure (2): Distribution of studied nurses' total practice score regarding safe use of high alert medications in PICU at pre and post educational guidelines phases (n = 66)**

**Table (5): Distribution of the studied nurses' attitude score regarding safe use of high alert medications in PICU at pre and post educational guidelines phases (n = 66).**

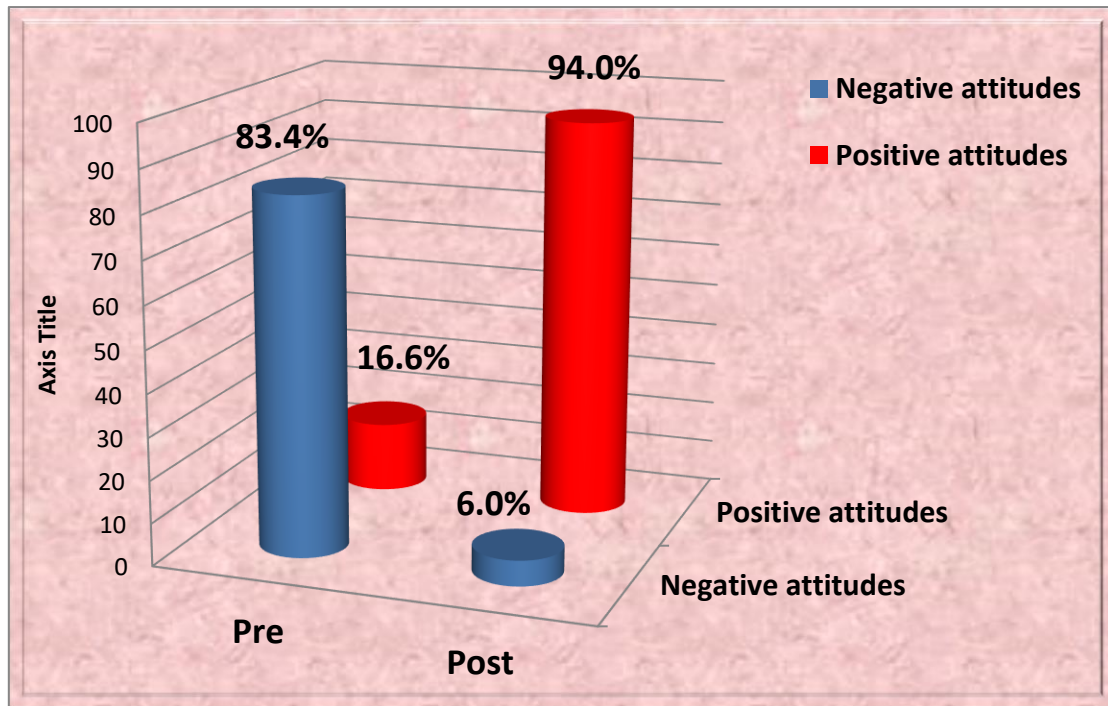| Items | Pre- educational guidelines(n=66) | | | | | | Post- educational guidelines(n=66) | | | | | | X² FEET | P value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Agree | | Uncertain | | Disagree | | Agree | | Uncertain | | Disagree | | | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % | | |
| - Safe storage of sound alike medications | 7 | 10.6 | 28 | 42.4 | 31 | 47.0 | 43 | 65.1 | 19 | 28.8 | 4 | 6.1 | 50.54 | 0.001** |
| - Tallman lettering and highlight in labeling drugs | 2 | 3.0 | 15 | 22.8 | 49 | 74.2 | 56 | 84.8 | 5 | 7.6 | 5 | 7.6 | 75.41 | 0.001** |
| - Order of medication prescription. | 4 | 6.1 | 18 | 27.2 | 44 | 66.7 | 55 | 83.4 | 9 | 13.6 | 2 | 3.0 | 102.36 | 0.001** |
| - Safe drug administration. | 6 | 9.1 | 8 | 12.1 | 52 | 78.8 | 42 | 63.7 | 21 | 31.8 | 3 | 4.5 | 95.45 | 0.001** |
| - Necessity of making independent double checks with another licensed nurse. | 4 | 6.1 | 23 | 34.8 | 39 | 59.1 | 45 | 68.2 | 16 | 24.2 | 5 | 7.6 | 48.90 | 0.001** |
| - Availability of rescue medication in case of high alert medication overdose. | 9 | 13.6 | 25 | 37.9 | 32 | 48.5 | 49 | 74.2 | 10 | 15.2 | 7 | 10.6 | 61.90 | 0.001** |
| - Observation side effect after administration of medications. | 3 | 4.5 | 10 | 15.2 | 53 | **80.3** | 47 | **71.3** | 16 | 24.2 | 3 | 4.5 | 112.55 | 0.001** |
| -Right documentation | 7 | 10.6 | 23 | 34.8 | 36 | 54.6 | 53 | 80.3 | 11 | 16.7 | 2 | 3.0 | 57.27 | 0.001** |

**Figure (3): Distribution of studied nurses' total score attitudes regarding safe use of high alert medications in PICU at pre and post educational guidelines phases (n = 66)**

**Table (6): Correlation coefficient between total knowledge, total practice, and total attitude scores of studied nurses regarding safe use of high alert medication in PICU at pre and post educational guidelines phases (n = 66).**

| Variables | | Total nurses' knowledge | | Total nurses' Practice | | Total nurses' attitude | |
|---|---|---|---|---|---|---|---|
| | | Pre | Post | Pre | Post | Pre | Post |
| **Total nurses' knowledge** | **R** | - | - | 0.838 | 0.925 | 0.657 | 0.801 |
| | **P** | | | 0.000** | 0.000** | 0.000** | 0.000** |
| **Total nurses' Practice** | **R** | 0.843 | 0.939 | - | - | 0.705 | 0.902 |
| | **P** | 0.000** | 0.000** | | | 0.000** | 0.000** |
| **Total nurses' attitude** | **R** | 0.657 | 0.801 | 0.605 | 0.809 | - | - |
| | **P** | 0.000** | 0.000** | 0.000** | 0.000** | | |

# Effect of Educational Guidelines on Nurses' Performance regarding Safe Use of High Alert Medications at Pediatric Intensive Care Units

**Discussion:**

High-alert medications have a great risk of seriously harming children, even when used as prescribed. Its injuries are more likely to cause harm than those caused by other drugs, and the harm they cause is likely to be more severe. This results in suffering for children and higher expenses for their care. Therefore, nurses should be aware of safe use practices for high alert medications in children to reduce their potential harm. So, this study aimed to enhance nurses' performance regarding the safe use of high alert medications in the PICU (**Institute for Healthcare Improvement, 2023**).

Regarding personal characteristics of the studied nurses, the current study reported that, more than one thirds of the studied nurses' age ranged 30 to less than 35years with the mean age 30.80±5.27 and experience years were10-< 15 in the PICU with mean years of experience11.07±5.13 years. Regarding their level of education, more than half (54.6%) had technical institute of nursing. Regarding gender three quarters (75.0%) of them were females and majority (86.3%) of them didn't attend training courses regarding HAM. This could be as a result of the urgent conditions that require highly skilled nurses in PICU settings for children. In addition to the majority of elderly nurses were females and graduated from technical institute of nursing in Benha city.

These findings supported by **Shittaya et al., (2019)** who stated that less than half of the studied nurses were in the age category of 30-35 years and years of experience ranging from 10 to 15 years. Additionally, more than two thirds of them were women and didn't participate in any high alert medication education sessions. Also, in accordance with **Alandajani et al., (2022)** who founded that,

the majority of respondents (84.8%) fell within the 30 to 40 age range and a higher percentage of them were female respondents (68.9%). In line with the current study finding **Alshammari et al., (2021)** showed that (60.5%) of the participants were females, with half of them were younger than 35 years of age, and more than half (53.7%) had 5–15 years of experience. Although regarding level of the studied nurses' education, the finding of the current study disagreed with **Shittaya, et al., (2019)**, **Alandajani et al., (2022) & Alshammari et al., (2021)** who showed that more than half of the study participants had diploma and bachelor's degrees.

The study result regarding children personal characteristics observed that, less than half of the studied children age ranged from5-< 10 years with mean age8.10±3.89 years and diagnosed diabetes mellitus with prescribed insulin for child, followed by neurological disorders, cardiovascular disorders, and respiratory disorders with prescription of fentanyl, lanoxin, and dormicum respectively. This result may indicate that children are more likely to have diabetes mellitus and insulin is considered a highly used type of high alert medication in children. The finding of the current study supported by **Alves et al., (2021)** who stated that according to American diabetes association diabetes mellitus considered the most cause result in 280,000 child need hospital admission. In line with **Alghamdi et al., (2019)** who clarified that drug classes most frequently involved in medication mistakes and avoidable adverse drug events in PICUs were nervous system agents such as sedatives, anti-infective agents, intravenous fluids, cardiovascular agents, respiratory agents and diuretics.

According to nurses' knowledge about safe use of high alert medications for children in PICU at pre and post educational guidelines, the current study clarified that, the majority of the studied nurses had complete correct answer about high alert medication at post educational guidelines compared to pre-educational guidelines. Moreover, there was a highly statistically significance in all items of studied nurses' knowledge about safe use of high alert medication in PICU at pre and post educational guidelines phases (p<0 .000). From a researcher's perspective, these results reflected nurses' knowledge deficit about safe use of high alert medications.

These results in accordance with **Güneş et al., (2021)** who showed that, the majority of the studied nurses had lack information regarding safe use of high alert medications in pediatric patients. Also, in agreement with **Huang et al., (2022)** who found that, HAM knowledge among nurses is insufficient, with a median (IQR) of 75.0 (70.0, 80.0) with lowest score regarding their knowledge about fentanyl skin patches. Additionally, on the same line with **Zein Eldin et al., (2018)** who showed that, on the posttest, nurses scored more correctly regarding medication safety with (13.64 ± 2.09) than pretest (8.02 ± 3.7). Moreover, **(Mohamed & Abdalla, 2022)** displayed that between the pre- and post-test mean scores of nurses' knowledge of the high alert drugs, there were highly statistically significant variations at p<0.001).

As regard nurses' total knowledge score about use of high alert medications safely in PICU at pre and post educational guidelines the present study illustrated that, nearly three quarters of studied nurses had poor level of total knowledge pre-educational guidelines phase. While improved to the majority of them were knowledgeable about

how to utilize high alert medications safely in PICUs according to post-educational guidelines. This result may indicate that the educational program had a high improvement effect on nurses' knowledge regarding safe use of high alert medications.

This result is supported by **Ahmed et al., (2020)** who showed that the overall level of understanding regarding HAM safety measures was unsatisfactory for less than two thirds (63.5%) of the study's staff nurses. While 36.5% of the staff nurses who participated in the study showed a satisfactory overall level of awareness of HAM safety measures. Despite a study of **Pierobon, etal., (2022)** clarified that 79.4% of nurses had a general understanding of how to administer and regulate HAM.

Additionally, similarly to **Mohanty, (2020)** who reflected in his study that after intervention nearly 90 percent of nurses were adequately knowledgeable about HAMs. In addition to, the current study result is like **Sullivan et al., (2021)** who indicated that more over one-third of research respondents felt confident in their understanding of high alert medications prior to the HAMs interventions. After the interventions, this result rose to less than three quarters (p<0.001).

The current study revealed that there was a highly statistically significance in all items of studied nurses' knowledge about safe use of high alert medications in PICU at pre and post educational guidelines phases (p<0 .000). This finding in accordance with **(Mohamed & Abdalla, 2022)** whose analysis revealed a highly statistically significant differences between nurses' total knowledge scores at pre and post-test (p<0.001). Additionally, like to **Soomar et al., (2019)** who stated that there was very significant

improving in knowledge of nurses after intervention.

Concerning nurses practice about safe use of high alert medications for children in PICU the current study result showed that, there was a highly statistically significance in all items of studied nurses' practices at pre and post educational guidelines phases (p<0 .001). This result agreed with **(Mohamed & Abdalla, 2022)** who demonstrated that there was a very statistically significant difference in all nurses' practice's pre-test and post-test mean scores regarding high alert medications(p<0.000).

According to total nurses' practice score about safe use of high alert medication in PICU at pre and post educational guideline the result of current study revealed that, the majority of studied nurses had competent level of total practice at post-educational guidelines phase in comparison to pre-educational guidelines. This finding reflected that educational guideline achieved their purpose in improving nurses' practices regarding high alert medications. This result supported by **Zein Eldin et al., (2018)** who represented that, means ratings of total nurses' practices of safety preparation and administration of medication on pre, and post are higher in posttest (16.80 ± 1.7) than pretest (14.84 ± 1.4). Additionally, in agreement with **Soomar et al., (2019)** who mentioned that, nurses' practices were significantly increased after intervention. Moreover, in line with **Mahmood & Hassan, (2020)** who represented that nurses' practice about not mixing medication in pre and post education program was improved from (34.0%) to (47.0) in posttest.

According to nurses' attitude score about safe use of high alert medication in PICU at pre and post educational guidelines phases

the current study illustrated that, the majority of the studied nurses had disagreed attitude at pre-educational guidelines, while improved to more than two thirds of them had agree attitude about observation side effect after administration of medications at post-educational guidelines. Moreover, there was a highly statistically significance in all items of studied nurses' attitude about safe use of high alert medication in PICU at pre and post educational guidelines phases (p<0.001). From researchers' point of view, this result may indicate that nurses' attitude improved regarding side effects of high alert medications as a critical situation require more attention for prevention of its consequences on children heath. This result is supported by **Alandajani et al., (2022)** who stated that nearly half of the studied nurses disagree about observation, reporting medication errors and side effects.

The study result regarding total attitude of the studied nurses observed that, the majority of them had negative attitudes pre-educational guidelines phase. While most of them had positive attitudes regarding safe use of high alert medication in PICU at post educational guidelines phases. From researchers' point of view, the educational guidelines had great impact on nurses' attitude regarding how to use high alert medication safely in PICU. This result on the same line with **Abd -Elmageed et al., (2020)** who showed that (48.6%) of nurses had a negative attitude toward administering medications, and (51.4%) of them had a favorable attitude toward it. In addition to, **Al-Saadi, (2021)** who clarified that the level of attitude was high among most of the study participants (41%) and average among 37% of them. Also, agreed with **Mohammed et al., (2022)** who demonstrated that, the majority of the nurses in the study had a favorable attitude after the session, compared to less than half who had a

negative attitude about drug delivery errors for children before the program.

As regards relation between total knowledge, total practice, and total attitude scores of studied nurses about safe use of high alert medications in PICU at pre and post educational guidelines phases the present study demonstrated that, there was a positive correlation with highly statistical significance between them (p<0.001). According to researchers, this showed that nurses' attitudes changed significantly when their knowledge and practice improved about dealing with high alert medication safely. This result agreed with **Abd Elmageed et al., (2020)** who represented that there was a statistically significant positive relation between nurses' knowledge, practice, and attitude regarding medication administration (P=0.021, r0.022). On the same line with **Mohammed et al., (2022)** who illustrated that pre and post program, there was a good association between nurses' total knowledge, attitude, and practice regarding mistakes in medication administration for children. Also, **Fathy et al., (2020)** who showed that there was a positive correlation between nurses' total knowledge and practice. Additionally, **Abukhader & Abukhader, (2020)** illustrated that there was statistically significant positive correlation between nurses' total knowledge and practice (r 0.029, P < 0.05).

Moreover, **Ehsani et al., (2022)** reported that the association between nurses' knowledge and practice was statistically significant (P < 0.001). **Abd El Aziz et al., (2021)** found that the highest strong positive statistically significant correlations between the total scores of knowledges and practice (r=0.89). Although incompatible with **Alsulami, etal., (2019)** who illustrated that around (97%) of the studied nurses were knowledgeable enough about drug errors and (90%) had a favorable

attitude towards medication error while, approximately 65.8% had incompetent practice.

## Conclusion:

According to the study findings, the majority of the studied nurses had good knowledge level, competent practice and positive attitudes regarding safe use of high alert medication in PICU at post educational guidelines phases. This evidence reflected that the implementation of educational guidelines had strengthened nurses' performance regarding safe use of high alert medication.

## Recommendations:

- Establishing standardized guidelines for nurses regarding the safe use of high alert medications that should be available in each hospital to enhance nurses' performance at PICU.

- Implementation of on-service training to update nurses' knowledge in dealing with high alert medications safely.

## References:

**Abd Elmageed, E. M., Soliman, H. M., & Abdelhamed, H. M. (2020).** Knowledge, attitude and practice of nurses in administering medications at Mansoura University Hospitals. IOSR Journal of Nursing and Health Science (IOSR-JNHS), 9(4), 06-16.

**Abd-Elrahman, M. E., Mostafa, M.G., & Hasanin, G.A. (2022).** Effect of an Educational Program for nurses about High Alert Medications on their Competence. Benha Journal of Applied Sciences, 7(4), 273-282.

**Abukhader, I., & Abukhader, K. (2020).** Effect of medication safety education program on intensive care nurses' knowledge regarding medication errors. Journal of Biosciences and Medicines, 8(06), 135.

# Effect of Educational Guidelines on Nurses' Performance regarding Safe Use of High Alert Medications at Pediatric Intensive Care Units

**Alandajani, A., Khalid, B., Ng, Y. G., & Banakhar, M. (2022).** Knowledge and Attitudes Regarding Medication Errors among Nurses: A Cross-Sectional Study in Major Jeddah Hospitals. Nursing Reports, 12(4), 1023-1039.

**Alghamdi, A. A., Keers, R. N., Sutherland, A., & Ashcroft, D. M. (2019).** Prevalence and nature of medication errors and preventable adverse drug events in paediatric and neonatal intensive care settings: a systematic review. Drug safety, 42, 1423-1436.

**Alsaadi, B. H. S. (2021).** knowledge, attitudes and practice of nurses regarding medication error reporting in KSA. European Journal of Molecular & Clinical Medicine, 6(1), 305-313

**Alshammari, F. M., Alanazi, E. J., Alanazi, A. M., Alturifi, A. K., & Alshammari, T. M. (2021).** Medication Error Concept and Reporting Practices in Saudi Arabia: A Multiregional Study Among Healthcare Professionals. Risk Management and Healthcare Policy, 2395-2406.

**Alsulami, S. L., Sardidi, H. O., Almuzaini, R. S., Alsaif, M. A., Almuzaini, H. S., Moukaddem, A. K., & Kharal, M. S. (2019).** Knowledge, attitude and practice on medication error reporting among health practitioners in a tertiary care setting in Saudi Arabia. Saudi medical journal, 40(3), 246

**Alves, B. M. C. S., de Andrade, T. N. G., Santos, S. C., Goes, A. S., da Silva Santos, A., de Lyra Junior, D. P., & de Oliveira Filho, A. D. (2021).** Harm prevalence due to medication errors involving high-alert medications: a systematic review. Journal of patient safety, 17(1), e1-e9.

**Drug Regulatory Authority of Pakistan (2022).** Guidelines on High Alert Medication Management, 1st edition, Islamabad-Pakistan, 16th June, 2022, pp. 26-127.

**Ehsani, M., Farahani, M. A., Haghani, S., Khaleghparast, S., & Memar, M. M. (2022).** Assessment of knowledge and practice of cardiovascular nurses regarding warfarin. Journal of Education and Health Promotion, 11(1), 270.

**Farag, A. M. A., Eweda, S. M., & Elsayed, N. F. (2017).** Nurses knowledge and practice in dealing with high alert medications. Alexandria Scientific Nursing Journal, 19(2), 1-24.

**Fathy, A. S. M., Khalil, N. S., Taha, N. M., & M Abd-elbaky, M. (2020).** Nurse's knowledge and Practice regarding Medication Errors in Critical Care Units: Descriptive study. Minia Scientific Nursing Journal, 8(1), 111-120.

**Ahmed, M.G., Mostafa, H.A., & Khalaf, D. A. (2020).** Staff Nurses' Performance Regarding Safety Measures of High Alert Medications. Egyptian Journal of Health Care, 11(4), 1368-1381.

**Güneş, Ü., Ozturk, H., & Ülker, E. (2021).** Nurses' Knowledge Level about High-Alert Medications. Mehmet Akif Ersoy Üniversitesi Sağlık Bilimleri Enstitüsü Dergisi, 9(1), 12-20.

**Mohammed, A.H., Ouda, W.E., Abdelsadik, B.R., & Mohamed, R. A. (2022).** Effect of an Educational Program for Nurses regarding Errors in Medications Administration for Children. Journal of Nursing Science Benha University, 3(2), 461-478.

**Huang, H. M., Lu, Q., Gu , Y.H., Hu, Y., & Zhang, X. (2022).** Call for Decision Support for High-Alert Medication Administration Among Pediatric Nurses: Findings From a Large, Multicenter, Cross-Sectional Survey in China. Frontiers in Pharmacology, 13.

**Institute for Healthcare Improvement, (2023).** High-Alert Medication Safety, improving health and health care worldwide, March 2023, available at https://www.ihi.org/Topics/HighAlertMedicationSafety/Pages/default.aspx

**Mahmood, A. H., & Hassan, H. B. (2020).** Effectiveness of an educational program on nurse¨s knowledge concerning danger of mixing medications in Al-Hussein Teaching Hospital in Al-Muthanna Governorate. International Journal of Psychosocial Rehabilitation, 24(09).

**Mohamed, H. R. & Abdalla, S. S. (2022).** Effectiveness of nursing guidelines on nurses' performance regarding high alert medications at neonatal intensive care units. Evidence-Based Nursing Research, 4(2), 54-63.

**Mohanty, S.B. (2020).** Effect of educational intervention on knowledge and practice regarding high alert medications among nurses in hospitals of Navi Mumbai. Iaetsd Journal for Advanced Research in Applied Sciences: vol 7(1): pp1-9, (2020)

**Abd El Aziz, A.M.M., Ahmed, S. M., & Abolwafa, N. F. (2021).** Nurses, Knowledge and Practice Regarding Medication Preparation and Administration Errors Occurrence at Neonatal Intensive Care Units. Minia Scientific Nursing Journal, 10(1), 141-147.

**National Medication Safety Committee of Singapore, (2021).** The national guidelines on high alert medications,11 August 2021, Singapore,pp.7-10.

**Nydert, P., Kumlien, A., Norman, M., & Lindemalm, S. (2020).** Cross sectional study identifying high alert substances in medication error reporting among Swedish pediatric inpatients. Acta Paediatrica, 109(12), 2810-2819.

**Pharmaceutical Services Programme of Malaysia, (2023).** Guideline on safe use of high alert medications (HAMS), ministry of health Malaysia,2nd Edition.

**Pierobon, N., Batista, J., Marcondes, L., & da Silva, D. P. (2022).** Knowledge of nurses in the administration and regulation of high alert medications in oncology. Enfermería Global, 21(3), 96-108.

**Schilling, S., Koeck, J. A., Kontny, U., Orlikowsky, T., Erdmann, H., & Eisert, A. (2022).** High-alert medications for hospitalised paediatric patients–a two-step survey among pediatric clinical expert pharmacists in Germany. Die Pharmazie-An International Journal of Pharmaceutical Sciences, 77(6), 207-215.

**Shittaya, A. I. M., AL-Rafay S. S., Tantawi, R .H., & Ali, A. E. F. (2019).** Performance of Nurses Regarding High Alert Medications in Critical Care Units. Egyptian Journal of Health Care, 10(4), 748-764.

**Soomar, S. M., Raees, R., & Abbas, K. M. (2019).** Medication errors in neonatal intensive care unit and strengthening education of registered nurses. Journal of Pediatrics, Perinatology and Child Health, 3(3), 130-139.

**Sullivan, K. M., Le, P. L., Ditoro, M. J., Andree, J. T., Charest, D. J., & Tuiskula, K. A. (2021).** Enhancing high alert medication knowledge among pharmacy, nursing, and medical staff. Journal of Patient Safety, 17(4), 311-315.

**Zein Eldin, Z. E. A., Okby, O. M., Abd Elrazek, F. A., & Badawy, S. F. (2018).** Children Medication Safety strategies: Its effect on Reducing Medication Errors among Pediatric Nurses. Menoufia Nursing Journal, 3(2), 107-118.

**Zyoud, S. E. H., Khaled, S. M., Kawasmi, B. M., Habeba, A. M., Hamadneh, A. T., Anabosi, H. H. & Al-Jabi, S. W. (2019).** Knowledge about the administration and regulation of high alert medications among nurses in Palestine: a cross-sectional study. BMC nursing, 18, 1-17.

# تأثير الإرشادات التثقيفية على أداء الممرضين فيما يتعلق بالاستخدام الآمن للأدوية عالية الخطورة في وحدات العناية المركزة للأطفال

## سهام محمد عبد العزيز ـ رشا راضي السيدـ إسراء جمال محمد

تعتبر الأدوية عالية الخطورة من الأدوية التى تؤدى الى حدوث أضرار شديدة للأطفال عند استخدامها بشكل غير صحيح، حيث يؤدى الخطأ في هذه الأدوية الى مضاعفات شديدة تؤدى الى تدهور صحة الأطفال. لذا، يجب على الممرضين ان يكونوا على دراية بالتعامل مع هذه الأدوية بأمان. لذلك هدفت هذه الدراسة الى تقييم تأثير الإرشادات التثقيفية على أداء الممرضين فيما يتعلق بالاستخدام الآمن للأدوية عالية الخطورة في وحدات العناية المركزة للأطفال. وتم تطبيق هذه الدراسة على عينة مناسبة من كل الممرضين (66) وعينة غرضية من الأطفال (66) بوحدات العنايه المركزه للأطفال بمستشفى بنها الجامعي ومستشفى الاطفال التخصصي ببنها. وأظهرت نتائج هذه الدراسة أن هناك دلالة إحصائية عالية بين معلومات وممارسات و اتجاهات الممرضين عن الاستخدام الآمن للأدوية عالية الخطورة في وحدات العناية المركزة للأطفال قبل وبعد تنفيذ الإرشادات التثقيفية (0.000> P). واستنتجت هذة الدراسة ان تطبيق الإرشادات التثقيفية أدى الى تعزيز أداء الممرضين فيما يتعلق بالإستخدام الآمن للأدوية عالية الخطورة فى وحدات العناية المركزة للأطفال. وقد أوصت الدراسة بضرورة وضع مبادئ توجيهية موحدة عن الإستخدام الآمن للأدوية عالية الخطورة التى ينبغي أن تكون متاحة في كل مستشفى لتعزيز أداء الممرضين في وحدات العناية المركزة للأطفال.