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Effect of Educational Program on improving Nurses' Performance Regarding Care Provided toward Poisoned Children

Asmaa Hassan Hussein¹, Amal Mohamed El-Dakhankhny², and Nesreen Mosbah Elsayed Mohamed³

(1) Teaching Instructor at Secondary Technical Nursing School, (2) Professor of Pediatric Nursing Faculty of Nursing- zagazig University and (3) Lecturer of Pediatric Nursing- Faculty of Nursing- zagazig University.

Corresponding author: Asmaa Hassan Hussein

Email: sedsedsed435@gmail.com

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Abstract: Background: Acute poisoning in children aged 1–5 years is a critical global health concern and a leading cause of accidental mortality. Nurses often serve as the first point of contact for children with acute poisoning, highlighting the importance of their role in providing effective care. **Aim:** The aim of this study was to evaluate the impact of an educational program on improving nurses' knowledge and practices in caring for poisoned preschool-aged children. **Design:** A quasi-experimental design was conducted at Zagazig Poison Control Center, Zagazig University Hospitals, and Zagazig General Hospital, involving all 40 nurses working in these centers and 80 children. **Tools:** three tools were included the first, a structured interviewing questionnaire, the second, an assessment of nurses' knowledge on pediatric poisoning, and the third an observational checklist for pediatric nursing procedures. **Results:** Findings revealed that prior to the program, 70% of nurses had poor knowledge and 85% exhibited unsatisfactory practices. Following the program, 92.5% demonstrated good knowledge, and 95% achieved satisfactory practices. A significant positive correlation was observed between knowledge and practice scores pre- and post-intervention. **Conclusion:** The study concluded that the educational program significantly improved nurses' performance in managing poisoned preschool-aged children. **Recommendation:** It is recommended to implement periodic evaluations and training to continually update nurses' skills and knowledge in acute poisoning management.

Keywords: Educational program, Children, Poisoning, Nurses, knowledge, Practices.

Introduction

Childhood poisoning is a prevalent medical emergency frequently encountered in pediatric practice. Although it has been a concern for generations, significant attention has only been directed toward this issue in the past three decades. This heightened focus is due to the considerable morbidity and mortality associated with poisoning, which has not declined at the same rate as infectious diseases largely mitigated by advances in immunizations and antimicrobial therapies (Li et al., 2021).

A poison is defined as any substance that, when introduced into the body, causes tissue damage or disrupts enzymatic functions. Poisoning can result from ingestion, inhalation, or skin contact with hazardous substances such as detergents, plants, or carbon monoxide, or from the excessive intake of substances typically considered safe. The severity of poisoning depending on factors as the type, concentration, and quantity of the poison, as

well as the timeliness and effectiveness of medical intervention. In Egypt, common causes of pediatric poisoning include exposure to insecticides, corrosives, hydrocarbons, foodborne toxins, analgesics, antihistamines, carbamazepine, phenol, and oral contraceptive pills (**Soave et al., 2022**).

Poisoning was a major cause of unintentional child injuries worldwide, ranking fourth after road traffic accidents, burns, and drowning. In Egypt, acute poisoning accounts for a significant proportion of pediatric emergency visits, with an incidence ranging from 0.33% to 7.6% across various studies. The majority of cases occur in children aged 1–5 years, representing 80% of all pediatric poisoning incidents. According to the World Health Organization (WHO), unintentional poisoning resulted in a global mortality rate of 1.4 deaths per 100,000 populations in 2021, increasing to 2.7 deaths per 100,000 in Africa (**Joda et al., 2021**).

Worldwide, 44.2 % of children less than five and 32.6 percent of children under the age of three suffer from acute poisoning. Between June 2020 and November 2020, 304 children of all sexes, aged 1 to 18, were admitted to the Ain Shams University Hospitals Poison Control Center with acute poisoning. Acute poisoning accounts for a significant percentage of pediatric and youth emergency visits in Egypt. Regular monitoring is required to detect trends in youth poisoning because the causes and demography of children's toxicity are highly variable (**Abu El-Naga et al., 2022**).

Most childhood poisonings occur in domestic settings, where hazardous substances are often within reach of toddlers, leading to accidental ingestion in mere moments. Limited caregiver awareness and inadequate supervision, combined with children's natural curiosity and tendency to explore their environment, are significant contributing factors (**Marano et al., 2021**).

The severity and outcomes of poisoning depend on multiple interrelated factors, including the type and amount of the poison, the duration of exposure, and the child's physiological vulnerability. Effective treatment prioritizes stabilizing the child, focusing on critical functions such as airway, breathing, and circulation (ABCs), while ensuring that essential physiological processes are maintained. Despite advances in medical care, prevention remains the most effective strategy to reduce childhood poisoning (**Cairns et al., 2024**).

Timely intervention and effective management are crucial for saving the lives of poisoned children. Nurses play a vital role in providing rapid and skilled care, equipped with the necessary tools and knowledge to address such emergencies. Continuous education and training for healthcare providers, particularly nurses, are essential to enhance their ability to manage pediatric poisoning effectively (**Sun et al., 2021**).

Significant of the study

The increasing number of pediatric poisoning cases highlights a critical public health concern. Data from the Zagazig University Poisoning Treatment Unit reveal a concerning rise in poisoned patient admissions, with 624 cases reported in 2019, 639 cases between July 2021 and June 2022, and a significant surge to 2294 cases during 2023. Among these, 970 patients required admission to the Poisoning Treatment Unit, with the majority being under 18 years old.

Given this alarming trend, the role of nurses in poison control centers is indispensable. Assessing and improving nurses to have knowledge and skills in managing unintentional child poisoning is crucial. Their responsibilities include emergency care, accurate diagnosis, antidote administration, supportive therapy, and effective prevention strategies. Additionally, nurses must address the needs of both patients and their families by developing comprehensive care plans to improve outcomes and mitigate future risks (**Nicholls, 2022**).

Purpose of the study:

The study aimed to evaluate the effect of an educational program on improving nurses' performance regarding caring for preschool-aged children who had been poisoned.

Research Hypothesis

The educational program will significantly enhance nurses' knowledge and performance in providing care for poisoned children.

Subjects and Methods

Research Design

The study used a quasi-experimental design.

Setting

The research was carried out at the Zagazig Poison Control Center, which operates within both Zagazig University Hospitals and Zagazig General Hospital.

Subjects

Group I: Included all nurses (n=40) working in the poison centers. This consisted of 18 nurses from Zagazig University Hospitals and 22 nurses from Zagazig General Hospital, all involved in the care of poisoned preschool children and accepted to participate in the study.

Group II: Consisted of children who received nursing care during the implementation of the educational program. A total of 80 children participated in the study, with 40 children assessed before the educational program and the other 40 children assessed afterward.

Tools for collecting data

Three tools were utilized to collect data:

The first: Structured Interviewing Questionnaire

Designed by the researcher based on relevant literature and studies, this questionnaire was composed of three sections and written in Arabic:

Part 1: Personal characteristics of nurses as, age, gender, prior training on poisoning and years of experience.

Part 2: The children's personal details, including their age, gender, and birth order.

Part 3: Medical characteristics of the children, covering poisoning type, route, and signs/symptoms.

Tool (II): Nurses' knowledge regarding preschool aged poisoning (pre and post-test)

The researcher created this section to assess the nurses' comprehension of specific poisoning types, including general nurses' knowledge of poisoning, food poisoning, petroleum poisoning, drug poisoning, iron poisoning, caustic poisoning, carbon monoxide poisoning, plant poisoning, lead poisoning, nurses' contribution to teaching mothers how to protect their children from poisoning, and their familiarity with the Wong-Baker Facial Pain Scale, Pediatric Glass Coma Scale, and Alert, Verbal, Pain and Unresponsive (AVPU) scale.

Scoring System for Knowledge Assessment

Each knowledge item was evaluated against a model answer key. Correct responses were given one point, while incorrect responses or "I don't know" answers received 0 points. The total knowledge score was 168 points

The overall scores of the nurses were divided into the following categories:

- Poor knowledge: Less than 60 percent of the total score.
- Average knowledge: Between 60% and 80%.
- Good knowledge: Greater than 80%.

Tool (III): Observational Checklists for Selected Pediatric Nursing Procedures

The researcher created the observational checklist to evaluate nurses' performance of ten specific pediatric nursing procedures.

Scoring System for the Observational Checklist

The checklist utilized a scoring system where each item was rated as either:

- **1 point** if the step was performed correctly, or
- **0 points** if it was not performed.

The total practice score was 136 points, distributed across the following nursing procedures:

- Immediately nursing care for poisoned children upon admission: 10 points
- Vital signs assessment: 52 points
- Gastric catheter lavage: 20 points
- Cardiopulmonary resuscitation (CPR): 16 points
- Use of Wong-Baker Facial Pain Scale: 3 points

- Pediatric Glasgow Coma Scale assessment: 3 points
- Assessment using the Alert, Verbal, Painful, Unresponsive (AVPU) scale: 4 points
- Skin care: 9 points
- Oral hygiene (mouth care): 8 points
- Electrocardiography (ECG): 11 points

Classification of Total Practice Scores

The nurses' total practice scores were categorized as follows:

- **Unsatisfactory practice:** Less than 80% of total score.
- **Satisfactory practice:** 80% or more of total score.

Educational Training Program Development

An educational training program was designed to equip nurses with the skills and knowledge needed to provide care for poisoned preschool-aged children.

Specific Objectives:

- Develop comprehensive knowledge about poisoning.
- Master nursing procedures related to care for poisoned preschool children.

Phases of the Program:

(I) Assessment Phase

An educational program was designed to evaluate and improve nurses' knowledge and practices. The assessment phase involved a pre-intervention evaluation of nurses' knowledge and practices using **Tool I** and **Tool II**. This was conducted through individual interviews with each nurse after explaining the study's objectives and obtaining their consent to participate.

(II) Planning Phase

Drawing from the results of the pilot study, assessment phase, and a review of pertinent literature, the researcher created an educational training program tailored to address identified gaps, needs, and deficiencies. The program's aim and objectives were formulated to address these requirements. The content of the training program was based on the identified needs and covered both theoretical and practical aspects. Teaching methods were chosen to facilitate small group learning and included lectures, group discussions, demonstrations, and re-demonstrations. Supporting materials such as colored posters, handouts (booklets), and video presentations were prepared using a laptop to enhance the learning experience.

(III) Implementation Phase

The educational program was delivered in eight sessions, either individually or in small groups, depending on the nurses' availability and workload at the poison center. Each session lasted 45-60 minutes, with the duration varying based on the content and nurses' responses.

The sessions covered the following topics:

1. **Session 1:** Overview of poisoning, types of poisoning, food poisoning, and petroleum poisoning.
2. **Session 2:** Drug poisoning, iron poisoning, caustic poisoning, and carbon monoxide poisoning.
3. **Session 3:** Plant poisoning, lead poisoning, and the role of nurses in educating mothers about poisoning prevention.
4. **Session 4:** Knowledge about Wong-Baker Facial Pain Scale, Pediatric Glasgow Coma Scale, and the AVPU scale.
5. **Session 5:** Vital sign assessment and immediately nurse care for children who have been poisoned upon admission.
6. **Session 6:** The gastric lavage and cardiopulmonary resuscitation procedures.
7. **Session 7:** Practice on Pain assessment, Pediatric Glasgow Coma Scale, and the AVPU scale.
8. **Session 8:** Skin care, oral hygiene, and electrocardiography (ECG) procedure.

Each session began with a brief recap of the previous session and an outline of the objectives for the current session. The sessions were conducted in Arabic with simple English terms to suit the nurses' educational level.

Motivation and reinforcement were employed throughout the sessions to encourage active participation and enhance learning.

(IV) Evaluation Phase

One month after the implementation of the educational program, a post-intervention assessment was conducted using **Tool II** and **Tool III**. Each nurse was individually interviewed to evaluate their knowledge and practices following the intervention. The evaluation phase aimed to measure the effectiveness of the educational program.

Content validity and reliability

Following a review of relevant literature, the tools were created and presented to a panel of five medicals and nursing professors who are authorities in their respective fields. The panel consisted of three pediatric nursing professors and two pediatric medicine professors. After a few minor adjustments, the completed forms were prepared for usage. Cronbach's alpha test reliability coefficient was used to determine the tools' content reliability coefficient. Good consistency of the employed instruments is indicated by the reliability of the nurses' practice assessment being 0.914 and the reliability of the nurses' knowledge assessment being 0.90.

Field Work

The data collection was conducted over eight months, from August to March 2024. After obtaining official permissions, the study tools underwent pilot testing and subsequent analysis. The researcher met with nurses three days a week (Sunday, Tuesday, and Thursday) during two shifts: from 10:00 a.m. to 1:00 p.m. for the morning shift at Zagazig University Hospitals, and from 4:00 p.m. to 7:00 p.m. for the afternoon shift at Zagazig General Hospital, on alternating days. Nurses were interviewed individually or in small groups based on their availability. The researcher provided a brief explanation of the study's purpose to both the nurses and the parents of the children involved, ensuring their understanding and obtaining their verbal consent to participate.

Ethical Considerations

Official permission was obtained by submitting an authorization letter from Nursing Faculty, Zagazig University, to the relevant authorities at the study sites. Ethical considerations were strictly adhered to throughout all phases of the study. Participants' anonymity and confidentiality were maintained, and their participation was entirely voluntary. The study's purpose was clearly explained to both the nurses and the parents of the children before their participation, and verbal consent was obtained. Participants were informed of their right to withdraw from the study at any time and assured that all collected information would remain confidential and be used solely for research purposes.

Pilot Study

The pilot study was performed on 10 percent of the sample (4 nurses) to evaluate the feasibility and applicability of the data collection tools. This process involved assessing the arrangement of items, estimating the required time to complete the sheet, and determining the overall acceptability of the study. Since no major modifications were necessary, the participants in the pilot study were included in the final study sample.

Statistical Analysis

Data were organized, coded, and analyzed using SPSS version 20. Descriptive and inferential statistics, including chi-square tests and correlation analysis, were employed. Significance levels were set at $P < 0.05$, with high significance at $P < 0.001$. Non-significant differences were defined as $P \geq 0.05$.

Results

Characteristics of the Studied Nurses

Table (1) presents the characteristics of the studied nurses. In terms of age, 45% of the nurses were aged between 30 and less than 40 years, and 95% of them were female. Regarding educational qualifications, 40% of the nurses had a diploma degree, 22.5% had completed their education at a technical institute of nursing, and 37.5% possessed a bachelor's degree in nursing. The table also indicates that 67.5% had more than six

years of professional experience, and 85% had not participated in any previous training programs related to poisoning management.

The characteristics of the studied children as reported by their parents was shown in Table (2). Pre intervention, it was indicated that 85% were aged between three and less than four years, with 62.5% being male. Regarding birth order, 42.5% were first-born, and 40% were second-born. Post-intervention, the characteristics revealed that 85% of the children remained in the same age group from three to less than four, with the proportion of males increasing to 75%. Additionally, 80% of the children were first-born after the intervention.

Table (3) provides details on the medical history of the studied children before and after the intervention as reported by their parents.

Children in Pre-Intervention:

Regarding medical history, it was found that 57.5% of the children experienced drug poisoning, while 12.5% had caustic poisoning or rodenticide poisoning. **Concerning Symptoms on Admission**, 30% of the children presented with vomiting, 12.5% with difficulty breathing, and 17.5% with loss of consciousness as well as hypotension. On the other hand, **Previous Exposure to Poisoning** 97.5% of the children had not been exposed to poisoning previously. Among those exposed, 92.5% were poisoned at home, 72.5% in rural areas, and 35% during the afternoon.

Children in Post-Intervention:

Medical History: 37.5% of the children had drug poisoning, while 25% experienced caustic poisoning. **Symptoms on Admission:** 22.5% of the children had no symptoms, 20% had difficulty breathing, 12.5% showed signs of vomiting, and 15% presented with both losses of consciousness and rapid heartbeat. **Previous Exposure to Poisoning:** 87.5% of the children had not been exposed to poisoning previously. Of those exposed, 90% were poisoned at home, 62.5% in rural environments, and 42.5% in the afternoon.

First Aid Administration:

Before and after the intervention, it was noted that 80% of the children had not received any first aid at home. Among the 20% who received first aid, 75% were given cold milk.

Table (4) highlights the effect of the educational program on nurses' knowledge scores and their domains. Significant improvements were recorded across all knowledge items following the intervention, with a highly statistically significant difference ($P < 0.001$).

Figure (1) demonstrates the nurses' total knowledge scores regarding poisoning through study phases. Before the program's implementation, only 7.5% of the nurses demonstrated a good knowledge score, which increased significantly to 92.5% post-implementation. Conversely, 70.0% of the nurses had a poor knowledge score before the program, which decreased to 0.0% after its implementation. This improvement was statistically highly significant (p value < 0.001).

Table (5) displays the effect of the educational program on the total satisfactory practice scores and their domains throughout the study phases. There was a highly significant improvement in all aspects of nursing practices after the intervention compared to the pre-intervention phase ($P < 0.001$). When compared to the pre-intervention period, all aspects of nursing practices showed highly significant improvements following the intervention ($P < 0.001$).

Figure (2) illustrates the impact of the program on the total practice scores of the nurses. Initially, only 15.0% of the nurses had satisfactory practice scores, which increased to 95.0% after the program.

Correlation between total scores of knowledge and practice

Table (6) explores the correlation between the total knowledge and practice scores of the nurses before and after the program. the correlation was positive between the nurses' total knowledge scores and total practice scores related to children's nursing procedures in the post-program phase ($P < 0.05$).

Table (1): Characteristics of the studied nurses (n=40).

Demographic characteristics	No.	%
Social status		
- Single	0	0.0
- Widower	2	5.0
- Divorced	1	2.5
- Married	37	92.5
Age		
- Less than 20 years	0	0.0
- 20 to less than 30 years	11	27.5
- 30 to less than 40 years	18	45.0
- 40 years and above	11	27.5
Gender		
- Male	2	5.0
- Female	38	95.0
Educational qualification		
- Diploma in Nursing	16	40.0
- Nursing Technical Institute	9	22.5
- Bachelor's Degree in Nursing	15	37.5
- Postgraduate Studies	0	0.0
Work place		
Zagazig university hospital	18	45.0
Zagazig General hospital	22	55.0
Years of experience		
- Less than one year	0	0.0
- One to three years	5	12.5
- Four to six years	8	20.0
- More than six years	27	67.5
Have you attended training courses on poisoning		
- Yes	6	15.0
- No	34	85.0
- If the answer is yes (n=6)	37	92.5
Course name		
- Poisoning course	6	100.0
- Others	0	0.0
Course duration		
- 1-3 days	5	83.3
- 4-7 days	1	16.7
- More than 7 days	0	0.0
Course date		
- One years ago	0	0.0
- Two years ago	5	83.3
- More than 2 years	1	16.7
Were you able to implement what you learned in the course in your daily work		
- Yes	6	100.0
- No	0	0.0

Table 2: Socio-demographic characteristics of the studied children (n=80)

Demographic characteristics	Pre-phase (n=40)		Post-phase(n=40)		χ^2 (p-value)
	No.	%	No.	%	
The age of the child who was poisoned					
Three years to less than four	34	85.0	34	85.0	2.143 (0.543)
Four years to less than five	3	7.5	4	10.0	
Five years to less than six	3	7.5	1	2.5	
Six years or more	0	0.0	1	2.5	
The gender of the child					
Male	25	62.5	30	75.0	2.296 (0.317)
Female	15	37.5	10	25.0	
Birth order					
The first	17	42.5	32	80.0	11.937 (0.001**)
The second	16	40.0	6	15.0	
The third	3	7.5	1	2.5	
The fourth	4	10.0	1	2.5	

χ^2 : Chi square test, non-significant($p>0.05$), **: statistically highly significant ($p<0.01$)

Table 3: Medical history of the studied children (n=40).

Medical history	Pre-phase (N=40)		Post-phase (N=40).		χ^2 (p-value)
	No.	%	No.	%	
Type of poisoning					9.938 (0.192)
Food poisoning	1	2.5	0	0.0	
Corrosive Poisoning	5	12.5	10	25.0	
Drug poisoning	23	57.5	15	37.5	
Petroleum Poisoning	1	2.5	2	5.0	
Cannabis poisoning	4	10.0	3	7.5	
Rodenticides “rat poisons”	5	12.5	4	10.0	
Pesticide poisoning	0	0.0	5	12.5	
Snake bite poisoning	1	2.5	1	2.5	
The symptoms with which he entered the center					10.848 (0.145)
Vomiting	12	30.0	2	5.0	
Difficulty breathing	5	12.5	8	20.0	
Loss of consciousness	7	17.5	6	15.0	
Rapid heartbeat	4	10.0	6	15.0	
Burning sensation in the mouth and throat	2	5.0	5	12.5	
Abdominal pain	3	7.5	1	2.5	

Iron poisoning	37	92.5	1	2.5	2	5.0	4	10.0	8	20.0	28	70.0	0.001**
Mean± SD	24.17±4.80					34.00±1.28							
Caustic poisoning	13	32.5	20	50.0	7	17.5	0	0.0	0	0.0	40	100.0	0.001**
Mean± SD	9.77±2.85					14.65±0.57							
Carbon monoxide poisoning	20	50.0	18	45.0	2	5.0	0	0.0	0	0.0	40	100.0	0.001**
Mean± SD	4.82±1.05					7.72±0.45							
Plant poisoning	30	75.0	10	25.0	0	0.0	0	0.0	0	0.0	40	100.0	0.001**
Mean± SD	3.55±1.43					7.77±0.42							
Lead poisoning	34	85.0	6	15.0	0	0.0	0	0.0	6	15.0	34	85.0	0.001**
Mean± SD	4.62±1.53					9.12±0.64							
Their role in educating mothers to protect their children from poisoning	5	12.5	13	32.5	22	55.0	0	0.0	0	0.0	40	100.0	0.001**
Mean± SD	12.22±2.67					15.92±0.26							
Wong-Baker Facial Pain Scale	27	67.5	6	15.0	7	17.5	0	0.0	2	5.0	38	95.0	0.001**
Mean± SD	2.17±0.90					5.72±0.55							
GCS	27	67.5	13	32.5	0	0.0	0	0.0	1	2.5	39	97.5	0.001**
Mean± SD	4.05±1.11					9.70±0.51							
AVPU	29	72.5	8	20.0	3	7.5	0	0.0	2	5.0	38	95.0	0.001**
Mean± SD	2.47±0.66					7.55±0.59							
Total	28	70.0	9	22.5	3	7.5	0	0.0	3	7.5	37	92.5	0.001**
Mean± SD	95.77±15.31					157.55±3.09							

MH: marginal homogeneity test,**: statistically highly significant (p<0.001)

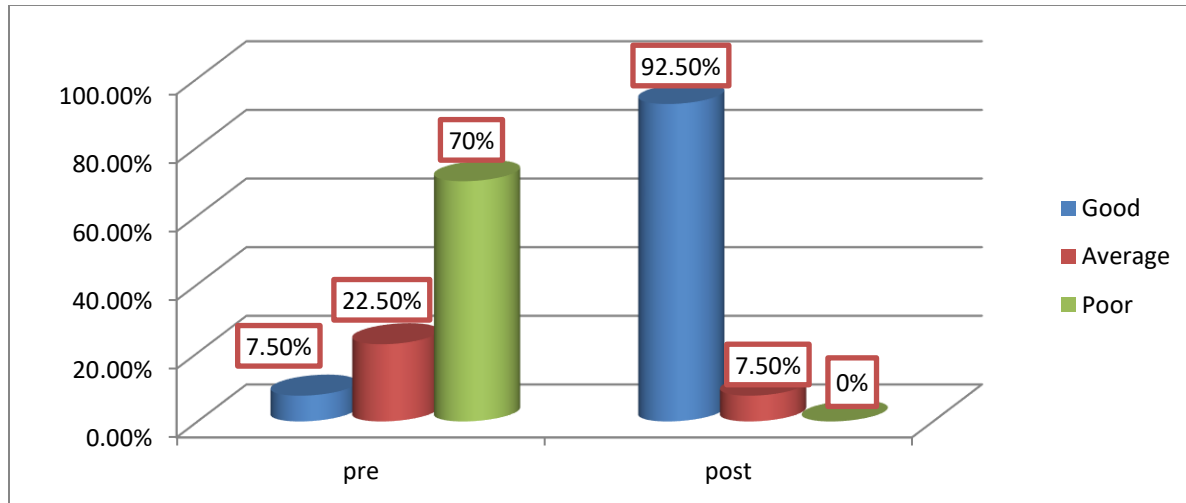


Figure (1): Total score of the studied nurses' knowledge regarding poisoning at pre and post educational program, (n= 40)

Table (5): Frequency and Percentage Distribution of Total satisfactory scores of practice and its domains Throughout Study Phases (n=40).

Items	Pre		Post		MC p
	No.	%	No.	%	
Immediate nursing care provided to poisoned children at admission	1	2.5	11	27.5	0.896
Mean± SD	5.57±1.44		8.17±0.74		
Respiratory rate	1	2.5	11	27.5	0.001**
Mean± SD	2.67±0.26		4.20±0.56		
Peripheral pulse	5	12.5	39	97.5	0.001**
Mean± SD	4.27±1.13		6.67±0.52		
Oral temperature	6	15.0	40	100.0	
Mean± SD	8.05±1.56		11.77±0.47		0.001**
Axillary temperature	4	10.0	38	95.0	0.001**
Mean± SD	8.25±1.48		12.25±0.89		
Blood pressure	6	15.0	40	100.0	0.001**
Mean± SD	10.85±1.36		14.60±0.54		
Gastric catheter lavage	2	5.0	35	87.5	0.001**
Mean± SD	9.27±5.16		18.07±1.47		
Cardiopulmonary resuscitation	2	5.0	40	100.0	0.001**
Mean± SD	6.47±1.85		14.40±0.70		
Pain assessment	0	0.0	34	85.0	0.001**
Mean± SD	0.90±0.31		2.85±0.36		
Pediatric Glasgow coma score	1	2.5	37	92.5	0.001**
Mean± SD	0.95±0.34		2.92±0.26		
AVPU score	1	2.5	25	62.5	0.001**

Mean± SD	0.20±0.5		3.62±0.49		
Skin care	3	7.5	40	100.0	0.001**
Mean± SD	5.90±1.10		8.65±0.48		
Oral hygiene	0	0.0	39	97.5	0.001**
Mean± SD	4.65±0.92		7.82±0.44		
ECG	28	70.0	40	100.0	0.001**
Mean± SD	8.65±1.57		11.00±0.00		
Total	1	2.5	40	100.0	0.001**
Mean± SD	76.67±14.12		127.02±3.16		

MC: McNemartest, **: statistically highly significant (p<0.001)

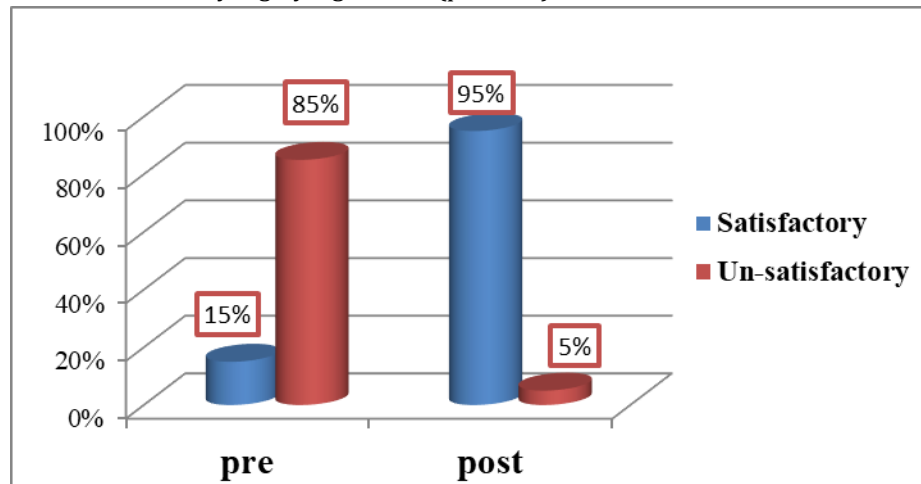


Figure (2): Total nurse's practice score

Table (6): Correlation between knowledge and practice of studied nurses throughout study phases.

Pre	Practice		Post	Practice	
	R	P		R	P
knowledge	0.163	0.314	Knowledge	0.346	0.029*

Discussion

Child poisoning is a critical and increasingly prevalent issue in pediatric nursing. Acute poisoning, characterized by the ingestion or exposure to harmful substances, remains one of the leading causes of emergency department referrals for children. It is described as the intake of substances that cause harm to bodily tissues or enzymes (**Bulut et al., 2022**). Young children, particularly toddlers and preschoolers, are at heightened risk due to their mental and physical immaturity. Their developmental traits, including curiosity, initiative, and imitation, often lead to accidental poisoning, compounded by their lack of danger awareness (**Romeeh et al., 2022**).

The role of nurses in managing child poisoning is indispensable. Proper training in assessing, planning, and evaluating poisoning cases can prevent life-threatening complications and ensure child safety (**Freedra et al., 2019**). So our aim was to evaluate the effect of educational program on improving nurses' performance regarding care provided toward poisoned preschool age children

Personal characteristics of nurses under studied

The study revealed that less than half of the nurses were aged between 30 to less than 40 years, consistent with findings by **Allam et al. (2021)**, who reported a similar age range. However, this contrasts with **Saad et al. (2021)**, who found that most nurses were aged 20 to 30 years. The majority of participants in this study were female, with over a third had a diploma in nursing and more than two-thirds having over six years of experience. These results align with findings by **Khatab et al. (2024)**, who noted that most nurses in their study were female, over one-third of the individuals held a diploma degree, while more than two-thirds had between 5 and 15 years of experience. The nursing profession continues to be predominantly female, with men remaining a minority among practitioners.

The study revealed that most nurses had not attended training programs on poisoning management. This finding concurs with **Shawq and Kadhim (2023)**, they reported that most of the participants had not attended any training sessions. The lack of training may contribute to deficiencies in knowledge and practice, likely due to limited access to hospital-managed training opportunities.

Personal Characteristics of the Studied Children

The findings of the current study revealed that the majority of the studied children were between three and less than four years old. This result aligns with the study by **Abu El-Naga et al. (2022)**, which documented that most poisoned children were under four years old. This can be attributed to the natural curiosity and oral exploration behaviors that are more prominent in young children, making them more susceptible to poisoning. In terms of gender, the study showed that more than two-thirds of the children in the pre-intervention phase and one-quarter in the post-intervention phase were male. This finding contrasts with **Farag et al. (2015)**, who reported that 63% of poisoned children were male. The discrepancy could be explained by the general tendency of boys to be more active, exploratory, and less compliant, which increases their risk of exposure to toxic substances.

Regarding the birth order of the children, the present study found that more than one-third of the cases involved first-born children. This result differs from **Alruwaili et al. (2022)**, who reported that more than one-third of poisoning cases occurred in third-born children. The difference might stem from first-time mothers' lack of experience, while mothers of third-born children may pay less attention to supervision.

The study also revealed that drug poisoning was the most common type of poisoning. This finding is consistent with **Uwumiro et al. (2023)**, who reported that 81.6% of childhood poisoning cases were due to pharmaceuticals or drug overdoses. Possible reasons include children imitating adults' behavior, parents presenting medications as candy to encourage compliance, and improper storage of medicines in unsecured locations.

With regard to symptoms, the study found that 17.5% of children in the pre-intervention phase and 22.5% in the post-intervention phase were asymptomatic. Vomiting was the most common symptom in the pre-intervention phase, whereas difficulty breathing was the most common in the post-intervention phase (20.0%). These results are in agreement with **Ramawat and Jain (2021)**, who reported that 18% of poisoned children were asymptomatic, while others presented with symptoms such as vomiting (44%) and respiratory distress (22%).

The study further demonstrated that there were more poisoned children in rural areas compared to urban areas. This result is supported by **Molla et al. (2022)**, who found that 65.9% of poisoning cases occurred in rural areas. This may be due to the neglect of mild cases in rural areas or the tendency of urban patients to seek treatment in private hospitals.

Additionally, the current study revealed that the majority of poisoning incidents occurred at home. This finding is consistent with **Abu El-Naga et al. (2022)**, who reported that 98.0% of pediatric poisoning cases happened at home. Factors such as caregivers being preoccupied with household chores like cooking or cleaning while hazardous substances are left within reach of children contribute to this risk. These findings underscore the

importance of constant supervision and educating mothers on preventive measures to minimize the risk of poisoning in children.

Nurses' Knowledge and Practice

According to the current study's findings, over two-thirds of the nurses under investigation had poor pre-program knowledge levels. However, the knowledge of nurses significantly increased about poisoning following implementation of the program. This improvement can be attributed to the lack of formal training on poisoning management in nursing curricula, limited participation in related training programs, insufficient incentives for nurses to enhance their knowledge, and workplace challenges such as heavy workloads and a lack of continuous professional development opportunities.

These findings are consistent with those reported by **Freeda et al. (2019)**, Their results demonstrated that most nurses initially had inadequate knowledge, but there was a statistically significant improvement in knowledge scores post-intervention ($p < 0.001$). This evidence supports the effectiveness of educational programs in enhancing nurses' knowledge of poisoning management.

Conversely, the current findings contradict those of **Adal et al. (2023)**, they found that Over fifty percent of nurses in Public Hospitals of Bahir Dar City, Ethiopia, had good knowledge of poisoning management. This discrepancy could be attributed to differences in educational backgrounds, as most nurses in Adal's study held bachelor's degrees, and nearly half had formal training in acute poisoning management.

Regarding skill acquisition and practice, the current study revealed that most nurses had unsatisfactory practice scores prior to the educational program. This could be due to limited training opportunities, the delegation of certain procedures to physicians, and the absence of regular updates on poisoning management. The findings are supported by **Khatab et al. (2024)**, who reported that two-thirds of nurses had unsatisfactory practice scores before the implementation of an educational program. Similarly, **Bassam et al. (2022)** concluded that most nurses at Zagazig Poison Control Centers had inadequate practices regarding accidental poisoning in children prior to intervention.

In contrast, **Hassan et al. (2021)** found that most critical care nurses in Egypt had acceptable practice levels in managing toxicological emergencies. This may be due to the higher proportion of nurses with technical institute degrees, experience in emergency settings, and frequent exposure to poisoning cases, which provided hands-on learning opportunities.

The present study also demonstrated significant improvement in nurses' practice scores immediately after program implementation. This improvement was attributed to the combination of theoretical knowledge, practical training, audiovisual aids, effective communication, and the provision of a detailed instructional booklet. The integration of these elements ensured a more comprehensive understanding and application of poisoning management practices.

These findings align with **Allam et al. (2021)**, who reported significant improvement in nurses' practice scores immediately and one month after an educational intervention. Similarly, **Shawq and Kadhim (2023)** observed statistically significant improvements in nurses' practice scores between pre- and post-tests ($p = 0.000$) following an intervention.

The current study further revealed a positive correlation between total knowledge and practice scores among nurse's post-program ($p < 0.05$). This finding aligns with **Mohamed et al. (2023)**, they discovered that there was significantly positively correlation between nurses' knowledge and practice scores in nurses caring for clients with acute organophosphate poisoning. Additionally, **Saad et al. (2021)** confirmed a statistically significant correlation between knowledge and practice among nurses managing toxicological emergencies. These findings suggest that knowledge is a critical foundation for effective nursing practice.

However, the present study's findings differ from those of **Mohamed et al. (2015)**, who reported no correlation between knowledge and practice scores in their study on nurses' detection and management of acute drug poisoning. This discrepancy might reflect variations in study design, sample characteristics, or the emphasis on practical training during educational interventions.

Conclusion

The findings of this study indicated that the educational program significantly improved nurses' knowledge and practices regarding the management of poisoning in preschool-aged children, as evidenced by statistically significant differences across the phases of the study.

Recommendations

The present study's conclusions lead to the following suggestions being put forth:

1. Establish a continuous educational program to update nurses' knowledge and improve care for patients with acute poisoning and be conducted at least every six months to maintain high-quality nursing practices.
2. Develop and provide a standardized nursing booklet containing essential knowledge and practical guidelines for managing poisoning cases, ensuring nurses can deliver effective and informed care.
3. Implement a regular evaluation system for nurses to identify areas for improvement and develop targeted strategies to enhance their knowledge and skills in acute poisoning management.
4. Add specialized nursing records to patient files to facilitate comprehensive assessment and effective management of poisoned children.
5. Conduct caregiver-focused educational programs in poison centers to raise awareness about poisoning prevention in children and teach appropriate first aid measures.
6. Replicate the educational program in other hospitals to broaden its impact and further improve nurses' knowledge and practices in managing acute poisoning cases.

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