

Improving Nurses' Performance Regarding care of Children with Multiple Trauma Post Road Traffic Accident: An Educational Program

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Abstract:

Background: Road traffic accident (RTA) can results in various types of injuries, ranged from minor to severe. The severity of these injuries can lead to long term physical disabilities. **The study aimed to** evaluate the effect of an educational program on nurses' performance regarding care of children with RTA. **Study design:** a quasi-experimental design was utilized. **Setting:** The study was conducted at Emergency department at Benha hospital. **Study subjects:** (a) a convenient sample of 40 nurses working as a full time at previous setting and willing to participate in the study, (b) a convenient sample of 40 children with multiple trauma post RTA. **Tools of data collection:** Two tools were used to conduct the study: **Tool (I):** A structured interviewing questionnaire, it included four parts: **Part (I):** Characteristics of the studied nurses, **Part (II):** characteristics of the studied children, **Part (III):** Clinical data of the studied children and **Part (IV):** Nurses' knowledge assessment which is subdivided to two subparts: **Subpart (I):** Nurses knowledge related to triage system and **Subpart (II):** Nurses knowledge regarding to care of children with multiple trauma. **Tool (II):** Observational check list. **Results:** Less than half of the studied nurses (47.5%) had poor total knowledge level pre educational program. In contrast more than three quarter (82.5%) had good level of knowledge post educational program. Also, less than two thirds (62.5%) of the studied nurses had incompetent level of practices pre-education program implementation. In contrast, more than three quarters (80%) had competent level of practices post-educational program implementation. **Conclusion:** There is a highly statistical significant positive correlation between total knowledge scores and total practices scores of the studied nurses' pre and post-educational program implementation. **Recommendations:** Provision of continuous educational program in order to update nurses' knowledge and enhance their practices related to care of children with multiple trauma post road traffic accident.

Keywords: Children, Educational program, Multiple trauma, Nurses' Performance, Road traffic accident.

Introduction:

Road traffic accidents (RTAs) are a significant cause of injury and mortality worldwide, particularly among children. Children involved in RTAs often experience multiple traumas, which can have severe physical, psychological, and social consequences. The care provided to these children in the immediate aftermath of the accident and throughout their recovery plays a

crucial role in determining their outcomes and quality of life. Challenging living conditions, heavy traffic, a lack of safe play space and an absence of child care options, together with a disproportionate vulnerability to injury, combine to put children at high risk. Inaccessible and unaffordable emergency services add to the number of resulting deaths and impairments (**Chen et al., 2021**).

Road traffic accident occurs when a vehicle collides with another vehicle, pedestrian, animal or children. Traffic collisions may result in injury, death. RTAs are among the leading causes of morbidity and mortality worldwide with 86% of deaths occurring in low and middle income countries. RTAs end hundreds of thousands of lives across the world every year and are a major cause of pediatric injuries. After RTAs, children suffer from severe physical and psychological injuries, which may last for a long time (Fylli et al., 2023).

There are factors that favor that the child be a victim of accidental injuries. The immaturity makes the child vulnerable to accidental injuries, given lack of experience, and the recklessness of the age itself. In the case of the infant and pre-school child, spirit of exploration makes these children vulnerable. The daredevil spirit of the adolescent and the psychological need for social acceptance frequently propels this age group into risky behaviors. The negative influence that an adolescent has on another while driving a vehicle is clear, which increases the risk of an accident (Gross et al., 2021).

Children with multiple traumas require specialized and coordinated care to address their complex needs. This includes prompt and accurate assessment, stabilization, resuscitation, and management of injuries across multiple organ systems. Additionally, attention must be given to their psychological well-being, rehabilitation, and long-term follow-up. The care of children with multiple trauma post RTA is a multidisciplinary effort that involves emergency medical services, trauma surgeons, pediatricians, nurses, psychologists, social workers, rehabilitation specialists, and other healthcare professionals. Each member of the healthcare team has a role to play in ensuring comprehensive and coordinated care, addressing not only the

physical injuries but also the emotional and developmental needs of the children (Mulvey et al., 2020).

Accidents and traffic trauma can result in various types of injuries, ranging from minor to severe. Common injuries include fractures, head injuries, spinal cord injuries, internal organ damage, and soft tissue injuries. The severity of these injuries can lead to long-term physical disabilities, chronic pain, psychological trauma, and reduced quality of life. Morbidity rates are influenced by factors such as the speed of the vehicles involved, the use of safety equipment, and the availability and timeliness of medical care. The mortality rate depends on several factors, including the severity of the accident, the type of collision (e.g., car-to-car, car-to-pedestrian) and the availability of emergency medical services. Major causes of death include severe head injuries, internal bleeding, organ damage, and multi-system trauma. The mortality rate can be influenced by factors such as rapid access to medical care, prompt and appropriate interventions, and the use of safety measures (Balogun et al., 2023).

Over 875 000 children less than 18 years of age die annually in the world as a result of injuries, mostly in low- and middle-income countries, where injuries account for 13% of the total burden of morbidity among children from 1 to 15 years of age. According to a report from the United Nations Children's Fund, childhood injuries declined by 50% in high-income countries (HIC) between 1970 and 1995. Unfortunately, several reports from low-income countries have shown the opposite trend. In 2005, 23% of the world's population of children < 5 years of age (i.e. 141 million children) lived in Africa (Komomo et al., 2019).

Nurses play an active role in recognizing and minimizing secondary injuries process by assessing the children's condition, including vital signs, neurological status, and overall

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physical and mental well-being. They provide immediate care and interventions, such as controlling bleeding, immobilizing fractures, and securing the airway. Nurses closely monitor the patient's condition throughout their hospital stay. Also, nurses assess for complications such as infection, respiratory distress, neurovascular compromise, and psychological distress. Nurses administer medications as prescribed by physicians to manage pain, prevent infection, and reduce inflammation. Nurses play a vital role in educating patients and their families about the importance of adhering to treatment plans, managing pain, recognizing signs of complications, and promoting self-care during the recovery process (Kim et al., 2022).

Effective care of children with multiple trauma post RTA requires continuous education and training of healthcare providers. Education programs tailored to their specific needs can enhance the knowledge, skills, and attitudes of healthcare professionals involved in their care. These programs may cover topics such as initial assessment and stabilization, management of specific injuries, pain management, psychological support, rehabilitation techniques, and long-term follow-up strategies (Schiza et al., 2021).

The educational program plays a crucial role in addressing the knowledge gap regarding the scientific foundations of educating and researching future practices in pediatric trauma. Among all disease processes in the pediatric population, trauma has a significant impact on morbidity and mortality. Nurses, being vital caregivers for children affected by multiple trauma following road traffic accidents, are essential in this care. Therefore, it is of utmost importance to emphasize the use of the educational program to identify the existing education and research priorities for pediatric trauma nursing, as outlined by the members of

the Society of Trauma Nurses (Javid et al., 2020).

Significance of the study:

Road traffic accidents are a leading cause of injury and death among children worldwide. Understanding the factors contributing to these accidents, their consequences, and effective preventive measures can have a substantial impact on public health and injury prevention strategies (Schwebel, 2019).

Egypt has been facing significant challenges related to road traffic accidents, and unfortunately, children are among the vulnerable groups affected. According to the World Health Organization (WHO) Global Status Report on Road Safety 2018, Egypt had a high rate of road traffic fatalities, with an estimated 12,000 deaths annually (Hassan et al., 2022).

The effectiveness of educational programs related to the care of children with multiple trauma post needs to be systematically evaluated. Robust research is required to assess the impact of these programs on healthcare providers' knowledge, skills, and attitudes, as well as on the outcomes and experiences of children with multiple traumas. This research can provide valuable insights into the strengths and weaknesses of existing educational interventions and guide the development of evidence-based educational programs that optimize the care and outcomes for these vulnerable patients.

So, the researcher found urgent to provide educational program to improve nurses' performance related to care of children with multiple trauma post road traffic accident to decrease morbidity, mortality and to improve quality of life.

Aim of the study:

The aim of this study was to evaluate the effect of an educational program on nurses' performance regarding care of children with multiple trauma post-road traffic accident.

The aim was achieved through:

- Assessing the nurses' knowledge regarding care of children with multiple trauma post-road traffic accident.
- Assessing the nurses' practices regarding care of children with multiple trauma post-road traffic accident.
- Designing and implementing education program based on nurse's actual needs.
- Evaluating the Effect of implementing educational program on nurses' knowledge and practice regarding to care of children with multiple trauma post-road traffic accident.

Research hypothesis:

Implementation of educational guideline is expected to improve nurses' knowledge and practice regarding care of children with multiple trauma post-road traffic accident.

Subjects and Method:

Research Design:

A quasi-experimental design was utilized to conduct this study. Research design (one-group pretest-posttest) was utilized, it is among randomizes empirical international study used to estimate the causal impact of an intervention on the target group or research participants is pretested, given a specific treatment or independent variable manipulation applied.

Research Setting:

The study was conducted at emergency department at Benha University Hospital affiliated to Ministry of Higher Education and Research at Benha City. This hospital provides services to children from Qaliobia and the surrounded Governorates. The emergency department located at the first floor and consists of 8 rooms. The first room for triage,

second room is related to emergency internal medicine, third room is related emergency for general surgery, and fourth room is related to emergency for children. Other rooms are archive rooms, nursing rooms, doctors' room and store room.

These rooms contain about 21 beds. The capacity of nurses in emergency department is 40 nurses, and the available equipment in the emergency department are: one Direct Current (D.C) Cardioversion shock, two portable suction, too monitors, one mechanical ventilator, two crush cars and two Electro-Cardio Graph.

Sample Size Calculation:

The sample size calculation was based on a previous study of (Maconochie et al., 2020) and through using the following formula:

$$[n=(Z_{\alpha}+Z_{\beta})^2 \times 2 \times (SD)^2 / (D)^2]$$

where:

(n) Number of subjects

(Z_{α}) at confidence level of 95%

(Z_{β}) at a power of 80%

(SD) standard deviation from the previous study = 5.66

(D) effect size=5

- $[n= (1.96+ 0.84)^2 \times 2 \times (5.66)^2 / (5)^2 = 20]$
- $[N=2n=2 \times 20=40]$

40 subjects are required to obtain an effect size of 5 with a power of 80% and a confidence interval of 95%.

Research Subjects:

1- A convenient sample of 40 nurses who are working as full-time nursing providers at the previously mentioned setting regardless of their characteristics and are willing to participate in the study during the period of the study.

2- A convenient sample of 40 children with multiple trauma post road traffic accident.

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Tools of data collection:

Data was gathered by using the following tools:

Tool (I): A Structured Interviewing Questionnaire:

It was designed by the researcher in the Arabic Language after reviewing of the recent related literature to assess the nurses, children's characteristics. It consisted of four main parts:

Part (I): Characteristics of the studied nurses which consisted eight items as the following: age, gender, qualifications, marital status, years of experience in emergency department, place of residence, previous attending training courses related to care of children with multiple trauma post road traffic accident and the time of last course.

Part (II): Characteristics of the studied children which consisted of three items related to age, gender and level of education.

Part (III): Clinical data of the studied children consisting of (13) items as the following: (one) about transportation of children to hospital immediately after road traffic accident, (one) about type of injuries after road traffic accident, (one) related to wounds. (one) about bleeding, (one) related to blood transfusion the child after road traffic accident, (six) about physical examination and sites of injuries, (one) about operation done to child after road traffic accident and (one) related to children transfer to another department in the hospital.

Part (IV): Nurses' Knowledge Assessment:

The researcher designed this tool based on **Cameron et al., (2019) and Gilboy et al., (2020)** to assess nurses' knowledge regarding to pediatric triage system and care of children with multiple trauma post road traffic accidents. The tool was used twice before and immediately after implementation of the

program. It consisted of two sub-parts as the following:

Subpart (A): Nurse' knowledge about pediatric triage system which composed of 8 multiple choice questions about definition, indication of pediatric triage system, the most common type of triage system in emergency, type of emergency triage system in emergency department in Benha University Hospital, aim of using emergency severity index version 4 triage system, number of triage level according to emergency severity index version 4 triage, steps of triage system for children with multiple trauma, and classifications patterns of children with multiple trauma post road traffic accident.

Subpart (B): Nurses' knowledge regarding care of children with multiple trauma post-road traffic accident: It consisted of (20) multiple choice questions covered the following: (one) related to definition of road traffic accident, (one) related to risk factor related to children with multiple trauma accidents, (one) about types of road traffic accidents, (one) about complication of road traffic accident, (eight) about clinical manifestations for children with multiple trauma, (one) related to the role of the emergency nurse in immediate nursing intervention for children with multiple trauma, and (seven) about nursing intervention for children with multiple trauma.

The Scoring System for Nurses' Knowledge:

The studied nurses' answers were scored as the following: the complete correct answer scored (2), the incomplete correct answer (1), and wrong answer or don't know scored (0). Total knowledge scores were ranged from (0-56) points. Then, the researcher categorized the level of nurses' knowledge as the following:

- Good knowledge ($\geq 80\%$) was (≥ 45) points
- Fair knowledge (60% to less than 80%) ranged from (34 - < 45) points

- Poor knowledge (less than 60%) was (<34) points.

Tool (II): An observational checklist (pre & post- implementation):

The researcher adopted this tool from **Martha and Griffet, (2019) & Kristin, (2017)** to assess the nurses' practices regarding care of children with multiple trauma post road traffic accident. The tool consisted of (117 steps) grouped under (6) procedures:

- 1- Cardio Pulmonary Resuscitation for pediatric (CPR) (16 steps)
- 2- Administration of oxygen (10 steps)
- 3- Control bleeding (8 steps)
- 4- Measuring of Glasgow Coma Scale (15 steps)
- 5- Monitoring the Vital Signs (40 steps)
- 6- Full Risk Assessment and Re-assessment (28 steps)

The Scoring System for Nurses' actual practices:

Each step done was scored (1), not done was scored (0). The total scores were ranged from (0-117) points. Accordingly, the level of nurses' actual practices was categorized as the following:

- Competent practices ($\geq 85\%$) where total scores was (≥ 99) points.
- Incompetent practices ($< 85\%$) where total scores was (< 99) points.

Preparatory Phase:

This phase included reviewing the related literature and different studies related to children with post road traffic accident with multiple trauma, using textbooks, evidence-based articles, the internet, periodicals, and journals to develop the tools and to get acquainted with the various study aspects of the research problem.

Administrative Design:

A letter was issued from the Dean of the Faculty of Nursing Benha University to the Hospital Director and the Head of the

Emergency Department at Benha University Hospital to take permission for carrying out the study with minimal resistance after explaining the nature, the importance, and the expected outcomes of the study.

Content validity:

Tools of data collection were investigated for content validity by a panel of three experts (two Professors and one Assistant Professor of Pediatric Nursing Specialty from the Faculty of Nursing, Benha University) to judge the content clarity, relevance, comprehensiveness, understanding, and applicability. The opinions were elicited regarding the layout, the format, and the sequence of the questions, and all of their remarks were taken into consideration. The tools were regarded as valid from the experts' point of view.

Reliability of the tools:

The researcher applied the reliability of tools for testing internal consistency by administering the same tool to the same subjects under similar conditions. Internal consistency reliability of all the tools items was assessed using Cronbach's alpha coefficient, which was (0.715) for a structured interviewing questionnaire and (0.778) for an observational checklist. This assessment indicated a high degree of reliability for the study tools.

Ethical Considerations:

An official approval was obtained from the Scientific Research Ethics Committee at the Faculty of Nursing, Benha University to carry out the study. The researcher clarified the aim of the study and the expected outcomes to all the studied nurses during the initial interview. Written approval was requested to participate in the current study. The data was kept private and anonymous, and it was only used for research purposes. Nurses were informed that participation in the study was entirely optional and also had the right to withdraw at any time without incurring any consequences.

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Pilot Study:

A pilot study was conducted on 10% of the total sample size (4 nurses) and (4 children) from the entire sample size who were randomly selected from the same setting to examine the clarity, feasibility, and applicability of the study tools. In the light of pilot study analysis, no modification was done, and nurses were included to total sample of the study. The period used for this pilot study take approximately one month, started from 1st of April to the end of April, 2022.

Field work:

The data was collected over a six-month period, beginning at 1st of May, 2022 and ending in November, 2022. At the beginning, the researcher welcomed nurses and provided a quick overview of the study's purpose, nature, the duration, the study activity, and took their oral approval to participate in the study before data collection. The study's framework was divided into four phases as the following:

Assessment phase:

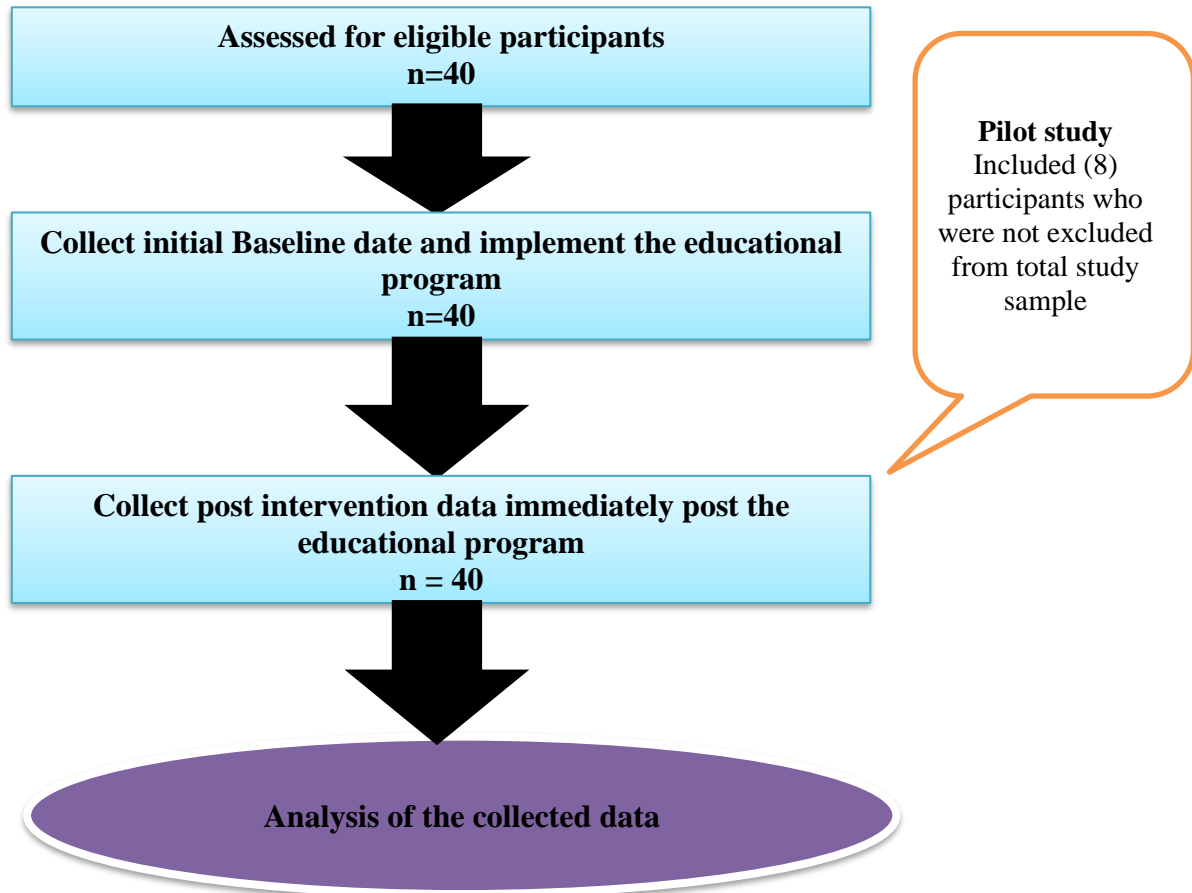
The assessment phase involved interviews with nurses and children involved in the study to collect baseline data. The researcher came to the study setting three days/week (Saturday, Sunday, and Tuesday) from 10:00 A.M. and extended to 2:00 P.M. in the morning shift and from 3:00 P.M. to 6 P.M. in the evening shift. The average number of interviewed nurses is about three nurses per day. The researcher collected the child's clinical data from medical hospital records which took about 15 minutes. After that, the researcher gave the studied nurses a structured interviewing questionnaire (tool I) in order to fill to assess their knowledge regarding pediatric triage system and care of children with multiple trauma post road traffic accident. It took nearly 30 minutes. Then, the researcher observed the nurses' actual

practices using observational checklists (tool II) to assess their actual practices. The time needed to filling the check list was ranged from (30–45) minutes. The pretest period took five weeks (starting from beginning May 2022 to first week of June 2022).

Planning phase:

Based on baseline data obtained from the assessment phase and relevant literature reviews, the researcher designed goals and objectives of the educational program according to the studied nurses' needs. It was constructed, revised, and modified to improve the nurses' knowledge and actual practices regarding care children with multiple trauma post traffic accident. Moreover, the researcher used different methods of teaching as modified lectures, group discussions, brainstorming and demonstration, and re-demonstration.

Different media was used for data presentation as colorful handouts (data show, laptop) and real equipment such as (doll, ambubag, stethoscope, laryngoscope, direct current Cardioversion chock (DC), monitor, suction machine, oxygen mask, flow meter, pulse oximeter, dolls for wounds, tourniquet, thermometer, sphygmomanometer) to help proper understanding of the content. This phase took one month from the half of June 2022 to the half of July 2022 for program construction.



(Flowchart for data collection)

General objective:

The general objective of this program was to improve studied nurses' knowledge and their actual practices regarding care of children post road traffic accidents.

Implementation phase:

This phase took (3) months from the end of July 2022 to the end of September 2022. The implementation phase was achieved through sessions: each session started with a summary of the previous session and the objectives of the new one. The researcher used motivation as giving gifts during sessions to enhance sharing in the study.

The studied nurses were divided into 10 groups: each group consisted of four nurses. The total number of sessions was seven

sessions, distributed as the following: (two) sessions for the theoretical part: each session kept going for 60 minutes, started from (9 – 10) A.M. and (five) sessions for the practical part: each session kept going for 60 minutes started from (10:30-11:30 A.M. , 12:00 – 1:00 P.M.) and were repeated to each group. The program had taken a total time from (7) hours for each group; (2) hours for the theoretical part and (5) hours for the practical part. The sessions were given in triage room, emergency room and meeting room by rotation three days per week (Saturday, Monday, Tuesday).

The theoretical part included the following:

First session: It included information about definition of pediatric triage system, indication uses of pediatric triage system in the emergency

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department, the most common types of the pediatric triage systems in the emergency department, the type of pediatric triage system using in emergency department at Benha University hospital, the Emergency Severity Index (ESI) Version 4 levels of acuity, the aim the Emergency Severity Index (ESI) Version, steps of a standardized approach to pediatric triage assessment for children with multiple trauma post road traffic accident according to Emergency Severity Index Version 4 and classification patterns of children with multiple trauma post road traffic accident.

Second session: It included information about: definition of road traffic accident / type of road traffic accident / predisposing factors for children with road traffic accident / causes of road traffic accidents for children / signs and symptoms of road traffic accident and danger signs that need immediate interventions / the complications associated with road traffic accident / the role of the emergency nurse regarding immediate care provided to children with road traffic accidents with multiple trauma / care of children with multiple trauma post road traffic accidents / preventive measures that should be followed to avoid road traffic accidents.

The practical part included the following:

First session: It included demonstration of cardio pulmonary procedure for children with multiple trauma post road traffic accident.

Second session: It included demonstration of procedures of oxygen administration and control bleeding for children with multiple trauma post road traffic accident.

Third session: It included demonstration of Glasgow coma scale for children with multiple trauma post road traffic accident.

Fourth session: It included demonstration of monitoring vital signs (temperature, pulse, blood pressure, breathing for children) for children with multiple trauma post traffic accident.

Fifth session: It included fall risk assessment and reassessment for children with multiple trauma post road traffic accident.

Evaluation phase:

This phase took six weeks starting from the beginning of November 2022 to the end of November 2022. After the implementation of the educational program, the researcher carried out a post-test immediately to assess nurses' knowledge and their practices by using the same format of pre-test tools (I & II) related to care of children with multiple trauma post road traffic accidents.

Statistical analysis:

The collected data organized, tabulated and statistically analyzed using Statistical Package for Social Science (SPSS) version 22 for windows, running on IBM compatible computer. Descriptive statistics were applied (e.g. frequency, percentages, mean and standard deviation). Chi-square test (χ^2) was used to measure significant of qualitative variables and correlation coefficient (r) used for quantitative variables that were normally distributed or when one of the variables is qualitative. T-test is used for difference between mean and standard deviation used in regression. Linear regression is a linear approach for modeling the relationship between a scalar response and one or more explanatory variables. Reliability of the study tools was done using Cronbach's Alpha. A significant level value was considered when $p < 0.05$ and a highly significant level value was considered when $p < 0.001$. No statistical significance difference was considered when $p > 0.5$.

Results:

Table (1) shows that more than one third of nurses (35%) were in the age group 20<30 years and 30>40 years with mean age is 42.72 ± 9.35 years, three quarters of them (75%) were female. Related to nurses' academic qualification more than half of (60%) of them had bachelor of nursing. Also

this table shows that, more than two thirds of them (65%) were married and more than half of them (55%) were from urban areas. Regarding years of experience, less than half of them (45%) had less than 5 years of experience; three quarters of them (75%) don't have previous training regarding care of children with multiple trauma post road traffic accident.

Table (2) shows that less than half of studied children (45%) were aged from 0 <5 years with mean age 6.8 ± 4.45 , 65% of them are male. Regarding their education, half of them (50%) were in preschool and three quarters of them (75%) lived in urban areas.

Table (3) shows that, less than of the studied children (22.2 & 22.2%) had head and face bleeding respectively. Regarding head injury less than one quarter of them, (11,1%) had head injury related to present of bleeding, less than three quarters of them (70%) didn't have bleeding. Regarding to blood transfusion, less than three quarters of them didn't need blood transfusion. Regarding abdominal injury, less than three quarters of them (70%) didn't have abdominal injury and more than half of them didn't need to do an operation. Regarding to cause of operation one quarter (33.3%) of them had bone broken.

Figure (1) shows that, less than half of the studied nurses (47.5%) had poor knowledge level and more than quarter of them (27.5%) had good knowledge level pre educational program implementation. In contrast, more than three quarter (82.5%) had good level of knowledge post implementation.

Figure (2) shows that, less than two thirds (62.5%) of the studied nurses had incompetent level of practices before educational program implementation. In contrast, majority (80%) had competent level of practices after educational program implementation.

Table (4): Clarifies that, education of the studied nurses was statistically significant

independent predictors regarding their total knowledge score at post program ($p < 0.042$). As well as experience of the studied nurses was statistically significant independent predictors regarding their total knowledge score at pre and post program ($p < 0.013$ & 0.003 respectively). Also training courses of the studied nurses was statistically significant independent predictors regarding their total knowledge score at pre and post program ($p < 0.022$ & 0.005 respectively).

Table (5): Clarifies that, residence of the studied nurses was statistically significant independent predictors regarding their total practices score at pre-program ($p < 0.017$). As well as education of the studied nurses was statistically significant independent predictors regarding their total practices score at pre and post program ($p < 0.016$ & 0.012 respectively). Also training courses of the studied nurses was statistically significant independent predictors regarding their total practices score at pre and post program ($p < 0.028$ & 0.031 respectively).

Table (6): Clarifies that, there is a highly statistical significant positive correlation between total knowledge and total practices scores of the studied nurses pre and post - educational program implementation. ($r = 0.490$ and $p\text{-value} = 0.007^*$) & post educational program ($r = 0.827$ and $p\text{-value} = 0.000^{**}$).

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Table (1): Distribution of studied nurses regarding their characteristics (n=40).

Demographic characteristics	No.	%
Age in years		
20 < 30 years	14	35.0
30 < 40 years	14	35.0
≥ 40 years	12	30.0
Min –Max (21-59)		
Mean ±SD (42.72 ± 9.35)		
Gender		
Male	10	25.0
Female	30	75.0
Academic qualification		
Technical institute of nursing	12	30.0
Bachelor in nursing science	24	60.0
Post graduate	4	10.0
Marital status		
Single	10	25.0
Married	26	65.0
Widower	4	10.0
Years of experience		
<5years	18	45.0
5 <10 years	14	35.0
≥ 10 years	8	20.0
Min –Max (3-25)		
Mean ±SD (4.32±6.21)		
Residence		
Urban	22	55.0
Rural	18	45.0
Previous training course related road traffic accident (n=10)		
Yes	10	25.0
No	30	75.0

Table (2): Distribution of studied children regarding their characteristics (n=40).

Socio demographic characteristics	No.	%
Age in years		
<5years	18	45.0
5 <10 years	12	30.0
≥ 10 years	10	25.0
Min –Max (2-14)		
Mean ±SD (6.8±4.45)		
Gender		
Male	26	65.0
Female	14	35.0
Education Level		
Preschool	20	50.0
Primary school	12	30.0
Preparatory school	8	20.0
Residence		
Urban	30	75.0
Rural	10	25.0

Table (3): Distribution of studied children's regarding clinical data (n=40)

Items	No.	%
Wound site		
Hand	2	22.2%
Face	2	22.2%
Head	1	11.1%
Present of bleeding		
Yes	12	30%
No	28	70%
Blood transfusion		
Yes	12	30%
No	28	70%
Abdomen injuries		
Yes	12	30%
No	28	70%
Child need to do an operation		
Yes	18	44.5%
No	22	55.5%
Causes of the operation		
Bone broken	6	33.3%

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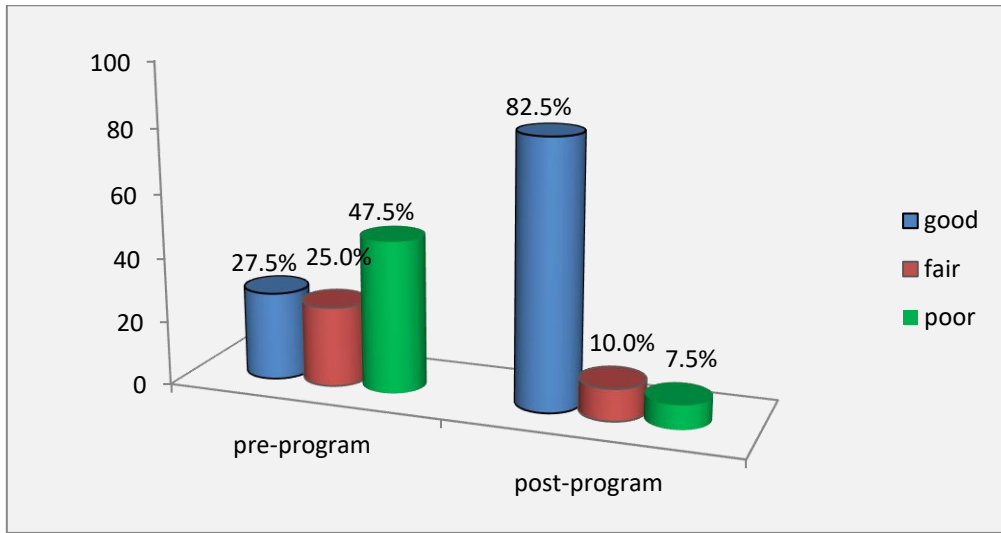


Figure (1): Distribution of studied nurses regarding their total knowledge level pre and post educational program implementation (n=40).

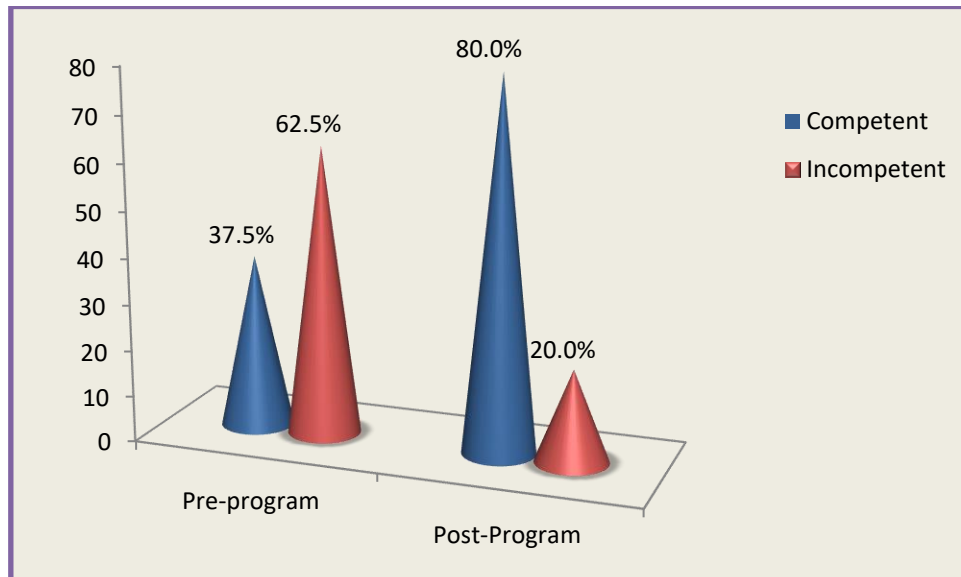


Figure (2): Distribution of studied nurses regarding their total practices level pre and post program (n=40)

Table (4): Linear regression between total knowledge score and nurses characteristics pre and post implementation (n=40).

	Pre program					Post program				
	Unstandardized Coefficients		Standardized Coefficients	t-text	p-value	Unstandardized Coefficients		Standardized Coefficients	t-test	p-value
	B	Std. Error	Beta			B	Std. Error	Beta		
(Constant)	15.350	4.469		3.435	.002	47.809	9.283		5.150	.000**
Age	.594	1.168	.172	.509	.614	.791	2.426	.114	.326	.747
Gender	1.450	1.110	.226	1.306	.201	1.544	2.306	.119	.670	.508
Education	.585	.469	.216	1.249	.221	2.059	.973	.377	2.115	.042*
Marital	.855	.882	.176	.969	.340	.450	1.831	.046	.246	.807
Experience	1.107	1.182	.306	.937	.013*	1.662	2.455	.227	.677	.003*
Residence	.236	.903	.042	.261	.796	.401	1.876	.036	.214	.832
Training	1.316	1.065	.206	2.236	.022*	4.226	2.213	.327	2.910	.005*

Table (5): Linear regression between total practices score and nurses characteristics pre and post program (n=40).

	Pre program					Post program				
	Unstandardized Coefficients		Standardized Coefficients	t-test	p-value	Unstandardized Coefficients		Standardized Coefficients	t-test	p-value
	B	Std. Error	Beta			B	Std. Error	Beta		
(Constant)	56.670	9.975		5.682	.000**	74.787	15.639		4.782	.000**
Age	4.959	2.607	.617	1.902	.066	0.673	4.088	0.059	.165	.870
Gender	1.057	2.478	.071	.426	.673	5.392	3.886	.252	1.388	.175
Education	.609	2.046	.396	2.582	.016*	2.612	1.640	.289	2.593	.012*
Marital	2.291	1.968	.203	1.164	.253	2.772	3.085	.171	.899	.376
Experience	4.341	2.638	.514	1.646	.110	0.379	4.136	.031	-.092	.928
Residence	5.068	2.016	.390	2.514	.017*	5.666	3.160	.304	1.793	.082
Training	5.490	2.377	.367	2.309	.028*	3.531	3.728	.165	2.947	.031*

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Table (6): Correlation between total knowledge and total practices among studied nurses pre and post program implementation

	Total knowledge			
	Pre –program		Post-program	
	r	p-value	r	p-value
Total practices	.490	.007*	.827	.000**

**** Correlation is significant at the 0.01 level (2- tailed)**

Discussion:

Children traffic accidents are a significant health problem worldwide, and nurses are often involved in the care of children who have been injured in traffic accidents. It is essential for nurses to have a good understanding of the factors that contribute to children's traffic accidents, the common types of injuries seen in these accidents, and the best practices for preventing and managing these injuries **Ahmed et al., (2023)**. So, the present study aimed to evaluate the effect of an educational program on nurses' performance regarding care of children with multiple trauma post-road traffic accident.

Regarding characteristics of the studied nurses, the finding of present study shows that, more than one third of nurses were in the age group 20<30 years and 30>40 years with mean age was 42.72±9.35 years old. This result is agreed with **Cohen & Scheeringa, (2022)** who conducted a study in Russia about “Post-traumatic stress disorder diagnosis in children: challenges and promises. Dialogues in clinical neuroscience” and stated that about half of the studied nurses have mean age 40.18±10.88 years old. This can be due middle-aged nurses are assigned to emergency departments because they are able to work quickly in emergency situations.

Concerning gender of the studied nurses' the present study revealed that, three quarters of them were females. According to nurses' academic qualifications, more than half of

them had bachelor degree of nursing. This agrees with **MacEachern et al., (2019)** who studied “Secondary traumatic stress: Prevalence and symptomology amongst detective officers investigating child protection cases” in United Kingdom and found that, more than two third of the studied nurses were female and less than three quarters of them had bachelor degree of nursing.

The findings of the current study revealed that, more than two thirds of nurses were married, and more than half were from urban areas. This is consistent with **Pata, (2021)** who studied “Understanding Post-Traumatic Stress Disorder in Children: A Comprehensive Review” in Japan and found that three quarters of respondents were married and lives in urban areas.

Regarding years of experience, less than half of nurses had less than 5 years of experience. This result is consistent with **Duffee et al., (2021)** who conducted a study in in the United States about “Trauma-informed care in child health systems.” and found that half of nurses had less than 5 years of experience. This may be due to the fact that a significant proportion of nurses may not have extensive experience in caring for children involved in traffic accidents. This finding clarifies the need for ongoing education and training programs to ensure that nurses have the necessary knowledge and

skills to provide high-quality care for children involved in traffic accidents.

According to previous training, three quarters of nurses didn't have previous training regarding care of children with multiple trauma post road traffic accident. This result inconsistent with the study conducted by **Al Zomia et al., (2023)** in Saudi Arabia about "Child Anxiety, Depression, and Post-traumatic Stress Disorder Following Orthopedic Trauma." and found that two thirds of nurses had previous training. This may suggest that many nurses need to training regarding care of children involved in traffic accidents.

Regarding characteristics of the studied children, the current study showed that, less than half of studied children were aged from 0 <5 years with mean age 6.8 ± 4.45 , and more than two thirds of them were males. Three quarters of them lived in urban areas. This result is inconsistent with the study result of **Mathur et al., (2020)** in India about "Community-based household survey to identify disability burden and health-related quality of life following road traffic accidents in Ujjain, India" who found that half of the age range was from $5 < 12$ years old. Additionally, three quarters of them were boys and more than half of them from urban areas. This may be due to this age group is particularly vulnerable to road traffic accidents.

The current study revealed that, more than one third of them had hand wounds and less than one third had face and head wounds. Regarding bleeding, less than three quarters of them did not have bleeding. These results are disagreed with **Bunting et al., (2019)** who conducted a study about "Trauma informed child welfare systems" in Northern Ireland and found that bleeding was occurred as a complication in children with multiple

traumas. This may due to in Egypt there are overcrowding in many road and it may cause a lot of accident but the severity of that accident is mild due to slow moving of cars

In terms of blood transfusion needs, less than three-quarters of the children did not require blood transfusions. This may be due to the injuries did not need blood transfusion because injuries didn't severe. This is consistent with **Turnbull et al., (2022)**, who studied "Trauma then and now: implications of adoption reform for first nations children" in Australia and found that blood transfusions are not always necessary in children with multiple trauma post-road traffic accidents.

The current study showed that, less than one third had abdominal injuries. This agrees with **Karadag et al., (2020)** who conducted a review about "Eye Movement Desensitization and Reprocessing" therapy in children and adolescents have post-traumatic stress disorder" in England and found that abdominal injuries are also relatively common in children with multiple trauma post-road traffic accidents.

The current study showed that, more than half of the studied children didn't need to do an operation, while one third of them need to do an operation for bone broken. This may be due to the severity of the accident due to increase road traffic in Egypt that leads to decrease car speed. Also, decrease the children's mass of muscles lead to bone broken. This result is in the same line with **Van Meijel et al., (2019)** who studied "The association between acute pain and posttraumatic stress symptoms in children and adolescents 3 months after accidental injury" in South Africa and found less than two thirds of the studied children didn't need to perform operation and less than half of them had extremities broken.

Regarding nurses' total knowledge level, the current study displayed that, less than half of the studied nurses had poor knowledge

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level and more than quarter of them had good knowledge level pre-educational program implementation. In contrast, more than three quarters had good level of knowledge post educational program implementation. This may be due to that importance of educational program in addressing the knowledge gaps and enhancing nurses' understanding of childcare after accidents. The program likely provided comprehensive and targeted information, enabling nurses to acquire a broader and more accurate knowledge base in this specific area.

This result conducted by **Abd-elhalem et al., (2022)** about "Pediatric triage educational program for improving nurses' performance regarding head injury" in Egypt and found that majority of studied nurses had unsatisfactory level of knowledge in the pre-program phase. While most of them had a satisfactory level of knowledge post- program implementation.

Similarly, this result is congruent with the study conducted by **Moss et al., (2019)** "The effectiveness of educational interventions on trauma intensive care unit nurses' competence" who highlighted the importance of education and training programs in improving healthcare professionals' knowledge regarding the care of children with trauma.

In respect to the total nurses' practices, the current study showed that, less than two thirds of the studied nurses had incompetent total level of practices pre educational program implementation. In contrast, majority of them had competent total level of practices post educational program implementation. This result is consistent with a study by **Khademian et al., (2020)** about "The effect of basic Cardio Pulmonary Resuscitation training on adults' knowledge and performance in rural areas of Iran" and found that the intervention group's mean score of performance was significantly

greater after the intervention than before the intervention. This may be due to effectiveness of material used, good interaction with the staff nurses that help in improving nurses' competence level regarding care of children with multiple trauma post road traffic accident.

This result is consistent with a study by **Cannon et al., (2020)** about "Trauma-informed education: Creating and pilot testing a nursing curriculum on trauma-informed care." and found that significant effects of trauma education on improving intensive care nurses' practices. Similarly, **Palfrey et al., (2019)** in a study about "Achieving service change through the implementation of a trauma-informed care training program" in Australia and found that training programs improved nurses' skills in the management of pediatric trauma.

Concerning linear regression between total knowledge score and nurses' characteristics pre and post educational program implementation, the present study findings showed that, education of the studied nurses was statistical significant positive independent predictors regarding their total knowledge score at post program. This finding came inconsistent with the study performed **Saleh & El-Sayed, (2023)**, who studied "The medicolegal aspects of road traffic accidents and evidence of Tau protein as a prognostic factor, in Egypt", and found that; there was no statistically significant positive independent predictors between nurses characteristics and their total knowledge score.

Moreover the present study findings showed that, experience of the studied nurses was statistically significant positive independent predictors regarding their total knowledge score at pre and post program. This finding was in the same line with the study performed by **Chelly et al., (2019)**, who studied "Clinical characteristics and prognosis of traumatic head injury following road traffic

accidents admitted in Intensive Care Unit" and found that, there was positive statistical significant independent predictors between experience of the studied nurses and their total knowledge score. This might be due to the nurses' knowledge is drawn from a multifaceted base and includes evidence that comes from science, experience and personally derived understanding.

Furthermore the present study findings showed that, training courses of the studied nurses was statistical significant positive independent predictors regarding their total knowledge score at pre and post program. This finding is disagreement with the study performed by **Pei et al., (2019)**, who studied "Nursing knowledge, willingness, and attitudes toward the first aid behavior as bystanders in traffic accident trauma", and found that, there were statistical significant independent predictors between training courses of the studied nurses and their total knowledge score. This might be due to training courses are central to nurses' lifelong learning and constitutes a vital aspect for keeping nurses' knowledge and skills up-to-date.

Regarding linear regression between total practices score and nurses characteristics pre and post program, the present study findings showed that, residence of the studied nurses was statistically significant positive independent predictors regarding their total practices score at pre-program ($p < 0.017$). This finding disagrees with the study performed by **Daif et al., (2022)**, who studied "Fractures due to road traffic accidents referred to Orthopedic Department–Al Hadra University Hospital, in Egypt", and found that, there was no statistically significant independent predictors between nurses' characteristics and total practices score. This might be due to that the nurses' environment plays a key role in the

quality and quantity of the care that they can provide.

Also the present study findings showed that, education of the studied nurses was statistically significant positive independent predictors regarding their total practices score at pre and post program. This finding was supported with **Chen et al., (2021)**, who studied "Predictors of in-hospital mortality for road traffic accident-related severe traumatic brain injury" and found that, there was significant independent predictors between education of the studied nurses and their total practices score. This might be due to the education has an important part in one's health practice to care of disease.

The current study clarified that there is a highly statistically significant positive correlation between total knowledge scores and total practices scores of the studied nurses pre and post educational program implementation. This means that nurses who had a higher level of knowledge about the care of children with trauma also had better practices.

This result is consistent with **Abou El-Soud et al., (2023)** in a study about "The impact of first aid training program on school health staff knowledge, attitude, and practice at national guard girl schools in Riyadh-Saudi Arabia" who showed that there is a highly statistical significant positive correlation between total knowledge scores and total practices scores of the studied nurses.

Conclusion:

The educational program was effective in improving nurses' knowledge and practices level related to care of children with multiple trauma post-road traffic accident. Besides, there is a highly statistical significant positive correlation between total knowledge and total practices of the studied nurses' pre and post - educational program implementation.

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Recommendations:

Based on the main study findings, the following recommendations are suggested:

- Provision of continuous educational program in order to update nurses' knowledge and enhance their practices related to care of children with multiple trauma post road traffic accident
- More researchers are needed for training of nurses about the proper effective care children of multiple trauma post road traffic accident and raising their awareness about the importance of effective care for children immediately after accident and different forms of management to prevent complications.
- Follow up program for children with multiple trauma post road traffic accident should be applied and organized in the hospital for the proper management application to prevent complications.
- Further, the studies are need for enhancing good quality of life for children of multiple trauma post road traffic accident.

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تأثير برنامج تعليمي على تحسين أداء الممرضات تجاه رعاية الأطفال الذين يعانون من الإصابات المتعددة بعد الحوادث المرورية على الطريق

تهانى رزق أمين عطا الله - آمال غريب سباق - رشا راضى السيد

يمكن أن تؤدي الحوادث المرورية على الطريق إلى أنواع مختلفة من الإصابات والتي تتراوح من البسيطة إلى الخطيرة. ويمكن أن تؤدي خطورة هذه الإصابات إلى إعاقات جسدية طويلة المدى. **الهدف من الدراسة:** هدفت هذه الدراسة تقييم تأثير البرنامج التعليمي على تحسين أداء الممرضين تجاه رعاية الأطفال الذين يعانون من الإصابات المتعددة المصابين بعد الحوادث المرورية على الطرق. **تصميم الدراسة:** تم استخدام تصميم شبه تجريبي لإجراء هذه الدراسة. **مكان البحث:** أجريت هذه الدراسة بقسم الطوارئ بمستشفى بنها الجامعي. **عينة البحث:** أ- عينة متاحة مكونة من 40 ممرضاً وممرضة يعملون كمقدمي رعاية تمريضية بدوام كامل في المكان السابق ذكره, ب- عينة مناسبة مكونة من 40 طفلاً يعانون من الإصابات المتعددة بعد الحوادث المرورية على الطرق. **أدوات جمع البيانات:** تم استخدام أداتين لجمع البيانات: الأداة الأولى: استمارة استبيان: والتي تتكون من أربع أجزاء: الجزء الأول: خصائص الممرضين المشاركين فى الدراسة, الجزء الثاني: خصائص الأطفال, الجزء الثالث: البيانات السريرية للأطفال والجزء الرابع: معلومات الممرضين تجاه رعاية الأطفال الذين يعانون من الإصابات المتعددة بعد الحوادث المرورية على الطرق والأداة الثانية: قوائم الملاحظات قبل وبعد البرنامج التعليمي. **النتائج:** أقل من نصف الممرضين المدروسات (47,5%) لديهم مستوى معلومات ضعيف قبل تنفيذ البرنامج التعليمي. وفي المقابل، فإن أكثر من ثلاثة أرباع المشاركين (82,5%) لديهم مستوى جيد من المعلومات بعد تنفيذ البرنامج التعليمي. وأقل من ثلثي (62,5%) الممرضين لديهم مستوى غير كفؤ من الممارسات قبل تنفيذ البرنامج التعليمي. فإن أكثر من ثلاثة أرباع المشاركين (80%) لديهم مستوى كفؤ من الممارسات بعد تنفيذ البرنامج التعليمي. **الاستنتاج:** توجد علاقة ارتباطية موجبة ذات دلالة إحصائية عالية بين درجات المعلومات الكلية ومجموع درجات الممارسات لدى الممرضين المدروسات قبل وبعد تنفيذ البرنامج التعليمي. **التوصيات:** توفير برنامج تعليمي مستمر لتحديث معلومات الممرضين وممارساتهم المتعلقة برعاية الأطفال المصابين بإصابات متعددة بعد الحوادث المرورية على الطرق.