

The Effect of Simulation-Based Intervention on Nurses' Performance and Satisfaction regarding Colostomy Care at Pediatric Surgical Unit

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Abstract

Background: Colostomy is a surgical procedure that involves creating an opening in the abdominal wall to divert the flow of stool from the colon to a stoma. This procedure can have a profound impact on the lives of pediatric patients and their families, requiring specialized care and support. The nurse can play a clinically relevant role in the care of children undergoing colostomy surgery pre and post-operative colostomy. **This study aimed to** investigate the effect of simulation-based intervention on nurses' performance and satisfaction regarding colostomy care at the pediatric surgical unit. **Method:** a quasi-experimental design was utilized to fulfill the purpose of this study. **Setting:** The study was conducted in the Pediatric Surgical Unit affiliated to Sohag University Hospital. **Subjects:** all nurses (50) caring for children with colostomy who are working in the Pediatric Surgical Unit were included. **Tools for data collection:** (1) colostomy questionnaire sheet (2) observational checklist, and (3) nurses' satisfaction scale was used to collect data. **Results:** There was a highly statistically significant difference between the studied nurses' knowledge, practice, and satisfaction. The study result revealed that more than half of the studied nurses had a poor level of knowledge, and more than half of them had an unsatisfactory level of practice about colostomy before the implementation of the simulation-based intervention. The vast majority of the studied nurses had a good level of knowledge and most of them had a satisfactory level of practice after implementing simulation-based intervention. There was a highly statistically significant difference and improvement in nurses' performance after simulation-based intervention than pre-intervention. **Conclusion:** The present study concluded that simulation-based intervention had a positive effect on improving nurses' performance and satisfaction regarding colostomy. **Recommendations:** The study recommended that simulation-based intervention should be integrated as an effective method in nurses' training about colostomy.

Keywords: Nurse's performance, colostomy, Satisfaction, Simulation-based intervention.

Introduction:

A colostomy is a surgical procedure in which an abdominal incision is made. Through this aperture, a stoma—a section of the large intestine brought outside the abdominal wall—can be formed. Partially digested food passes through this stoma and is collected using an external pouching system (**Wound, Ostomy Continence Nurses Society, 2018 & Abd-Elhay et al., 2019**). Ostomies are necessary for a variety of pediatric surgical conditions in low-income countries. These disorders can be acquired, such as intestinal perforation brought on by typhoid or gangrenous ileocolic intussusception, or congenital, such as anorectal malformations (ARM) and Hirschsprung's disease (HD) (**Muzira et al., 2018**).

To remove obstructions in the colon brought on by congenital anomalies such as

imperforate anus and colon atresia, children frequently have colostomies. Colostomies are occasionally done to treat tumors or rectal perforations as well. Colostomy and ileostomy are the two ostomy procedures that surgeons perform most frequently. Other variations, like the less common jejunostomy, can be made to relieve pressure, clean, and redirect the gastrointestinal tract's contents, though (**Massenga, et al., 2019**).

Various types of stomas are created in the abdominal wall, with some being temporary and others permanent. Stomas that originate from the colon are referred to as colostomies, and their specific names are based on the part of the colon involved, such as sigmoid descending or transverse colostomies. Stomas originating from the small intestine are known as jejunostomies or ileostomies. If a stoma is created for urine drainage, it is called a urostomy, while a stoma

created for feeding the patient through the stomach is known as a gastrostomy (**Uddin et al., 2017 & Peter et al., 2018**).

Many complications were noted, some of which were brought on by mistakes made in the surgical procedure and others by the parents' insufficient counseling. According to the reason for the colostomy and the particular kind of colostomy that was done, the patients were divided into two groups (**Kurpad et al., 2015 & Nasar, 2017**). Furthermore, 33 cases of pediatric colostomies in infants and children were examined in a clinical study carried out at a tertiary center by **Mallik et al., (2019)**. According to the study, skin excoriation and wound infection were the two most common complications among these cases. The usefulness of planned nursing interventions for parents of children with colostomies in Mumbai hospitals was investigated by **Uslu et al., (2015)**, Research revealed that inadequate knowledge of appropriate stoma management among carers resulted in infections and complications for children with colostomies, causing readmissions, especially because of skin excoriation.

The study also brought attention to issues that are frequently disregarded but are frequently not reported, like the incapacity to identify symptoms of skin deterioration and the existence of ribbon-like stools. For children who have colostomies, stoma prolapse is an additional risk factor. Stoma prolapse is the term used to describe the stoma's telescoping or protrusion above the skin's surface. This may make it harder to keep the colostomy appliance sealed properly, which could result in leaks, skin irritation, and possibly infection. surgical intervention may be necessary in severe cases of stoma prolapse to correct the prolapsed stoma and ensure proper functioning (**Tan Tanny et al., 2019**).

Children who have colostomies may also experience stoma retraction as a potential complication. Stoma retraction is the term used to describe the stoma sinking or pulling back below the surface of the skin. This may make it difficult to get a tight seal with the colostomy appliance, which could result in leaks and skin irritation. According to **Townley et al. (2018)**, surgical revision might be required in certain circumstances to modify the stoma height and enhance appliance adherence. Children who have colostomies may experience uncommon complications like ischemia

and stoma necrosis. Tissue death as a result of insufficient blood flow to the stoma causes these complications. To stop additional harm and potentially dangerous complications, prompt detection and intervention are essential. Surgical revision may be required to restore blood flow to the affected area and prevent further tissue necrosis (**Martynov et al., 2019**).

Nursing simulation-based intervention encompasses more than just manipulating mannequins; it also includes a range of activities utilizing pediatric patient simulators, devices, and qualified personnel in addition to lifelike virtual environments and role-playing. One of the most important components of nursing education today is a clinical simulation, which is described as "an activity or event replicating clinical practice using scenarios, high-fidelity manikins, medium-fidelity manikins, standardized patients, role-playing, skills stations, and computer-based critical thinking simulations" by the National Council of State Boards of Nursing (NCSBN). (**Cai et al., 2018**).

The benefits of simulation-based educational interventions include the ability to individualize learning, adjust the difficulty level, repeat practice learning, and quick feedback on clinical education (**AbdElbaky, 2018**) However, the research indicates that undergraduate degrees usually do not provide many opportunities to practice nursing techniques on live patients. (**Alexander et al., 2015**) This fact might affect how competent newly trained healthcare workers develop in the future, raising the risk of mistakes and endangering patient safety (**Powell et al., 2018 Cant and Cooper, 2017**).

A key component of assessing nurses' motivation, satisfaction, and acceptance of a teaching strategy is their level of satisfaction. It is the extent to which the student can continue to provide patient-centered care, demonstrate teamwork skills in multifaceted healthcare settings, and give exceptional service with a positive attitude. (**Shin, and Kim, 2015 Kada, 2018**).

The nurse's role in colostomy care is crucial and begins even before the procedure. It involves assessing and preparing children, maintaining stoma hygiene, managing appliances, identifying risk factors to reduce the likelihood of

complications, and closely monitoring any complications that may arise. To avoid these complications, pediatric nurses need to implement the most effective evidence-based colostomy strategies (9). Additionally, the nurses must perform post-colostomy tasks such as documentation and assessment, which will raise the bar for care and enhance the outcomes for the kids (Carmel et al., 2016).

Numerous pieces of evidence have demonstrated that nurses frequently carry out procedures traditionally or routinely, which suggests that there is a gap in the knowledge of science and accepted practice. Furthermore, if the procedure is performed incorrectly, it may cause harm to the children. For this reason, pediatric nurses providing colostomy care must possess the knowledge and abilities supported by reliable scientific research (Powell et al., 2018).

Significance of the study

Preoperative colostomy education is more effective than postoperative education, as evidenced by evidence-based practice. 75% of participants achieved colostomy independence in 5 days or less after a coordinated EBP approach was implemented preoperatively for colostomy care (Bryan & Dukes, 2017). There is a higher likelihood of improved outcomes for pediatric colostomy patients when preoperative colostomy nurse education programs are implemented (Subih & Neil, 2016).

Furthermore, knowledge about adult colostomy procedures and results has advanced significantly; pediatric and neonatal populations have yielded less knowledge. This results in gaps in our knowledge about best practices. So, this study focused on improving the nurses' knowledge, practice, and satisfaction through implementing simulation-based intervention regarding colostomy care at the pediatric surgical unit.

Aim of the study

To investigate the effect of simulation-based intervention on nurses' performance and satisfaction regarding colostomy care at the pediatric surgical unit

Research Hypotheses

The knowledge, practice, and satisfaction of nurses regarding colostomy care at the pediatric surgical unit are anticipated to improve with the implementation of simulation-based intervention.

Subject and methods

Research design

A quasi-experimental design was utilized to fulfill the purpose of this study (one group pre/post-test design).

Settings

The study was conducted in the Pediatric Surgical Unit affiliated to Sohag University Hospital

Subjects

All nurses (50) caring for children with colostomy who are working in the Pediatric Surgical Unit were included

Tools for data collection

Three tools were used for collecting data in this study.

Tool (I): Colostomy questionnaire sheet: It was developed by the researchers after reviewing the national and international related literature (Nabeel, et al., 2013). This tool was made up of the following two parts:

Part one: Information about the personal characteristics of nurses, including age, gender, years of experience, and education, was included in this section.

Part Two: A multiple-choice knowledge questionnaire was used to gauge the nurses' understanding of colostomy care before, immediately after, and after two months. It involved 20 questions concerning the care of colostomies, including the following:

1. Definition of the colostomy, indications, normal appearance of the stoma, risk signs, types of pouches, complications.
2. Role of the nurse regarding colostomy care
3. Role of the nurse to prevent the complications of colostomy

Scorings system

Every right response was worth one point, while every wrong response was worth zero. The

three categories for the nurses' knowledge level were: fair (50–75%), good (more than 75%), and poor (less than 50%).

Tool II: “Observational Checklist Sheet about Colostomy Care”: This sheet was filled by the researcher, it was adopted from (Potter, et al., 2016), it consists of four items for evaluating nursing practice about colostomy care such as domain assessment of the stoma and peristomal skin including (7) steps, Applying new ostomy appliance including (25) step, irrigation of the stoma including (27) step, and emptying the pouch including (8) steps.

Scoring system

The following was the scoring system for the observational checklist: correctly completed (2), incompletely completed (1), and not completed (0). Alfar, El-sheik, Hassan, and Selim (2020) state that all nursing practices were divided into two groups: practices that were deemed satisfactory and practices that were deemed unsatisfactory. A nurse's practice was deemed unsatisfactory if their score was less than 80%, and satisfactory if their score was greater than 80%.

Tool III: Nurses' satisfaction scale: A rating system created by the National League for Nursing was used to gauge how satisfied the nurses were with the simulation experience (Jeffries, 2005). It was designed to gauge nurses' satisfaction with the simulation exercise and included five items. To grade each item, a 5-point Likert scale was employed. One point was awarded for strongly disagreeing, two for disagreeing, three for being undecided, four for agreeing, and five for strongly agreeing. The overall score ranged from 5 to 25, where a higher score indicated a higher degree of satisfaction. It asked whether I enjoyed learning through simulation, whether the teaching materials used in the simulation were motivating, whether the simulation was appropriate for learning and whether the teaching methods used in the simulation were effective. It also asked whether the simulation offered a variety of learning materials and activities to promote my learning.

Scoring System

The nurses' level of satisfaction was categorized as follows: a score of 80% or higher

was deemed satisfactory, while a score of less than 80% was deemed unsatisfactory.

Validity and reliability:

Content validity:

Data collection tools were developed after an extensive review of the literature. The tools were reviewed by 5 experts in pediatric nursing, and pediatric plastic surgery to test the content validity of the tools. The tools were examined for content coverage, clarity, relevance, applicability, wording, length, format, and overall appearance. Based on experts' comments and recommendations; no modifications had been made.

Reliability of the tool (1, 2) the internal consistency was measured to identify the extent to which the items of tools measure the same concept and correlate with each other. Internal consistency estimates reliability by grouping questions in a questionnaire that measure the same concept. One common way of computing correlation values among the question instruments is by using Cronbach's alpha. Regarding the reliability of this study tool, the coefficient alpha of the questionnaire sheet was 0.70.

Ethical considerations

An official permission to carry out the study was obtained from the ethical committee of the faculty of nursing. A letter from the dean of Sohag University's nursing faculty served as official authorization. To clarify the goal of the study and obtain their consent and cooperation for carrying it out, the researchers met with the administrators of the Pediatric Surgical Unit. Nurses were informed about the purpose and advantages of this study before giving their consent to participate. The nurses under investigation were informed by the researchers that they could opt out of the study at any point. They also received assurances regarding the confidentiality of their information.

Pilot study

It conducted the pilot study. To assess the ease of use, practicality, comprehensibility, and relevance of the created instruments, 10% of the entire sample (5 nurses) was involved, and the required adjustments were made. The study's overall sample comprised the results of the pilot project.

Field of work

Approval was obtained from the director of Sohag University Hospital. The time frame for conducting the study was July 1st to September 30th, 2023. The researchers welcomed each nurse, identified themselves, and gave an overview of the purpose and design of the study at the start of the interview.

Phases of the study: There were four phases to the study's execution:

I-Assessment Phase

- Before the program, each nurse was interviewed to gather information about their characteristics using a tool (I) part (1).

- Tool (I) part (2), tool II, and tool III were used to evaluate the knowledge, practice, and satisfaction of nurses about colostomy care.

II. Planning phase:

Based on the results of the previous phase, the objectives, priorities, and expected results were defined to address the practical needs, knowledge gaps, and satisfaction of the nurses about colostomy care. For the nurses under study, the researchers designed five sessions: two theoretical and three practical.

The educational program

An educational program was designed and revised. It included theoretical and practical sessions regarding colostomy care.

The general objective of simulation-based intervention sessions:

The nurses were expected to leave the sessions with new skills and knowledge that would enhance their performance and level of satisfaction with colostomy care at the pediatric surgical unit.

Specific objectives of the program:

- Define colostomy.
- Enumerate the indication of the colostomy.
- List the types of colostomy.
- Identify the normal appearance of the stoma
- List the risk signs of the colostomy
- List the types of pouches
- Demonstrate the care of the colostomy.
- Identify the most common complications of colostomy
- Perform the appropriate documentation

III. Implementation phase:

- - Through five sessions—two theoretical and three practical sessions (lasting approximately 30 to 45 minutes each), the implementation of the simulation-based intervention was intended to improve nurses' performance and satisfaction regarding colostomy at the pediatric surgical unit.

- *Before each session, the researchers solicited feedback regarding the preceding session, and after each, they provided a summary.

- *Two days a week, from 9 a.m. to 1 p.m., the researchers were accessible in the study settings. The aforementioned research instruments were utilized to conduct one-on-one interviews with each nurse.

- *There were five nurses in each of the subgroups that were created from the studied nurses.

- After reviewing the relevant literature in light of the assessment of the actual needs of the studied nurses, a simplified booklet covering all topics related to knowledge and practice regarding colostomy care was provided to nurses in Arabic as supportive material.

A hospital's teaching class faculty used a simulation manikin to apply for a simulated education program. Other teaching techniques included lectures, small group discussions, brainstorming, pictures, and demonstration and re-demonstration using the required equipment. A variety of instructional tools were employed, including flipcharts, PowerPoint, figures, handouts, and animated films about colostomy care.

The theoretical and practical sessions were carried out as the following

The first session (Theoretical): The researchers began this session by introducing themselves, extending a warm welcome to the nurses, expressing gratitude for their participation in the study, and outlining the goals of these training sessions. The following topics were covered in the first session: definition, goal, types, indications, typical stoma appearance, five risk indicators, pouch types, and colostomy complications.

Second session (Theoretical): These sessions addressed topics about the nurse's role in providing care for patients with colostomies and in preventing complications from developing.

Third session (Practical): these sessions

included training the studied nurses on the preparation and assessment of the stoma and peristomal skin colostomy.

Fourth session (Practical): During these sessions, the faculty clinical lab was used to conduct clinical demonstrations and re-demonstrations of the colostomy care procedure (applying a new ostomy appliance, irrigation of the stoma, and emptying the pouch) by trained nurses. The simulation manikin was used for these sessions. Following the faculty lab sessions, trainees moved to the pediatric surgery unit at Sohag University Hospitals to give them real-time re-demonstration under the researchers' supervision. This helped to build their confidence and validate their competence in carrying out the procedures for their newborns.

Fifth session (Practical): The researcher distributed the post-test, thanked all of the participant nurses for participating in the study, and began by gathering feedback regarding the prior sessions and fielding any questions about colostomy care.

IV-Evaluation phase:

Every nurse had their performance and satisfaction evaluated three times: (1) Initial assessment (pretest) conducted before colostomy care knowledge questionnaire and observational checklist implementation. (2) The second evaluation (immediate posttest) was conducted right away following the patient's explanation of the knowledge questionnaire regarding colostomy care and the application of procedures in front of nurses regarding colostomy irrigation, stoma and peristomal skin care assessment, and ostomy appliance replacement. (3) A third evaluation (posttest) was conducted two months after the first two-month assessment of nurses' knowledge and skills regarding the care of children with colostomies, using the instruments previously mentioned to gauge the impact of the simulated-based intervention.

Statistical analysis:

Data were translated, coded, and tabulated into a form that was specifically created to be input into a computer. SPSS version 22 was utilized for data entry and analysis. The Excel program was used to help create the graphics. The same group's pretest and posttest results were compared using t-tests, which were used to analyze quantitative data presented as mean and SD. Quantitative data was expressed as numbers

and percentages. Pearson correlation was used to explain the relationship between quantitative variables that were normally distributed. Using a P-value of 0.05, the significance was ascertained as follows:

- A P-value less than 0.05 was considered to be statistically significant.
- A P-value less than or equal to 0.001 was considered to be highly statistically significant.

Results:

Table 1 indicates that 72% of the nurses under study were female and that 60% of them were between the ages of 25 and ≥ 36 , with a mean age of 30.28 ± 3.56 years. In terms of their educational background, 34% of the nurses under study held a baccalaureate degree in nursing, while 66% attended a technical institute. Of those with years of experience, 40% had between 10 and 15 years, and 24% had more than 5 years.

Table (2) Illustrates an improvement in nurses' knowledge about colostomy care before, immediately after, and two months after the simulation-based intervention. A highly statistically significant difference was found in this regard at ($P < 0.001$).

Before receiving the simulation-based intervention, 62% of nurses exhibited low levels of knowledge regarding the care of colostomies, as shown in **Figure 1**. However, following a simulation-based intervention, their level of knowledge increased to a good degree (92.0%) and 88.0% two months later. Nurses' knowledge of colostomy care pre/immediate post and two months after the implementation of the simulation-based intervention differed significantly ($P < 0.001$).

Table (3) shows that before, after post-intervention, and two months following simulation-based intervention, there was a highly significant statistical difference. This table made it evident that 46% of the nurses under study had inadequate experience with stoma and peristomal skin assessment before the simulated-based intervention, while 100% and 96%, respectively, had satisfactory experience immediately following and two months following the simulated-based intervention. Before the simulation-based intervention, 54% of the nurses in the study had

inadequate experience applying new ostomy appliances. However, immediately following the intervention, 92% of the nurses had satisfactory practice, and two months later, 90% of the nurses had satisfactory practice. Additionally, it was discovered that before the simulation-based intervention, 68% and 66% of the nurses under study had an inadequate level of practice with irrigation of the stoma and pouch emptying, respectively. In contrast, 94% and 96% of the nurses immediately following the simulation-based intervention and 88% and 86% two months later had a satisfactory level of practice.

The practice level distribution of the nurses under study about colostomy care is shown in **Figure (2)**. It was found that 88% of the nurses had a satisfactory practice level after two months of simulation-based intervention, while 14% of the studied nurses had an unsatisfactory practice level before the intervention.

Figure (3): Demonstrates the distribution of the nurses' satisfaction levels with colostomy care two months after the simulation-based intervention. As a result of the simulation-based intervention, almost all of the nurses reported a satisfactory level of.

Table (4): shows that there was a positive correlation between total knowledge and total practice scores regarding colostomy care pre and post-simulation-based intervention in the post-test compared to the pre-test and after two months with a statistical significance in the post-test and after 3 months.

Table (5): shows that there was a statistically positive correlation between total knowledge score and total practices, and satisfaction scores pre and post-simulation-based intervention ($P \leq 0.001$ and $P \leq 0.05$).

Table (1): demographic characteristics among the studied nurses (n. =50)

Demographic characteristics	No.	%
Age (Years)		
< 25 years	19	38.0
25 - \geq 36 years	29	58.0
Mean \pm SD	30.28 \pm 3.56	
Gender:		
Male	14	28.0
Female	37	72.0
Education:		
Technical Institute of Nursing	33	66.0
Baccalaureate degree in nursing	17	34.0
Years of experience:		
< 5 years	12	24.0
5 - <10 years	18	36.0
10 - \geq 15 years	20	40.0

Table (2): Comparison between the studied nurses' knowledge regarding colostomy care pre-, immediately post, and two months post-simulation-based intervention (n. =50)

Nurses' knowledge regarding colostomy care	Pre- simulation-based intervention		Immediately,- simulation-based intervention		Two months Post- post- simulation-based intervention		F	P-value
	No	%	No	%	No	%		
Definition								
- Correct	30	60.0	50	100	50	100	112.5	<0.001**
- Incorrect	20	40.0	0	0.0	0	0.0		
Indications								
- Correct	24	48.0	49	98.0	46	92.0	132.6	<0.001**
- Incorrect	26	52.0	1	2.0	4	8.0		
Types								
- Correct	26	52.0	47	94.0	45	90.0	122.8	<0.001**
- Incorrect	24	48.0	3	6.0	5	10.0		
normal appearance of the stoma								
- Correct	22	44.0	46	96.0	47.0	94	107.4	<0.001**
- Incorrect	28	56.0	4	4.0	3.0	6.0		
Risk signs								
- Correct	19	38.0	46	96	46	92.0	97.9	<0.001**
- Incorrect	31	62.0	4	4.0	4	8.0		
Types of pouches								
- Correct	28	56.0	49	98.0	47	94.0	87.6	<0.001**
- Incorrect	22	44.0	1	2.0	3	6.0		
complications								
- Correct	28	56.0	49	98.0	47	94.0	87.6	<0.001**
- Incorrect	22	44.0	1	2.0	3	6.0		

(**) highly statistical significance at p < 0.001 (**) Highly significant at P<0.001

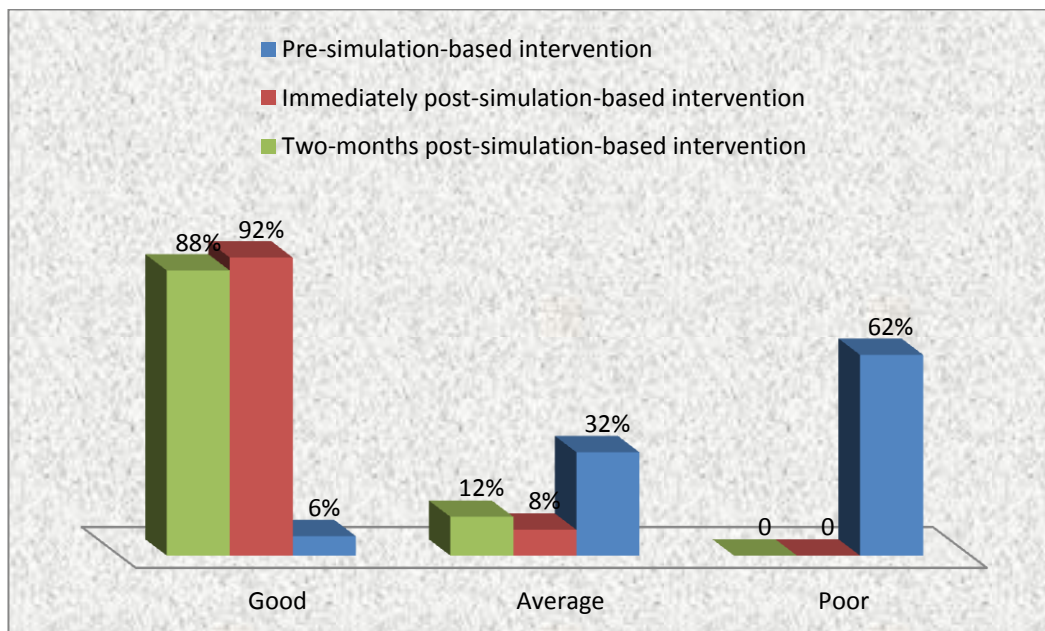


Figure (1): Comparison between the studied nurses' level of knowledge regarding colostomy care pre-, immediately post, and two months post-simulation-based intervention (n=50)

Table (3): Comparison between the total nurses' practice regarding colostomy care pre, post, and two months post-simulation-based intervention (n=50)

Nurses' practice	Pre- simulation-based intervention				Immediately,- simulation-based intervention				Two months Post- post-simulation-based intervention				F	P
	Unsatisfactory		Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory		Satisfactory			
	No	%	No	%	No	%	No	%	No	%	No	%		
Assessment of the stoma and peristomal skin	23	46.0	26	54.0	0	0	50	100	3	4.0	47	96.0	123.3	0.000**
Applying a new ostomy appliance	27	54.0	23	46.0	4	8.0	46	92.0	5	10.0	45	90.0	167.4	0.000**
Irrigation of the stoma	34	68.0	16	32.0	3	6.0	47	94.0	6	12.0	44	88.0	113.6	0.000**
Emptying the pouch	33	66.0	17	34.0	2	4.0	48	96.0	7	14.0	43	86.0	95.2	0.000**

(**) Highly significant at P<0.001

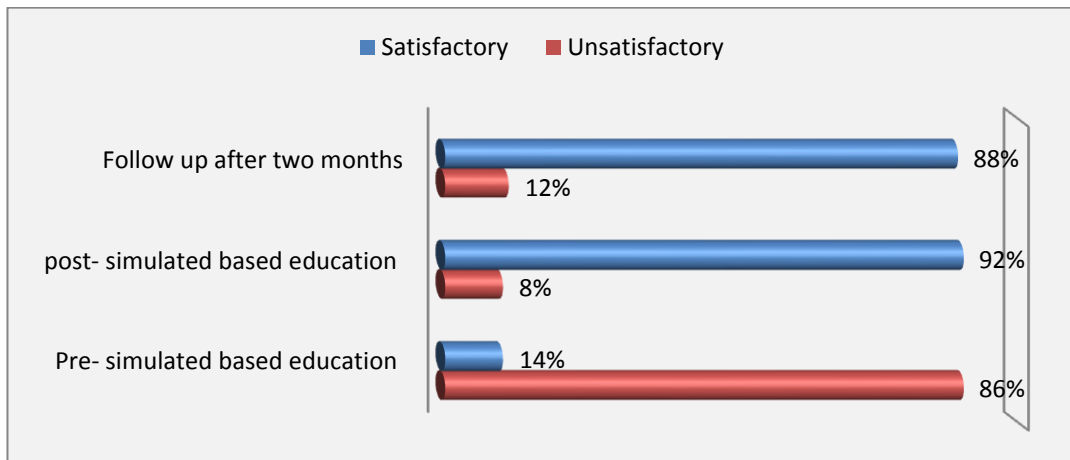


Figure (2): Comparison between the studied nurses' level of practice regarding colostomy care pre-, immediately post, and two months post-simulation-based intervention (n=50)

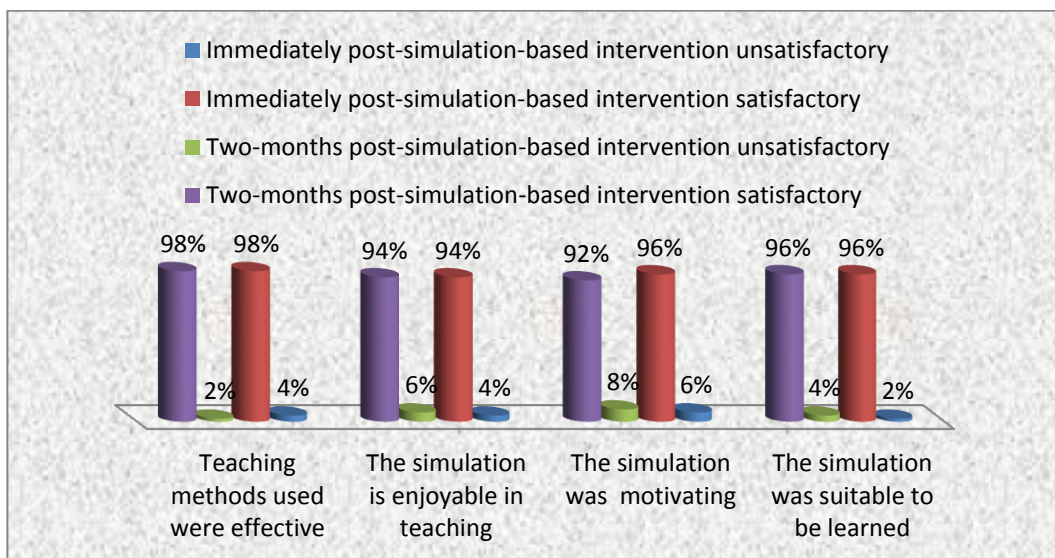


Figure (3): Nurses' satisfaction level immediately and after Two months Post- simulation-based intervention (no=50)

Table (4): Correlation between Nurse's Total Knowledge Scores and Total Practice Scores Regarding Colostomy Care pre and post-simulation-based intervention (n = 50).

Items	Total knowledge Scores					
	Pre-simulation-based intervention		Post-simulation-based intervention		Two months Post- post-simulation-based intervention	
	r	P	R	p	R	P
Total practice Scores	0.108	0.528	0.372	0.021*	0.306	0.049*

* Statistical significant ($P \leq 0.05$)

Table (5): Correlation coefficient between total knowledge, practices, and satisfaction scores of the studied nurse's pre and post-simulation-based intervention (n=50)

Variables	Total knowledge score			
	Before simulation training n= 56		After simulation training n= 56	
	R	P	R	P
Total practices score	0.518	0.000**	0.711	0.000**
Total satisfaction score	0.461	0.000**	0.548	0.000**

* Correlation coefficient statistically significant difference at $p < 0.05$

Discussion:

An efficient way to teach nurses how to handle pediatric emergencies is through simulation training. One effective teaching method is simulation training, which gives nurses a safe and supportive environment in which to practice newly acquired skills. nurses' self-confidence is fostered and best practices for handling emergencies can be developed with increasing frequency of exposure to high-risk medical scenarios in simulated environments (Baayd et al., 2023; Angelina et al., 2021).

Simulation is one of the techniques that nursing educators can use to help future nurses prepare for real-world practice. Performance is the completion of a given task with established benchmarks for accuracy, completeness, cost, and timeliness. Poor outcomes may be associated with inadequate nursing knowledge preparation and skill, according to a growing body of research (McGaghie et al., 2019)⁽²⁶⁾. Hence, this study was conducted to investigate the effect of simulation-based intervention on nurses' performance and satisfaction regarding colostomy care at the pediatric surgical unit.

Based on the individual information provided by the nurses under investigation, the current study's findings revealed that, with a

mean age of 30.28 ± 3.56 years, less than half of the nurses under investigation were female and in the age group of 25 to ≥ 36 . The study's conclusions show that the majority of nurses were female and that three-fifths of them were under 25. The current study's conclusions demonstrated that women made up more than two-thirds of all the samples examined. The fact that nursing is generally associated with women, particularly in our culture, could help to explain this outcome. Moreover, Betty Lebona et al. (2016) found that the majority of the sample that was analyzed consisted of females.

About three-fifths of the nurses had a technical nursing education, according to the most recent data regarding the educational background of nurses. the outcome validated the conclusions made by Hashem and Abusaad (2016) A nursing diploma was held by more than half of the nurses. However, the majority of the sample group studied BSc, according to Betty Lebona et al. (2016), who also disagreed with this result. This may be explained by the fact that only a small percentage of faculty graduates worked in hospitals affiliated with the university and others in the Ministry of Health Facilities. The fact that nursing was previously only offered to girls in Egyptian institutions until a few years ago may help to explain the current

study's findings and account for the high proportion of female students.

It was discovered that, in terms of years of experience, between 10 and 15 years were held by two-fifths of the nurses under study. This result was consistent with a study by **Ahmed (2016)**, which found that over one-third of study samples of nurses had more than ten years of experience in the field.

According to the current study's results, there was an improvement in the studied sample's knowledge of primary colostomy care among nurses before, immediately after, and two months after the simulation-based intervention. The benefits of simulation-based intervention could be the cause of this outcome. The current study's results showed that, about the overall level of studied nurses' knowledge scores regarding colostomy care following simulation-based intervention, most nurses possessed satisfactory knowledge. The favorable outcome of combining theoretical learning sessions with simulation training may account for the intern nurses' satisfactory level of knowledge acquisition. Arabic booklet distribution is essential for learning and remembering information.

This finding is consistent with a study (**Pearson & Helistrom, 2016**) that found that after three months, good and high information about colostomy care was obtained by more than half of the study sample in the post-educational program. The current study's findings are corroborated by a study conducted in London by **Chou et al., (2022)**, which found that after scenario simulation, clinical knowledge improved. The results of the current study also contradict those of **Betty Lebona et al. (2016)**, who discovered that a significant portion of participants knew colostomy care. Additionally, the results of an Albanian study, found that most respondents knew colostomy care in pre-test intervention (**Duruk & Ucar, 2018**).

Regarding the colostomy care practices of the nurses under study, According to the results of this study, there was a statistically significant difference before, after, and two months after the simulation-based intervention. This might be the result of the nurses' involvement in a simulated environment, where they would acquire experience, hone their knowledge and skills,

make trustworthy clinical judgments, receive opportunities for feedback, and practice repeatedly until they reach a certain level of proficiency.

Concerning the nurses' level of practice in colostomy care, According to the current study's findings, after two months of simulation-based intervention, most nurses had a satisfactory level of practice. This outcome could be explained by the fact that a high degree of knowledge has a beneficial impact and is reflected in practice. The study's findings, according to the researchers, demonstrated how well the application of simulated-based education improved the practice of the nurses under investigation and raised their clinical practice level scores. This was consistent with earlier research by **Nuraini et al. (2015)** who examined the effects of simulation-based education on nursing students' practical achievements and discovered that simulation-based education enhanced their performance, as well as **Gomes et al. (2020)** who studied "Clinical simulation for the teaching of wound evaluation and treatment." Moreover, **Beal et al. (2017)** discovered that clinical simulation was an effective tactic for raising study participants' performance in comparison to alternative teaching modalities.

In a study conducted in Jordan, **Richboarg et al. (2016)** found that stoma care nurses with advanced training and experience in ostomy care can improve patient outcomes. These findings corroborated their findings. This result was further supported by (**Golik, et al., 2018**), who noted that one of the responsibilities of nursing staff members is continuous learning and that the particularity of stoma nursing calls for additional knowledge and abilities.

As for the nurses' opinions on colostomy care two months following the simulation-based intervention, Almost all of the nurses reported a satisfactory level of performance following the simulation-based intervention. This outcome could be explained by the fact that the simulation-based intervention provided a secure learning environment in which nurses could acquire skills and subsequently increase satisfaction. The fact that the nurses enjoyed the simulation training may also have contributed to this outcome.

The results of this study showed that

satisfaction ratings before and after the simulation-based intervention showed a statistically significant positive correlation with the total knowledge score and total practices. According to **Hashem et al. (2022)**, this result showed a highly significant positive correlation between the nursing students' pre-, immediately after, and one-month simulation training program scores for total knowledge, practice, and self-confidence. This outcome could be explained by the fact that using a simulation-based intervention was linked to an increase in knowledge and a higher degree of confidence, which assisted the nurses in mastering the execution of clinical skills. According to the researchers, this shows how successfully simulation-based education was implemented. This demonstrated how crucial it is to comprehend the goal of implementing simulated-based education to increase knowledge. According to **Cerra et al. (2018)** who investigated the "Effects of high-fidelity simulation-based on life-threatening clinical condition scenarios on learning outcomes of undergraduate and postgraduate nursing," simulation training improved nursing knowledge and performance. This finding is consistent with the findings of their study.

According to the results of the current study, there was a statistically significant difference in post-test and after two months between the total knowledge and total practice scores regarding colostomy care pre and post-simulation-based intervention. According to this consensus (**Doughty, 2017**), nursing education and practice are interdependent, representing and fostering others' advancement and having an impact on each other's improvements. Furthermore, the current study demonstrated that, three months after the program's introduction, the majority of nurses with good knowledge were practicing competently, whereas more than half had inadequate knowledge and incompetent colostomy practices. This result demonstrates that, following the intervention of the educational program, the nurses under study had an improvement in their knowledge and practice scores regarding colostomy care and knowledge.

Conclusion

From the findings of the present study, it can be concluded that simulation-based intervention had a positive effect on improving nurses' performance and satisfaction regarding colostomy.

Recommendations

Based on the current study findings, it can be recommended that:

- The study recommended that simulation-based intervention should be integrated as an effective method in nurses' training about colostomy care.

- The establishment of written guidelines, administrative policy, and procedures for nursing measures in colostomy care need to be reviewed and updated regularly. These materials should include clear instructions, diagrams, and step-by-step guides on various care procedures.

- Develop and implement a standardized evidence-based nursing education program for nurses caring for children undergone colostomy surgery.

Further studies need to be performed:

- Provide pre-service and in-service training programs using simulation for newly appointed nurses to improve their competency level.

- Further research is crucial to conduct a similar study on a larger sample size in different settings for generalization of the findings.

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