Effect of Instructional Guidelines Based on Short Message Service on Nursing Performance Regarding Complications after Paracentesis for Cirrhotic Patients

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Abstract

Background: Paracentesis is more frequently used as a diagnostic tool to examine ascetic fluid and may be used as a therapeutic to remove a significant amount of fluid that is causing discomfort or difficulty breathing or that is affecting how the kidneys or intestines (bowel) are working into the abdomen to remove and drain ascetic fluid from the peritoneal cavity. **This study aimed to** determine the effect of instructional guidelines based on short message service on nursing performance regarding paracentesis for cirrhotic patients and to assess patients' complications after instructional guidelines based on short message service application. **Design:** Quasi-experimental research design was used to complete this study. **Setting:** The study was carried out at the internal medicine unit at Damanhur national medical institute Hospital, Egypt. **Subjects**: A convenient sampling technique involving 50 nurses and 100 patients divided into two groups (study group and control group), 50 for each group. **Tool:** A self-administered questionnaire (pre and post-test format) to assess the following parts (I) nurse's personal characteristics; (II) Nurse's knowledge about paracentesis (pre and post-test format); (III): Observational checklist about paracentesis procedure; and (IV): Patients' complications assessment sheet**. Results**: a good improvement in the knowledge and practice scores were found after instructional guidelines based on short message service application with a statistically significant difference and the complications of paracentesis were lesser among study group patients than in the control group. Also, there was a highly significant correlation between demographic characteristics and nurses' level of knowledge and practice in pre- and post-instructional guidelines mainly in the items of gender, and educational qualification. While there was a highly significant correlation between demographic characteristics and nurses' level of knowledge in pre- and post-instructional guidelines with nurses' age. **Conclusion**: patients undergoing paracentesis are exposed to several complications. Improving nursing guidelines can favorably affect the incidence of these complications. **Recommendation**: Continuous training programs to improve Nurse's knowledge and practices which will reflect on their patients' care.

Keywords: Complications, Instructional guidelines, Nurses' Knowledge and practices, Paracentesis.

Introduction:

A catheter or needle is inserted into the peritoneal cavity during a paracentesis procedure to drain fluid from the abdominal cavity in cases of ascites; relieve pressure on the abdominal and chest organs; and examine the chemical, bacterial, and cellular composition of the peritoneal fluid to aid in the diagnosis of diseases **(Aponte et al., 2023).**

According to **Friedman & Keeffe (2018**), the World Health Organisation (WHO) described cirrhosis as a widespread process characterized by fibrosis and the transformation of normal liver architecture into structurally aberrant nodules that lack normal lobular organization. With cirrhosis ranking as the 14th most prevalent cause of death worldwide, it is a growing contributor to morbidity and mortality in more industrialized nations. According to the **WHO**, liver cirrhosis has an overall mortality rate in Egypt of 41.6% and is becoming more common. Cirrhosis is increasingly becoming recognized as a disease that may be divided into various clinical prognostic phases, with 1-year mortality varying depending on the stage from 1% to 57% (**Wolf 2018**).

Although it has been demonstrated that paracentesis is a safe and effective approach for treating patients with severe ascites that is resistant to nutritional and diuretic therapy, it can have serious negative effects on the patient and is associated with some risks or difficulties. Systemic, local, and intra-peritoneal problems can all be categorized as complications. Significant hypotension and

infection are examples of systemic problems. Abdominal wall hematoma and localized infection at the puncture site are examples of local and intra-peritoneal complications. Numerous domestic and international studies have demonstrated a correlation between nursing adherence to the paracentesis guideline and favorable patient outcomes, patient safety, and a decrease in the risk of either local or systemic problems (**Saberifiroozi 2017**).

The most frequent major cirrhosis complication is ascites, which marks a significant turning point in the progression of chronic liver disease. It kept track for ten years. Ascites that need treatment develop in about (60%) of cirrhotic patients (**Cessario et al., 2019**). The procedure known as abdominal paracentesis involves the aseptic evacuation of fluid from the peritoneal cavity using a sterile cannula or needle by a medical professional (**Orman et al., 2018**). A procedure called a paracentesis is more frequently used as a diagnostic tool to examine ascetic fluid and may also be used as a therapeutic to drain and remove a significant amount of fluid from the abdomen that is causing discomfort, making it difficult to breathe, or interfering with the function of the kidneys or intestines (bowel) to remove and drain ascetic fluid from the peritoneal cavity (**Kim et al., 2019**).

Paracentesis complications include decreased blood pressure, unintentional blood vessel, bowel, or bladder puncture, kidney failure, infection, persistent leaking, post-paracentesis circulatory dysfunction (occurs after > 5 L of fluid is removed), intraabdominal wall hemorrhage, and intra-abdominal organ injury (**Runyon, 2019**). Therefore, nurses have a major responsibility toward patients undergoing paracentesis to minimize intraperitoneal fluid without intravascular volume depletion, prevent injury, and inhibit infection of the peritoneal cavity. The successful paracentesis procedure also depends on a skilled practitioner, a highly strict aseptic technique, good preparation, and careful monitoring of the patients throughout the procedure (**Gines et al., 2018**).

The pre-, during-, and post-procedure nursing roles concerning patients undergoing paracentesis are divided. Pre-procedure care involves gathering necessary supplies, explaining the procedure, obtaining consent, assessing the patient's condition, taking vital signs, positioning the patient, and emptying the bladder (**Fabrellas et al., 2020**). During the procedure, the aseptic technique must be maintained, and the patient must be closely watched for any abnormalities throughout the procedure. Among the post-procedure interventions are applying a sterile dressing and a pressure bandage at the puncture site to stop fluid leakage, keeping an eye on vital signs, checking for hypovolemia, electrolyte shifts, and changes in mental status, administering prescribed albumin intravenously after large-volume paracentesis, and documenting the procedure. **(Fahmy et al., 2020)**

To reduce these complications, the nurse should play a role that involves pre-, during-, and post-procedure preparation. Pre-procedure checks should include the patient's laboratory results, hand cleaning to prevent cross infection, vital sign measurements, particularly blood pressure, and requesting that the patient empty their bladder before the trocar is put in to prevent bladder perforation (**Kim et al., 2018**). To make efficient use of time and resources, the nurse should assist in gathering and setting up the necessary equipment, positioning the patient correctly, assisting the doctor as they do the procedure, measuring and recording the abdominal circumference, and taking vital signs (**Fabrellas et al., 2020**).

After paracentesis, the following steps should be taken: apply a sterile dressing right away after disconnecting the trocar; advise the patient to remove the dressing after 48 hours; record vital signs in the patient's chart; send the ascetic fluid specimen to the lab right away if ordered; observe any oozing from the puncture site; track drainage on the fluid balance chart; record and report the procedure (time, date, characteristics of ascetic fluid (color, amount, and consistency) (**Nottingham University Hospital, 2021**).

The mobile phone has proven to be an effective device in all facets of human life, according to researchers who have employed a range of technologies to deliver interventions in health promotion. 90% of Iranians now have access to cell phones. Short message services (SMS) and cell phones are contemporary tools for engagement and communication. They have a wide range of features and capabilities, including high speed, permanent access, affordability, relative security, storage capacity, adaptability, and attractiveness of content (**Shetty et al., 2019**). Given that most

individuals today lead busy lives and find it difficult to travel and attend training sessions, SMS may be an effective way to offer training interventions. Previous research (**Botelho et al., 2019,** and **Arora et al., 2018**) showed that sending SMS to diabetes patients was a successful strategy for promoting self-management behaviors.

The effectiveness of computer-based eLearning in impoverished countries may be hampered by a lack of access to and skill with computers.6 Mobile phones are becoming more and more common as delivery methods for training, and they may offer a cost- and capacity-effective alternative to conventional, computer-based eLearning. Mobile phone use in healthcare (mHealth) and education (mLearning or mEducation) has increased since they became widely available (**Peter et al., 2016**). The percentage of mobile phone ownership among the studied Kenyan healthcare workers was around 98%, and training offered by SMS has enhanced nurse adherence to standards of care in that nation and numerous other African programs. SMS-based training programs have also demonstrated information retention levels comparable to didactic instruction after 30 days. Several 'organically generated' mobile-telephone-based learning strategies, such as reflective practice, emotional support, and teaching in unanticipated scenarios, were reported by a group of nurses working in rural South Africa (**Zurovac et al., 2019**).

The widespread use of information and communication technologies today offers a significant opportunity to encourage diabetic self-care. This is due, in part, to the availability of SMS on mobile devices such as mobile phones. With this service, the patient is continuously reminded to practice self-care. Thus, there is increased interest in the use of SMS as an educational methodological tool to promote self-care by facilitating communication and connecting with people from various socioeconomic and racial backgrounds (**Fortmann et al., 2017,** and **Whitehead & Seaton, 2016**). Sending text messages has been demonstrated to be an incentive for the right management of diabetes by energizing the recipients and making knowledge assimilation easier.

These results reveal the potential of using this methodological strategy to improve self-care because of the constant reminders about the significance of daily practices for health, which strengthens the connection between the patient and his health center and encourages an improvement in the condition's clinical evolution (**Prado et al., 2018**). Studies carried out in the United States, India, and Egypt showed that interventions that adopted SMS in their methodological strategy to promote self-care improved clinical outcomes (**Arora et al., 2018,** and **Abaza & Marschollek, 2017**).

Significance of the study:

The nurse's knowledge of the paracentesis procedure is insufficient and has to be improved, according to the researcher's experience. In this region, this study will be the first to offer nurses recommendations for paracentesis, which will be beneficial to these nurse groups. According to the accepted guidelines for the care of ascetic patients undergoing paracentesis, the researcher saw from his or her professional experience that there was a discrepancy between the actual practice and expected paracentesis care. A large percentage of ascetic patients undergoing paracentesis suffer from either local or systemic complications as a result of malpractice, according to several studies that have been undertaken **(Saberifiroozi, 2017).** One of these studies was done in the Mansura University Hospital by **El-Sayed et al., 2018**, who discovered that 11% of patients had peritonitis due to the breakdown of aseptic technique and 32% of patients had signs and symptoms of hypovolemia following paracentesis due to lack of monitoring and rapid and increased ascetic fluid drainage.

Through the use of SMS and phone appointment reminders, technology offers the chance to lower the number of patients who don't show up for appointments. In a clinic with a high no-show rate, SMS is advised as a practical, affordable method to help improve patient appointment adherence (**Chen et al., 2018,** and **Leong, 2016).**

Operational definitions:

Short message service (SMS) Short message service (SMS)commonly referred to as Text messages can be sent up to 160 characters (maximum 224 characters if using a 5-bit mode) to mobile phones and smartphones via the short messaging service (SMS) program. Many cellular phone providers offer free

message receiving and sending for a set number of messages each month **(Hanna 2020)**.

A guideline is described as a set of statements that have been methodically developed to assist practitioners in making decisions on patient care in particular clinical situations. These must be supported by study or empirical data (**Rao & Tandon 2017**).

The aim of the study:

- To determine the effect of instructional guidelines based on short message service on nursing performance regarding paracentesis for cirrhotic patients
- To assess patient complications after instructional guidelines based on the short message service application
- Designing and implementing instructional guidelines based on short message service applications based on nurses' needs.

Research Hypotheses:

- The post means knowledge and practice scores of nurses who will be exposed to instructional guidelines based on short message service application will be higher than pre-application.
- The complications will be lesser among study group patients compared to those among the control group ones.

Research design:

A quasi-experimental research design was used to accomplish this study**.**

The setting of the study:

The study was carried out at the internal medicine unit at Damanhur national medical institute Hospital, Egypt.

Study subjects' sample:

A convenient sampling technique of all nurses working at the previously selected settings 50 nurses and One hundred adult cirrhotic patients undergoing paracentesis was included and had the following criteria (the age ranged between (21-65) years old, both male and female). Those (100) subjects were equally divided on a random basis into a study group and a control group, (50) for each.

Data collection tools:

Tool: A self-administered questionnaire (pre and post-test format), was developed by the researcher based on a literature review **(Fahmy et al., 2020,** and **El-Sayed et al., 2018)** to assess the following parts:

Part (I) Nurse's sociodemographic characteristics: It included data related to age, sex, education, training courses, and years of experience.

Part (II) Nurse's knowledge about paracentesis (pre and post-test format):

It was used to gauge nurses' level of knowledge of paracentesis (including the definition, symptoms, and causes of ascites, as well as the procedure's indications, risks, and how to avoid complications), necessary supplies, and the role of nurses before, during, and after the procedure. It is utilized by nurses during the three follow-up stages before and after the adoption of instructional guidelines and consists of 22 multiple-choice questions.

Scoring system:

The level of knowledge for nurses was deemed "satisfactory" if they had a score of 60% or higher, and "unsatisfactory" if they received a score of less than 60%.

Part (III): Observational checklist about the paracentesis procedure

To evaluate the nurses' practices before, during, and following the paracentesis procedure, the National Clinical Paracentesis Guideline, (2015), was employed as a pre-and post-test. The care-related steps are divided into three categories: not done, incompletely done, and completely done).

Scoring system:

It was deemed "adequate practice" if the nurses worked more than 70% in practices, and "inadequate practice" if they had less than 70%.

Part (IV): Patients' complications assessment sheet:

The complications assessment sheet includes items and covers the following areas:

Demographic data about the patient, which includes 6 items such as the patient's age, sex, level of education, occupation, and residence.

- Assessment of paracentesis complications signs and symptoms which include hypotension and hypovolemia, persistent leakage of ascetic fluid, abdominal bruises or localized infection at the puncture site within one week, bleeding, intestinal perforation, and hepatorenal syndrome.

Tools Validity:

Two specialists in tropical medicine, two in medical surgical nursing, and one from the gastroenterology department evaluated the instruments for content validity, and no revisions were made. Internal consistency, clarity, applicability, thoroughness, understanding, and simplicity of the instruments were evaluated.

Tools Reliability:

The Cronbach's Alpha coefficient test was used to assess internal consistency, and the result showed that the study's tools were reliable, as demonstrated by the value of (0.91).

Pilot study

To assess clarity, completeness, and time commitment, a pilot study was conducted on 10% of the total sample (5 nurses and 10 patients). Since no alterations were required, they included it in the real sample.

Ethical Considerations

The Damanhour University faculty of nursing's research ethics committee provided formal first approval, which was achieved. Every nurse who participated in this study was given a brief explanation of the aim of the current research. Each nurse and patient had the option of agreeing to or declining to participate in the study. Additionally, they disclosed that the data would be kept private and utilized just for the investigation. The voluntary nature of the engagement was emphasized by the investigator. Each patient and nurse gave their verbal consent before participating in the current investigation.

Data Collection Procedure

Phase I: Preparatory phase:

After explaining the study's objectives to the medical consultant of the study site, official approval for data collection was obtained. Additionally, each nurse who took part in the trial gave their written approval. A survey of the literature on the various aspects of the problems from the past and now, locally and internationally, utilizing books, articles, periodicals, and magazines, was conducted. After reviewing pertinent recent Arabic and English literature, instructional guidelines covering various facets of the study topic were created in the Arabic language using voice messages, text messages, figures, and videos. These guidelines were designed to fill in knowledge and practice gaps among nurses and to lessen complications among patients.

Phase II: Implementation phase:

After receiving approval to carry out the study, the researcher started gathering data. Data collection began in January 2023 and continued through April 2023 on four days per week in two shifts. The researcher introduces herself to start a conversation and describes the scope and goals of the study during the first interview. Each nurse who participated in the study had a pre-and post-test to gauge their knowledge and practices. The instruments were filled through interviews. The research was done throughout the morning and afternoon shifts. Then, each nurse participated in a pre-test during which she/he was evaluated for baseline knowledge using (tool I). This tool was filled out individually by the nurses in a matter of about 15 minutes, and each nurse was then individually evaluated by the researcher during her/his routine care during the paracentesis procedure to determine their baseline of practice using. In addition to assessing for paracentesis complications in the control group, the researcher described the nature and objective of the research to the chosen patients who were willing to participate.

The researcher conducted face-to-face interviews with the nurses; each interview lasted between 10 and 15 minutes before a brief message was sent. Before each interview, the researcher greeted and introduced herself to the nurses, explained the nature and purpose of the study, and then obtained each woman's oral consent to participate in the study. Before providing brief message instructions, the researcher first evaluated personal data and had face-to-face pre-test structured questions completed. The phase of the intervention (instructional recommendations based on a brief message) Then, for the next four weeks,

voice messages, text messages, images, and videos were sent twice daily with the educational guidelines based on brief messages.

The information was dispersed over the period following the topics. According to the requests of the nurses, more media were produced or modified by the team. Ascites definition and causes, paracentesis definition, indications, contraindications, potential complications and how to prevent them, necessary equipment, appropriate sites for needle insertion, and practical part (how to prepare patients undergoing paracentesis, aseptic and proper technique of needle insertion, patient's positioning, care during paracentesis and monitoring nursing actions after.

SMS texts were used as the delivery method for the training intervention over a month. A post-intervention telephone test was conducted after the final SMS had been issued. Purely theoretical assertions, candidate-response-able queries, and tasks were all part of the SMSs' original design. Important details were stated again. Candidates were urged to reply through SMS to questions posed or to engage in conversation with the researcher if they required clarification on specific subjects. SMSs were sent from the researcher's personal phone. The "posttests" were completed by each candidate over the phone at a prearranged suitable time.

Phase III: Evaluation phase:

The first post-test was administered one month after the nurses had received short message service application-based instructional instructions to assess their knowledge and practice. The knowledge was assessed by allowing each nurse to restock a tool. The researcher examined each nurse's performance of the paracentesis process individually, examining them while they worked and rechecking each step to see if it was completed correctly, incorrectly, or not at all. Each participant was interviewed and observed separately throughout the post-tests, and the researcher also completed the patient complication evaluation form within the allotted 15 minutes.

Statistical Analysis of Data

Using a suitable personal computer, data entry was completed. The statistical software SPSS-20 was used to conduct the analysis. The collection, revision, coding, analysis, and tabulation of the data were done utilizing the number and percentage distribution. Quantitative continuous data were presented using descriptive statistics in the form of frequency and percentages, and comparisons between the mean scores of the two study groups were made using student T-tests. The F-test (ANOVA) was employed for several groups. A person correlation analysis was performed to evaluate how knowledge and practices interacted before, during, and after the follow-up program. The threshold for statistical significance was set at p 0.05.

Results:

Table (1) Illustrated found that (80%) were females; and more than half of them their ages were < 30 years old, with a mean age of 27.33± 8.78 years. As regards the nurses' years of experience, it was noticed that (58%) had more than 5 years of experience. Regarding the educational qualifications of the nurses, it was found that (70%) of them had a technical institute of nursing. Concerning attendance of training courses regarding paracentesis, all of the studied nurses (100%) did not attend any previous courses. Finally, as regards place of residence, about three-quarters (75%) of them were living in rural areas

Table (2): Shows that the majority of both study (80%) and control group (70%) were males. As regards the level of education, the control group (54%) compared to 46% in the study group was illiterate. Concerning residence, 60.0% in the control group compared to 56% in the study group live in urban areas.

Figure (1) Portrays that 80% of the studied cirrhotic patients did paracentesis for therapeutic types and 20% for diagnostic types.

Table (3): Shows that there was a highly statistically significant difference between the pre and post-implementation of

instructional guidelines based on short message service as regards nurses' knowledge regarding paracentesis with p-value<0.05.

Figure (2): Illustrated that there was a significant improvement in nurses' knowledge regarding paracentesis procedure with a percentage of (92%) after the implementation of instructional guidelines based on short message service compared with a satisfactory level of knowledge (16%) at the pre-implementation phase.

Table (4): Shows that there was a highly statistically significant difference between the pre and post-implementation of instructional guidelines based on short message service as regards nurse's practices regarding paracentesis with p-value<0.05.

Figure (3): Illustrated that there was a significant improvement in nurses' practices regarding paracentesis procedure witha percentage of (96%) having adequate practice after the implementation of instructional guidelines based on short message service compared with an adequate level of practice (18%) at the pre-implementation phase**.**

Table (5): Shows that there was a statistically significant difference between diagnostic and therapeutic paracentesis concerning hypotension and hypovolemia and persistent leakage of ascitic fluid with a p-value <0.05.

Table (6): It reflected that there was there were highly statistically significant improvements in nurses' practice concerning improvement in nurses' knowledge after instructional guidelines based on short message service implementation (P≤0.01) as compared with before.

Figure (4): Shows those complications of paracentesis among the study group were lesser than the control group.

Table (7): Revealed a highly significant correlation between demographic characteristics and nurses' level of knowledge in pre- and post-instructional guidelines mainly in the items of educational qualification and nurses' age (with P-value 0.004, 0.008) respectively. While there was a significant correlation between demographic characteristics and nurses' level of knowledge in pre- and post-instructional guidelines with nurses' gender with P-value 0.021. While there was no correlation between the knowledge scores in the pre-and post-instructional guidelines and demographic factors in items of residence and years of experience of nurses.

Table (8): Illustrate a highly significant correlation between demographic characteristics and nurses' level of practice in pre- and post-instructional guidelines mainly in the items of gender, and educational qualification (with P-value 0.007, 0.002) respectively. While there was no correlation between the level of nurses' practices in the pre-and post-instructional guidelines and demographic factors in items of age, residence, and years of experience of nurses.

Table (1): Frequency distribution of the nurses according to their personal characteristics (n=50).

Nurses' personal characteristics	(N=50)	%
Gender:		
Male	10	20
Female	40	80
Age		
< 30	28	56
> 30	22	44
Mean+ SD	27.33± 8.78	
Years of experience		
< 5	21	42
> 5	29	58
Educational Qualification:		
Diploma	10	20
Technical Institute	35	70
Bachelor	5	10
Previous training courses regarding paracentesis		
Yes	0	0
No	50	1 00
Place of residence		
Rural	37	74
Urban	13	26

Table (2): Demographic characteristics of the studied cirrhotic patients in the study and control group (n=100)

Demographic characteristics of the studied cirrhotic patients	Control groupNo = 50		Study groupNo = 50		*P. value
	No.	%	No.	%	
Mean age ± SD	50.22±9.77		51.7± 8.44		0.650
Gender					
Male	40	80	35	70	0.260
Female	10	20	15	30	
Level of education					
Illiterate	27	54	23	46	0.525
Primary education	5	10	6	12	
Secondary education	8	16	5	10	
University	10	20	16	32	
Occupational status					
Housewife	20	40	18	36	0.539
Employed	10	20	12	24	
Unemployed	20	40	20	40	
Residence					
Urban	30	60.0	28	56	0.793
Rural	20	40.0	22	44	

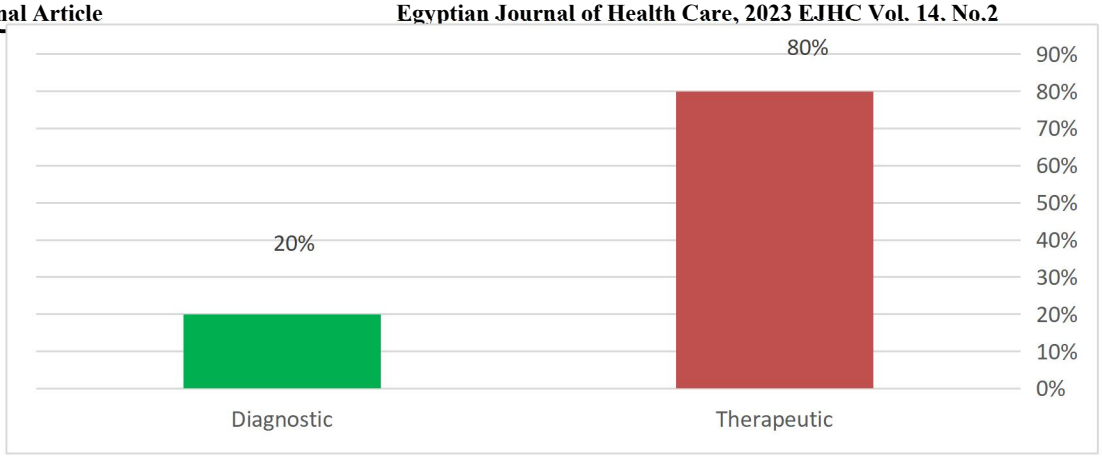

Figure (1): Frequency distribution of the studied cirrhotic patients according to their type of paracentesis among both the study and control group

Table (3): The studied nurses' knowledge about paracentesis pre and post- instructional Guidelines based on short message service

Nurses' knowledge	Pre-instructional guidelines based on SMS implementation		Post instructional guidelines based on SMS implementation		P-value
	N	%	N	%	
Definition of ascites	20	40%	50	100%	<0.001*
Causes of ascites	21	42%	50	100%	<0.001*
Definition of paracentesis	30	60%	50	100%	<0.001*
Indications of paracentesis	25	50%	46	92%	<0.001*
Contraindications of paracentesis	24	48%	45	90%	<0.001*
Complications of paracentesis	15	30%	48	96%	<0.001*
How to prevent complications of paracentesis	17	34%	46	92%	<0.001*
Needed supplies of paracentesis	16	32%	44	88%	<0.001*
Nurses' role before, during, and after paracentesis procedure	18	36.0	47	94%	<0.001*

**Significant p-value <0.05, **highly significant p-value <0.01.*

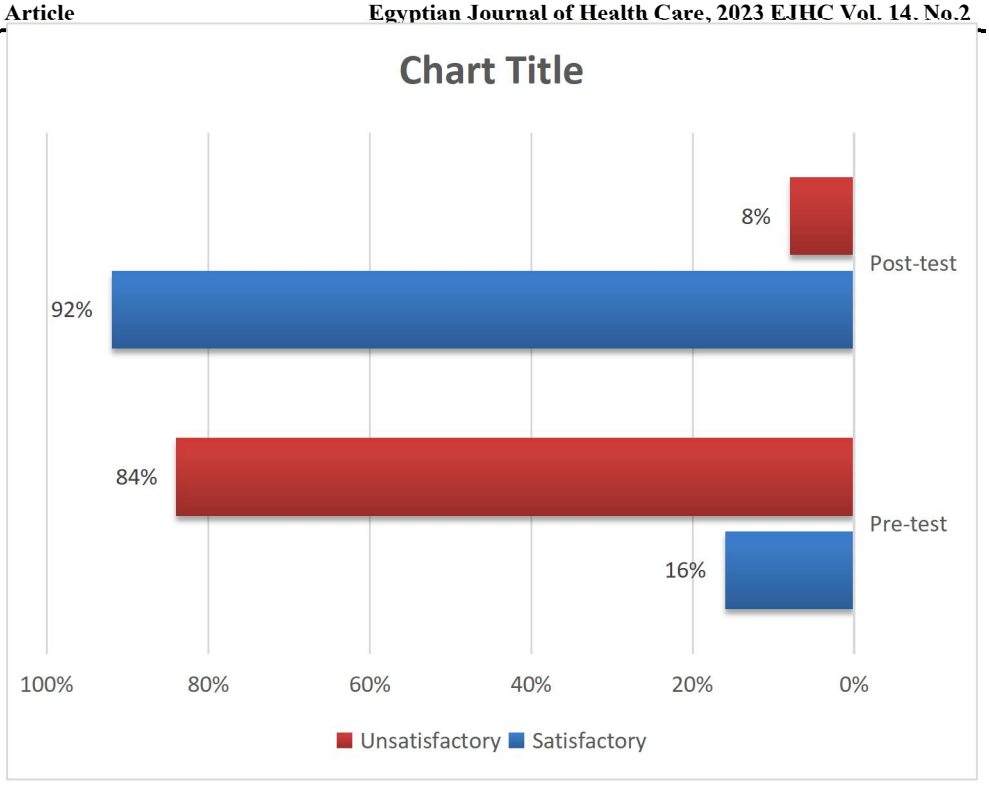

Figure (2): Comparison between the total level of nurses' knowledge about paracentesis procedure at pre and post- instructional Guidelines based on short message service (n=50)

Table (4): The studied nurses' practices about paracentesis pre and post- instructional Guidelines based on short message service

Nurses' practices	Pre- instructional guidelines based on SMS implementation		Post instructional guidelines based on SMS implementation		P. value
	No.	%	No.	%	
Practices of nurses before paracentesis	40	80	50	100.0	0.020*
Practices of nurses during Paracentesis	17	34	47	94.0	<0.001**
Practices of nurses after Paracentesis	25	50.0	48	96	<0.001**

**Significant p-value <0.05, **highly significant p-value <0.01.*

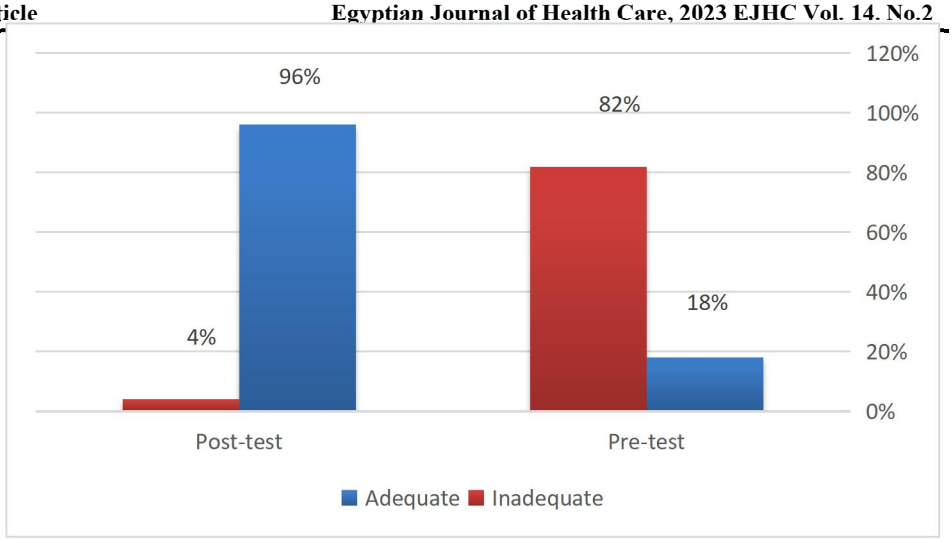

Figure (3): Comparison between the total level of nurses' practice regarding paracentesis procedure at pre and post instructional Guidelines based on short message service (n=50)

Table (5): Complications rates according to the type of paracentesis in both the study and control group of patients.

Complications rates	Therapeutic (n=40)		Diagnostic (n=10)		P. value
	No.	%	No.	%	
Hypotension and hypovolemia	8	20	0	0.0	0.029*
Persistent leakage of ascitic fluid	16	40	0	0.0	0.041*
Bleeding	10	25	5	50	0.718
Hepatorenal syndrome	2	5	0	0.0	0.526
Abdominal bruises or localized infection at the puncture site (within 1 week)	4	10.0	5	50	0.774

Table (6): Relation between total nurses' knowledge and practice regarding paracentesis at pre and post instructional guidelines based on short message service implementation

Items	Knowledge	Practice	t-test	P value
	Mean +SD	Mean +SD		
Pre instructional guidelines	7.77±0.89	15.88±12.8	2.88	.006**
Post instructional guidelines	16.22±2.12	54.78±6.79	37.4	.000**

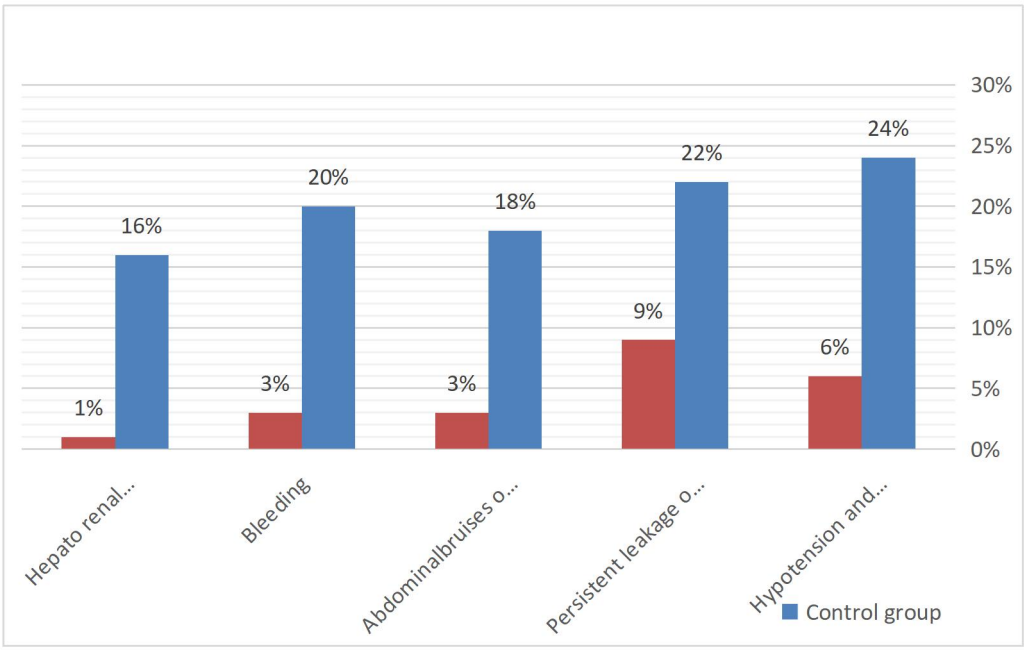

Figure (4): Distribution of the studied cirrhotic patients in the study and control groups as regards complications of paracentesis.

Table (7): Correlation between Demographic Characteristics and Nurses' Level of Knowledge Pre and Post-Instructional Guidelines (n=50)

Demographic Variables	Pre-test				Post-test				p-value
	Satisfactory (n=8)		Unsatisfactory (n=42)		Satisfactory (n=46)		Unsatisfactory (n=4)		
	No.	%	No.	%	No.	%	No.	%	
Gender									
Male	2	25.0	22	52.0	20	43.0	4	100.0	0.021*
Female	6	75.0	20	48.0	26	57.0	0	0.0	
Age									
< 30	4	50.0	30	71.0	18	39.0	0	0.0	0.008**
> 30	4	50.0	12	29.0	28	61.0	4	100.0	
Residence									
Rural	6	75.0	21	50.0	23	50.0	2	50.0	0.620
Urban	2	25.0	21	50.0	23	50.0	2	50.0	
Educational Qualification:									
Diploma	6	75.0	12	29.0	10	22.0	2	50.0	0.004**
Technical Institute	2	25.0	15	35.50	16	35.0	1	25.0	
Bachelor	0	0.0	15	35.50	20	43.0	1	25.0	
Years of experience									
< 5	4	50.0	18	43.0	23	50.0	1	25.0	0.504
> 5	4	50.0	24	57.0	23	50.0	3	75.0	

* P- value is statistically significant

Table (8): Correlation between Demographic Characteristics and Nurses' Level of Practice Pre and Post-Instructional Guidelines (n=50)

Demographic Variables	Pre-test				Post-test				p-value
	Adequate (n=9)		Inadequate (n=41)		Adequate (n=48)		Inadequate (n=2)		
	No.	%	No.	%	No.	%	No.	%	
Gender									
Male	4	44.0	15	36.58	18	37.5	2	100.0	0.007**
Female	5	56.0	26	63.42	30	62.5	0	0.0	
Age									
< 30	3	33.3	13	31.70	20	41.6	1	50.0	0.532
> 30	6	66.7	28	68.30	28	58.4	1	50.0	
Residence									
Rural	6	66.7	21	51.21	24	50.0	1	50.0	0.558
Urban	3	33.3	20	48.79	24	50.0	1	50.0	
Educational Qualification:									
Diploma	2	22.0	10	24.39	8	16.6	2	100.0	0.002**
Technical Institute	2	22.0	11	26.82	15	31.25	0	0.0	
Bachelor	5	56.0	20	48.79	25	52.15	0	0.0	
Years of experience									
< 5 years	5	56.0	25	60.97	22	45.83	0	0.0	0.720
> 5 years	4	44.0	16	39.1	26	54.17	2	100.0	

* P- value is statistically significant

Discussion:

A process referred to as paracentesis is placing a needle or catheter into the peritoneal hollow space to gather ascitic fluid for diagnostic or therapeutic purposes. The three stages of the nurse's involvement in paracentesis are called pre-paracentesis, paracentesis, and post-paracentesis **(Thomsen et al.,2016)**.

The proliferation of technology, consumer demand for high-quality treatment, cost-containment pressure, a decrease in hospital stay length, an aging population, and a rise in the prevalence of comorbidities are just a few of the issues that nursing staff are currently experiencing. These difficulties are closely related to the requirement for highly qualified nurses, who must be prepared with a focus on their knowledge and actions that have an impact on patient outcomes **(Duchscher, 2019).**

The primary method for draining temporary ascetic fluid from the peritoneal cavity is called paracentesis. Nurses play a significant role in preventing and lowering the likelihood of probable paracentesis complications (**Robinson, 2019**). To ascertain the impact of instructional guidelines based on short message service on nursing performance concerning paracentesis for cirrhotic patients as well as to evaluate patient problems following the use of instructional guidelines based on short message service, this research was carried out.

In the present study, the majority of nurses have been female. The results of the current study showed that women made up the majority of the nursing staff; this may be because women are more suited for the nursing profession in Egypt and because women have just recently been allowed to study in the nursing area. Additionally, because of the higher pay and better prospects, men nurses prefer to work overseas compared to female nurses. This discovery was consistent with **Elsayed, et al., (2018**), who at Mansoura University did a study titled "Applying nursing safety measures to prevent complications for the liver cirrhotic patient undergoing paracentesis" and discovered that most of the nurses under investigation were female.

Similarly, **Ahamed, (2018**) carried out a study at a hemodialysis unit titled "Developing the Designed Protocol Regarding the Care Offered to Hemodialysis Patients"; the results showed that the majority of the nurses' ages ranged from 20 to 40 years. Nurses tended to be mostly female. While Contrary to **Ghonemy et al., (2016**), who stated that the majority of the examined sample was male and believed that this result may indicate a social background that discourages women from this work and since the majority of female nurses are assigned to care for maternity and child health care, we can say that this result is likely due to both of these factors. Additionally, this can be the case since men handle nighttime responsibilities while females do not.

More than two-thirds of the investigated nurses received technical nursing education, according to the current study's findings about the nurses' degree of qualification. This outcome might be attributed to the fact that the nursing technical institute supplied the area with a significant number of nurses, to the high enrollment in nursing technical institutes, to students' desire to accelerate their employment, and to students' desire to increase their salary. This conclusion was in line with that of **Elsayed, et al., (2018**), whose research showed that the majority of nurses had technical training.

More than half of the nurses in the study were under 30 years old, with a mean age of 27.338.78 years. This is likely because younger nurses made up the majority of the workforce in hospitals and were only allowed to provide direct patient care, while older nurses took on administrative responsibilities. This discovery was consistent with that made by **Mobed, et al., (2018**), who in Assuit, Egypt, conducted a study titled "Effect of Designed Nursing Guidelines on Nursing Intervention to Reduce Complications for Cirrhotic Patients Undergoing Paracentesis" and discovered that most of the nurses they looked at belonged to the young adult age group. However, this result conflicted with that of **Yboa et al., (2016)** who revealed that the studied nurses' age ranged between 24 and 45 years.

More than half of the nurses in the current study have more than five years of experience and have attended a nursing technical institute. Similarly, **Ahamed, (2018**) carried out a study in the hemodialysis unit named Creating the specified protocol regarding the care provided to hemodialysis patients, which found that more than half of them have experience longer than ten years.

This information is consistent with **Mohamed, et al., (2018**), who found that the majority of the nurses in the study had fewer than 7 years of experience.

All of the study's nurses lacked any paracentesis procedure-related in-service training. This result contradicts **Mobed, et al., (2018**), who found that less than one-third of the nurses under study had taken in-service training courses related to the paracentesis procedure and claimed that there was no emphasis on instructing and training the new staff members in the techniques and protocols of nursing procedures.

The findings showed that there was a highly statistically significant change in nurses' knowledge of paracentesis between the pre-and post-implementation of instructional guidelines based on short message service. According to the researchers, this demonstrated the benefit of short message service-based educational instructions by showing that people knew more about the paracentesis process. The findings show a correlation between an increase in knowledge test scores and a solely SMS-based educational intervention. Studies employing SMS to train nurses and community health care workers in other poor nation contexts had similar encouraging findings, demonstrating the effectiveness of this affordable and widely accessible training technology (**Zurovac et al., 2019**). The acquisition of theoretical knowledge should be a component of an anesthetic nurse's training, and the lack of a skilled anesthesia assistant can significantly increase the likelihood of unfavorable results (**Zurovac et al., 2018).**

Studies in the theatre setting and in the larger healthcare context, where the level of nurse training is consistently connected to patient outcomes, further emphasize the necessity for high-quality training interventions and trained employees. This is especially crucial in areas with a lack of resources when a prevalent issue with subpar health worker performance exists (**Jones et al., 2017**).

The findings showed that, compared to less than one-fifth of nurses having a satisfactory level of knowledge before the implementation of instructional guidelines based on short message service, there had been a significant improvement in the majority of nurses' knowledge regarding the paracentesis procedure. This may be due, in part, to a lack of paracentesis-related training and a lack of ongoing education and in-service programs. These results highlight the necessity for nurses to execute instructional guidelines based on short message service effectively. The in-service training program had a positive impact on the nurses' knowledge and abilities, according to **Abd-Alla (2020)** research, which corroborated this conclusion. They also advocated for the continual assessment of educational programs and their alignment with nurses' requirements.

These findings were consistent with those of **Mobed et al. (2016),** who noted a significant increase in the mean knowledge scores following the implementation of the intended nursing protocol. The results of the current study showed a statistically significant improvement in knowledge scores concerning paracentesis in general, before, during, and after paracentesis following the adoption of nursing recommendations.

These results are in line with a study by **Elsayed, et al., (2018**), which found that nurses' knowledge was often limited before the implementation of nursing safety measures to avoid complications for liver cirrhotic patients having paracentesis. This result was consistent with that of **Mobed, et al., (2018**), who discovered a statistically significant difference in the nurses' knowledge of paracentesis items between the pre-and post-tests. The majority of the investigated nurses had sufficient knowledge at the post-test stages, according to **Fahmy et al., (2020)**, who also found that this conclusion was consistent with their findings. The findings of a study by **Yboa et al., (2016**), which discovered that educational interventions were successful in raising the level of nursing staff knowledge, are also compatible with this and suggested that group base intervention can improve the knowledge of healthcare workers about nursing procedures.

According to the results of the current study, there was a highly statistically significant difference between the nurse's paracentesis practices before and after the short message service-based instructional guidelines were implemented. By implementing instructional guidelines based on short message service, it appeared from the researchers' point of view that there was an improvement in training about paracentesis care for nurses. These results concurred with those of **Fahmy et al., (2020),**

Elsayed, et al., (2018), and **Yboa et al., (2016)** who discovered low levels of nurses' practice in the care of patients having paracentesis.

The current study showed that there had been a significant improvement in nurses' practices regarding the paracentesis procedure, with nurses having an adequate level of practice following the implementation of instructional guidelines based on short message service compared to an adequate level at the pre-implementation phase. This demonstrated the beneficial effects of guidelines education on nurses' clinical practice and confirmed the research premise. According to **Fahmy et al., (2020), Bayoumi & Mahmoud, (2019**) and **Elmagraby & Mohammed, (2019**), there was a highly statistically significant improvement in nurses' practice after the educational guideline's introduction compared to before. These findings are in line with a study by **Jan et al., (2015**), which discovered that after two months of implementing a teaching protocol, improvements in knowledge and practices had partially slowed down. This finding fulfilled the current study's main hypothesis, which was that nurses' understanding of the paracentesis method would be greatly increased by using instructional guidelines based on short messaging services.

Regarding paracentesis complications, it was discovered in the current study that the frequency of paracentesis complications was lower following the implementation of the instructional guidelines based on short message service implementation than it was before its implementation. The most frequent side effects before applying the short messaging service implementation instructional guidelines were hypotension and hypovolemia. This outcome conflicts with the findings of **Pache & Bilodeau, (2019**) who claimed that only 9 of 4729 paracenteses had a serious hemorrhage.

In the current study, therapeutic paracentesis accounts for the majority of problems, with a statistically significant difference between the two procedures regarding hypotension, hypovolemia, and ascitic fluid leakage. As a result, diagnostic paracentesis is a safe treatment with a very low incidence of significant sequelae, according to Runyon's assessment **(Runyon, 2019)**.

Our findings confirmed and backed up this assertion, showing that the instructional guidelines based on SMS implementation for nurses working with patients having paracentesis had succeeded in achieving its goals by enhancing nursing interventions and lowering problems. Text messages sent via SMS have proven to be effective instruments for promoting self-care and a methodological strategy that patients can use to enhance their care. In this regard, text messages are not only cost-free but also enable provider-user engagement through various multimedia modalities, such as texts, audio, and photos (**Hassan, 2017**).

Two randomized controlled trials, to compare appointment reminders via SMS with a control group that received no reminders, developed by **Taylor et al., (2018); and Youssef et al., (2014)** show that SMS is effective. This finding was also supported by **Bigna et al., 2019; and Perron et al., (2019)** who confirmed that SMS appointment reminders were equally successful. Appointment reminders via SMS are useful, as evidenced by the difference in appointment attendance, which was not statistically significant.

In terms of the gender of the nurses, the study found a significant correlation between gender and knowledge of the paracentesis process at the posttest, with female nurses having a higher percentage of knowledge than male nurses with a p-value of (0.009). This result was in the same context with **Mobed, et al., (2016)**, who showed a significant relationship between nurses' knowledge scores and their sex during the pre-test, but it contrasted with **Fahmy et al., (2020),** who found no statistically significant difference between knowledge score and nurses' gender.

The current study's findings revealed a strong relationship between the post-test knowledge scores of nurses and their ages, with nurses older than 30 years having higher satisfactory knowledge levels than the younger ($P = 0.021$). This finding was consistent with **Sabaq, et al., (2019**), who confirmed a strong relationship between the knowledge scores of nurses and their age throughout the pre-program phases. On the other hand, this result contradicts with **Fahmy et al., (2020),** who discovered that there was no connection between the knowledge scores of nurses and their ages.

According to the findings of the current study, there was a significant correlation between

the knowledge scores of the nurses and their educational qualifications on the post-test; this was especially true for nurses with bachelor's degrees, who demonstrated a higher level of knowledge than those with other educational backgrounds. This finding can be explained by the fact that nurses with bachelor's degrees had access to more information that would be useful to them in their line of work. This result supported by **Elmagraby & Mohammed (2019**) who showed a statistically significant relationship between educational qualifications and overall nursing knowledge score.

This can be explained by the fact that nurses with more education respond to educational training programs better than nurses with diplomas. The research of **Fahmy et al., (2020),** confirmed that the variable of educational qualifications does not influence nurses' knowledge, which is in opposition to this finding. However, there were no statistically significant relationships between the expertise of staff nurses and their years of experience or place of residency. These findings contrasted with **Thomsen et al., (2018)**, who found a substantial relationship between nurses' years of experience and their knowledge as well as a link between high levels of optimal competency.

The results of the current study revealed a highly significant correlation between nurses' practice and their gender, with female nurses performing at a higher level than male nurses in the post-test (p 0.009). This relationship existed between demographic characteristics and nurses' level of practice pre and post-instructional guidelines. Additionally, there was a substantial correlation between nurses' education and practice, with bachelor's degree holders performing at a higher level (p 0.047). This result is supported by the findings of **Elsayed, et al., (2018**) who found a significant relationship between sex and educational level and practice scores. Female nurses with a bachelor's degree tended to adhere to hand cleanliness, glove use, skin preparation with an aseptic solution for the puncture site, and close patient monitoring, compared to nurses with a diploma. While **Elmagraby & Mohammed (2019**) noted that there was no statistically significant difference in the total practice scores of nurses across all assessment periods concerning their sex and educational level, this result was the contrary. The study did find, however, that a nurse's degree of practice was unaffected by their age, years of experience, place of residence, marital status, or training courses. The results of **Thomsen et al., (2018**), and **Jan et al., (2015**), illustrated a substantial relationship between nurses' practice and their age and years of experience, disagree with the conclusions of this study.

Finally, there was no correlation between the knowledge scores in the pre-and post-instructional guidelines and demographic data (residence and years of experience of nurses). This may be the result of nurses' prior lack of knowledge of paracentesis, which was remedied by the instructional guidelines and connected with better practices following the instructional guidelines.

Conclusions:

Based on the findings of the present study, it can be concluded that nurses who received instructional guidelines about the paracentesis procedure showed a statistically significant improvement in the total level of knowledge and practice than before, and this is supported by the research hypothesis. The improvement in nurses' knowledge and practices was significantly higher after one month of instructional guideline application with some decline at the follow-up phase (after one month) which indicates the need for performing instructional guidelines for nurses. Patients undergoing paracentesis are exposed to several complications. Improving nursing guidelines can favorably affect the incidence of these complications. Additionally, there was a highly significant correlation between demographic characteristics and nurses' level of knowledge and practice in pre- and post-instructional guidelines mainly in the items of gender, and educational qualification. While there was a highly significant correlation between demographic characteristics and nurses' level of knowledge in pre- and post-instructional guidelines with nurses' age.

Recommendations:

Based on the results of the present study it can be recommended that:

- Continuous training programs to improve nurses' knowledge and practices which will reflect on their patients' care.

- Improving the quality of care among patients undergoing paracentesis should be done by using a scientific booklet, brochures, and Panners.
- Replication of the current study on a larger probability sample and other health care settings.

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