Assessment of Nurses' Readiness for Care of Patients Who Undertake Negative Pressure Wound Therapy

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Abstract

Background: Negative pressure wound therapy (NPWT), sometimes called vacuum-assisted closure, is a wound management method that uses suction to aid the healing process. It involves placing a sealed dressing over the wound, which is linked to a vacuum pump that extracts excess fluids and enhances circulation around the affected area. This therapy helps to decrease swelling, lower the chance of infection, and encourage the development of healthy tissue. **Aim of the study:** to assess nurses' readiness for care of patients who undertake negative pressure wound therapy. **Research design:** A descriptive research design was utilized to achieve the aim of the study. **Setting:** This study was carried out at the surgical departments at Sohag University Hospital, which included four departments: Plastic, Vascular, General Surgical, and Orthopedic departments. **Sample:** A convenience sample of (100) nurses worked at surgical departments was selected. **Data Collection Tools:** Two tools were used for data collection. **Tool (I):** A structured interview questionnaire sheet. It included three parts to cover the following data: **Part (I):** Demographic data sheet, **Part (II):** Nurses' knowledge questionnaire regarding negative pressure wound therapy and **Part (III):** Nurses' practical knowledge questionnaire regarding the care of patients undertaking negative pressure wound therapy device. **Tool (II):** Observational checklists to assess nurses' practice for applying negative pressure wound therapy dressing. **Results:** Findings revealed that more than half of the nurses were female, 72% being married. The average age was 28.8 ± 6.05 years. Approximately 68% of nurses demonstrated unsatisfactory overall knowledge of negative pressure wound therapy, and 80% were found to have inadequate practical skills in negative pressure wound therapy application, with only 20% classified as adequate. **conclusion:** The findings of the current study demonstrated a significant positive statistical relationship between the nurses' overall knowledge and their practice levels regarding negative pressure wound therapy at (p-value >0.001). **Recommendations**: It is recommended to organize regular in-service training sessions to enhance the knowledge and clinical skills of nursing staff concerning negative pressure wound therapy (NPWT).

Keywords: Knowledge, Negative pressure wound therapy, and Practice.

Introduction

Negative pressure wound therapy (NPWT) is a non-invasive treatment method that uses a vacuum system to support wound healing. It works by applying controlled suction to draw fluid from open wounds through a sealed or foam dressing, which is linked to a collection canister. This process uses sub-atmospheric pressure to create an environment that promotes faster and more effective healing (**Burhan et al ., 2022**). Negative pressure wound therapy (NPWT) has been shown to support quicker development of granulation tissue and faster re-epithelialization, while also helping to lower bacterial levels and improve oxygen supply to the wound area. Evidence from a small case series suggests that combining NPWT with skin grafting can lead to better graft adherence and more rapid healing. Other benefits include improved stabilization of skin grafts, effective removal of wound exudate, and a decreased frequency of dressing changes **(Esperón, et al., 2022).**

Mechanism of action include; Negative Pressure Wound Therapy (NPWT) facilitates wound healing by consistently applying negative pressure across the wound's surface. The therapy setup includes a foam dressing, a partially sealed barrier, and a system designed to collect wound exudate. Its effectiveness is based on four core mechanisms: the physical contraction of tissues (macrodeformation), removal of inflammatory fluid from the surrounding area, preservation of a stable wound environment, and

cellular-level tissue strain (microdeformation) **(Normandin et al., 2021).**

Benefits of negative pressure wound therapy include; Negative Pressure Wound Therapy (NPWT) offers multiple benefits, including faster healing through the ongoing removal of wound exudate and enhanced blood circulation. It helps maintain a clean and stable wound environment, thereby lowering the risk of infection. These advantages contribute to improved patient outcomes by minimizing complications and promoting quicker recovery. Additionally, NPWT proves to be cost-effective by reducing the duration of treatment and associated healthcare costs. Its user-friendly design also allows for easy integration into clinical routines, enabling nursing staff to apply the therapy with minimal difficulty (**Pacheco, 2022)**.

Indications of negative pressure wound therapy include; Patients with diabetic foot ulcers, pressure ulcers, surgical wounds, grafts and flaps, traumatic injuries, partial-thickness burns, pilonidal sinus wounds, or necrotizing fasciitis can benefit from therapies that promote faster granulation tissue development, enhance blood flow by removing excess interstitial fluid, decrease bacterial growth, and support the movement of epithelial cells (**Trujillo, et al., 2022**).

Contraindications of negative pressure wound therapy; Negative Pressure Wound Therapy (NPWT) is contraindicated for patients with cancerous wounds, untreated bone infections (osteomyelitis), or exposed critical organs. It should also be avoided in cases involving extensive necrotic tissue, bleeding disorders (coagulopathy), or patients who are hemodynamically unstable. Recent studies and clinical protocols emphasize the necessity of careful patient selection to ensure the effectiveness of NPWT while reducing potential complications (**Garcia et al., 2024**).

Negative pressure wound therapy is considered a safe approach and rarely leads to complications. Some complications of varying severity have been reported with VAC therapy, primarily due to improper technique or inappropriate patient selection. However, most of these adverse events are preventable through proper application, careful management, and vigilant monitoring. Common issues include bleeding during sponge changes caused by excessive granulation tissue, unpleasant odors, tissue necrosis at wound edges, as well as infection, toxic shock syndrome, and fluid loss **(Figueroa et al., 2020).**

Before starting NPWT, assess the wound and surrounding skin carefully. Avoid using NPWT on wounds with exposed organs, blood vessels, or nerves. Ensure the wound has sufficient granulation tissue and is free from necrosis. Premature application to necrotic tissue can worsen damage. Monitor for adverse reactions like maceration or erythema. Regular checks are crucial to prevent further deterioration and ensure proper healing (**Mustoe& McGuire, 2023)**.

Nurses are essential in managing and administering NPWT, helping to achieve the best possible patient results. Their duties include evaluating the wound, preparing and applying the negative pressure therapy device, monitoring the patient's progress, and educating patients on proper wound care (**Snyder et al., 2023**). Nurses evaluate the wound to decide if negative pressure wound therapy is suitable. This assessment includes evaluating the wound's size, depth, and general condition, as well as recognizing any contraindications like malignancy or exposed blood vessels. Conducting a detailed evaluation helps confirm the appropriateness of the therapy and reduces the risk of complications. Furthermore, nurses take into account the patient's overall health and existing medical conditions that could impact the effectiveness of the treatment (**Martin & Hughes, 2024**).

During the application of negative pressure wound therapy, nurses observe the patient for any sudden reactions or discomfort. They also evaluate the wound for infection indicators like increased redness, swelling, or fluid discharge (**Patel et al., 2023**). Nurses are responsible for frequently inspecting the NPWT system to verify it operates correctly and maintains the required pressure. Consistent monitoring enables early detection of problems and helps prevent complications. (**Reynolds et al., 2024**).

Significance of the Study

In developed countries, chronic wounds are present in about 1% to 2% of the population **(Falanga et al., 2022).** A recent systematic review reported that foot ulcers affect approximately 3% to 13% of individuals with diabetes globally. The risk of developing ulcers is higher among men and patients aged over 60 years **(McDermott et al., 2023).** The average number of cases that required to apply a negative pressure wound therapy device in the plastic surgical department at sohag university hospital from 6 to 7 cases per month , In general surgical department was 3 cases last february 2024 , In vascular surgical department was 2 cases last february 2024 and orthopedic surgical department was one case last february 2024.

Complications arising from chronic wounds contribute to increased healthcare costs and can lead to significant personal challenges that negatively impact patient outcomes. Traditional methods of

managing chronic wounds often require prompt irrigation to prevent delays in wound closure, which is considered one of the primary drawbacks associated with conventional dressing techniques **(Martino et al., 2020).**

Negative pressure wound therapy (NPWT) is commonly applied to manage both acute and chronic open wounds. In patients at high risk, initiating NPWT soon after surgery helps reduce the chances of wound dehiscence and surgical site infections (SSIs). It also decreases the formation of hematomas and seromas by lowering wound swelling and improving local blood circulation and lymphatic flow. Enhanced perfusion and oxygen delivery contribute to faster wound healing **(Vidya et al., 2023).**

Research conducted in Western countries has demonstrated the significant impact of vacuum-assisted closure (VAC) therapy in treating chronic wounds. This technique has shown promising results and is now considered a leading option in chronic wound care due to its ability to lower mortality rates and healthcare costs while improving wound closure and patient quality of life. However, within our institution, nurses had limited exposure to VAC therapy as it is a relatively new approach for wound management. As a result, further studies are necessary to evaluate the effectiveness and safety of VAC therapy in comparison to traditional wound dressing methods (**Vemulapalli et al., 2020).** Therefore, the researcher conducted this study to assess of nurses' readiness for care of patients who undertake negative pressure wound therapy.

Aim of the Study

This study aimed to: Assess nurses' readiness for care of patients who undertake negative pressure wound therapy.

Research Questions

1- What are the levels of nurses' knowledge about negative pressure wound therapy and wound healing assessment?
2- What are the levels of nurses' practice during used of negative pressure wound therapy?
3- Is there a positive correlation between nurses' knowledge levels, practice levels and their demographic characteristics?

Research Design

To achieve the study objectives, a descriptive research approach was applied.

Study Setting

This research was conducted across four surgical departments at Sohag University Hospital: Plastic, Vascular, Orthopedic, and General Surgical departments.

Plastic department consists of four rooms, each room contains five beds, Vascular department consists of four rooms, each room contains three beds, General surgical department consists of three rooms , each room contains six beds at the fourth floor in a separated building. Orthopedic department consists of four rooms, each room contains four beds at the second floor.

Sample

The study sample consisted of 100 nurses from surgical departments, selected through convenience sampling**.**

Data Collection Tools

Two tools were used for data collection.

Tool (I): A structured interview questionnaire sheet: This tool consisted of three parts

Tool (I): A structured interview questionnaire sheet: This tool was adapted from (**Sheta,2020**) and modified by the researcher based on national and international literature. It consists of three parts:

Part (I): **Demographic data sheet**: This part includes information about the nurse's age, sex, qualifications, years of experience, previous training courses about NPWT, marital status and job position.

Part (II): **Nurses' knowledge questionnaire regarding negative pressure wound therapy**: This part was adapted from (**Sheta, 2020**) and modified by the researcher. The tool was developed and validated using the most recent and relevant literature. It comprised a set of questions designed to evaluate nurses' theoretical knowledge related to negative pressure wound therapy and machine alarms. This part consisted of (15) multiple choice questions as regard definition of NPWT, mechanism of action, components, benefits, indications, contraindications, advantages, disadvantages, precautions, complications, device alarms and what refers to.

Scoring system: The knowledge questions were scored as follows: The knowledge questions were evaluated using a model answer key developed by the researcher. Each correct answer received a score of 1, while incorrect or unanswered questions were scored 0. The total knowledge score for each participant was calculated by summing the scores, with a possible range from 0 to 15 points. This total was then converted to a percentage scale from 0% to 100%. Knowledge levels were classified as follows:

- Satisfactory knowledge: scores between 70% and 100%.
- Unsatisfactory knowledge: scores below 70%.

Part (III): Nurses' practical knowledge questionnaire regarding the care of patients undertaking negative pressure wound therapy device: This part was developed by the researcher and includes (25) true or false questions. It comprised a set of questions designed to evaluate nurses' applied knowledge of negative pressure wound therapy covered nurses should ensure the NPWT device is correctly set up and functioning before beginning therapy, Nurses should avoid documenting the progress of the wound healing while the patient is undergoing NPWT, Patient education about NPWT is not a primary responsibility of the nurse, The nurse should change the NPWT dressing according to the manufacturer's guidelines and institutional policies, Nurses can adjust the negative pressure settings on the NPWT device without consulting with the physician and The nurse's role in NPWT includes ensuring that the patient is comfortable and addressing any issues related to the therapy's impact on their quality of life… etc.

Scoring system: The knowledge questions were scored as follows:

The answers to questions were assessed by use of a model answer sheet prepared previously by the researcher.

- Score (1) for the right answer.
- Score (0) for the wrong or no answer.

The total mean knowledge score calculated for each question by ranging from (0-25 points), then will be adjusted out of 100 (0% -100%) and will be graded as follows:

- Adequate knowledge from 70 % to 100%.
- Inadequate knowledge less than 70%.

Tool (II) Observational checklist: This checklist was adapted from **Taylor et al. (2015)** and modified by the researcher to evaluate nurses' practices in applying NPWT dressings. It includes 30 steps divided into three phases: pre-procedure (14 steps), intra-procedure (10 steps), and post-procedure (6 steps).

Scoring system: For each step, the score calculated as, from 0 -1. Zero means the nurse incompletely and incorrectly did the practice, and 1 means the nurse completed and correctly did the practice all item's scores were summed up and the total scores ranged from (0-30). A total score of 70% or higher was considered adequate practice, and it was inadequate practice when it was less than 70%.

Content validity

Content validity was established through consultation with three experts from Sohag University, specializing in Critical Care, Geriatric, and Medical-Surgical Nursing. These specialists assessed the knowledge questionnaire and the observational checklist related to the application of Negative Pressure Wound Therapy, evaluating them for clarity, relevance, completeness, comprehensibility, and practical utility.

Reliability of the tools

The reliability of the instruments was statistically assessed using Cronbach's Alpha, which produced a coefficient of 0.780 for the knowledge questionnaire and 0.853 for the practice checklist.

Ethical considerations

- Ethical permission for this study was granted by the Research Ethics Committee of the Faculty of Nursing at Sohag University. (IRB No. 211), dated January 19, 2025.
- Formal authorization to conduct the research was secured from the hospital administration.
- Written informed consent was obtained from all participating nurses after fully informing them of the study's objectives, procedures, and significance.
- Participants were assured of their anonymity and the confidentiality of their responses throughout the research process.
- Participation was entirely voluntary, with the right to withdraw at any time without any negative consequences.
- The privacy and dignity of all participants were respected and safeguarded during data collection.

Pilot study

A pilot study was carried out in May 2024 on 10% of the total sample (n=10) to evaluate the feasibility, clarity, applicability, and objectivity of the study instruments, and to determine the time required to complete the questionnaire. As no modifications were deemed necessary following the pilot, the ten nurses who participated were included in the final study sample.

Administrative design

Before conducting the study , an official permission was taken from the Dean of the Faculty of Nursing – Sohag University to the director of Sohag University Hospital and the head of Surgical departments , in order to obtain approval to conduct the study after explanation purpose of the study.

Data collection phase

After permission was taken from director of Sohag University Hospital and the head of Surgical departments, I sat with the head nurse and explained to him the purpose of the study then , the

researcher greeted the nurses, introduced himself, explained the study's purpose, and provided detailed information about its nature. Written consent was then obtained from each participant. Data collection was carried out by the researcher through the distribution of a self-administered questionnaire (Tool I, Part I), which took approximately 5–10 minutes to complete. Nurses' knowledge of negative pressure wound therapy was further evaluated using Tool I, Part II, requiring 15–30 minutes. Additionally, the researcher assessed nurses' practical skills in applying negative pressure wound therapy dressings using Tool II, which also required 15–30 minutes to complete. Number of interviews with nurses; three days per week
(Sunday, Tuesday and Thursday) in the morning shift from 9:11Am.

Statistical design

Following data collection, the obtained data were organized, tabulated, and statistically analyzed using IBM SPSS software, version 22. Descriptive statistics—including frequencies, percentages, means, and standard deviations—were used to summarize the data. Qualitative variables were analyzed using the Chi-square test, while Pearson's correlation coefficient was applied to examine relationships between study variables. Additionally, the results were visually represented using bar charts and pie charts. A p-value of ≤ 0.05 was considered statistically significant, while a p-value of ≤ 0.001 indicated a highly statistically significant**.**

Results

Table (1): shows that 46% of the studied nurses were aged between 20 and 30 years, with a mean age of 28.8 ± 6.05 years. Females represented 52% of the sample. Regarding experience, 32% had between 1 and 5 years of nursing practice, and none had previously attended a training course on Negative Pressure Wound Therapy (NPWT). (72%) of the studied nurses were married, and 76% held the position of staff nurse.

Figure (1) :indicates that more than two-thirds (68%) of the nurses demonstrated an unsatisfactory overall knowledge level about NPWT, whereas less than one-third (32%) achieved a satisfactory knowledge level.

Figure (2) :reveals that 80% of the nurses exhibited an adequate level of overall practice related to NPWT, while only 20% were deemed inadequate.

Table (2) :highlights a highly statistical significant relationship between nurses' total knowledge levels and their age group and educational qualifications. Additionally, years of experience and marital status were significant associated with knowledge levels. However, no significant relationship was found between knowledge level and nurses' sex or job position.

Table (3) :demonstrates a highly significant difference between nurses' total practice levels and their age, qualification, and marital status. Years of experience and job positions were also significantly related to practice levels. Conversely, sex showed no significant difference with practice level.

Table (4) :presents a statistical significant positive correlation between the total knowledge and total practice levels of the studied nurses regarding NPWT (p-value < 0.001)..

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Results

Table (1): Distribution of demographic characteristics of the study sample (N=100)

Item	N	%
Age (years)		
20-30 years	46	**46**
31-40 years	38	38
>40 years	16	16
Mean ± S.D*	**28.8 ± 6.05**	
Sex:		
Male	48	48
Female	52	**52**
Years of experience:		
<1 year	24	24
1- 5 years	32	**32**
6- 10 years	28	28
More than 10 years	16	16
Previous training course about negative pressure wound therapy		
No	100	**100**
Yes	0	0
Marital status		
Single	24	24
Married	72	**72**
Divorced	4	4
Widow	0	0
Job position		
Staff Nurse	76	**76**
Nursing supervisor	20	20
Head nurse	4	4

Figure (1): Distribution of the studied nurses according to their levels of total knowledge regarding negative pressure wound therapy (N=100).

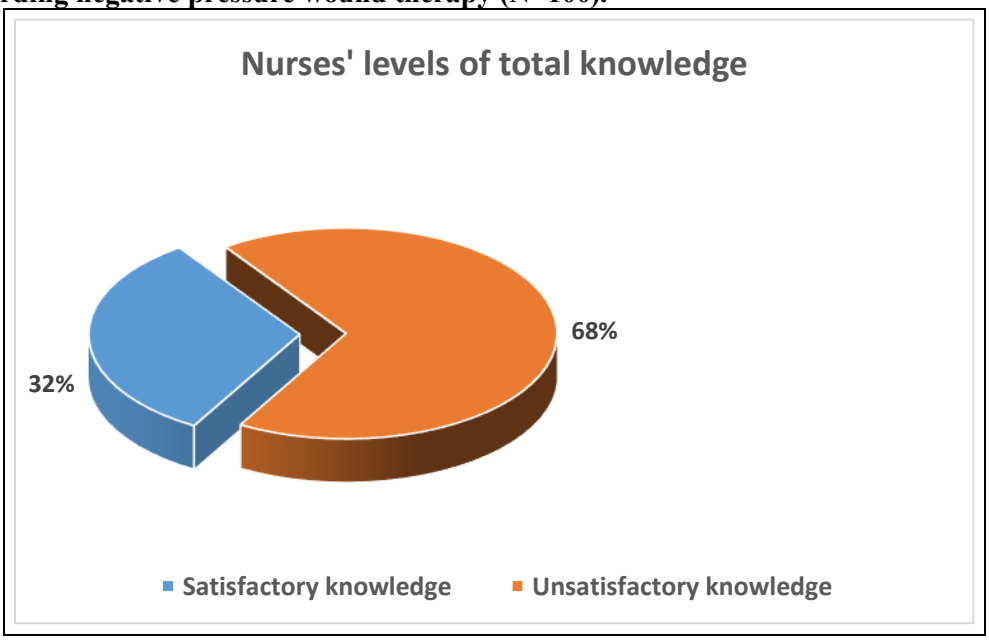

Figure (2): Distribution of the studied nurses according to their levels of total practices regarding negative pressure wound therapy (N=100).

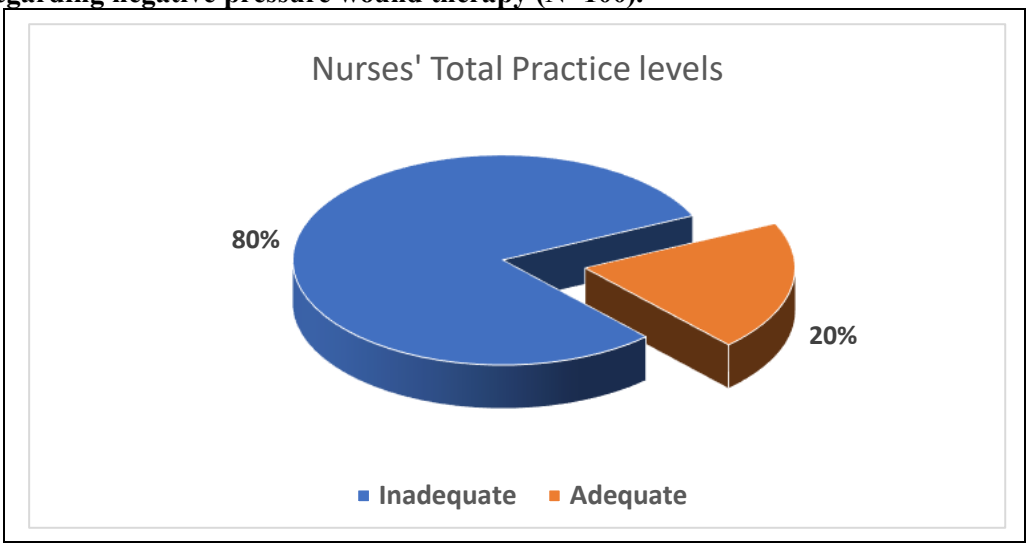

Table (2) Relationship between demographic characteristics of the nurses and their total knowledge levels (N=100)

Items	N	Total knowledge level		X^2	P-Value
		Satisfactory	Unsatisfactory		
Age (years)					
20-30 years	46	22	24	18.18	**.000****
31-40 years	38	10	28		
>40 years	16	0	16		
Sex					
Male	48	16	32	.075	.784
Female	52	16	36		
Qualification					
Diploma of secondary school of nursing	20	4	16	16.667	**.000****
Technical institute of nursing	60	28	32		
Bachelor in nursing	20	0	20		
Years of experience:					
<1 year	24	4	20	7.869	**.049***
1- 5 years	32	16	16		
6- 10 years	28	8	20		
More than 10 years	16	4	12		
Previous training course about negative pressure wound therapy:					
No	100	32	68	-----	-----
Yes	0	0	0		
Marital status					
Single	24	4	20	6.046	**.049***
Married	72	28	44		
Divorced	4	0	4		
Widow	0	0	0		
Job position					
Staff Nurse	76	28	48	4.025	.134
Nursing supervisor	20	4	16		
Head nurse	4	0	4		

X^2= Chi-square test. (*) Statistically significant at p<0.05. (**) highly statistically significant at p<0.01.

Table (3) Relationship between demographic characteristics of the nurses and their total practice levels (N=100)

Items	N	Total practice level		X^2	P-Value
		Competent	Incompetent		
Age (years)					
20-30 years	46	12	34	14.286	**.003****
31-40 years	38	8	30		
>40 years	16	0	16		
Sex					
Male	48	8	40	.641	.423
Female	52	12	40		
Qualification					
Diploma of secondary school of nursing	20	0	20	16.667	**.000****
Diploma of technical institute of nursing	60	20	40		
Bachelor in Nursing	20	0	20		
Years of experience:					
<1 year	24	0	24	8.036	**.045***
1- 5 years	32	8	24		
6- 10 years	28	8	20		
More than 10 years	16	4	12		
Previous training course about negative pressure wound therapy:					
No	100	20	80	-----	-----
Yes	0	0	0		
Marital status					
Single	24	0	24	9.722	**.008****
Married	72	20	52		
Divorced	4	0	4		
Widow	0	0	0		
Job position					
Staff Nurse	76	20	56	7.895	**.019***
Nursing supervisor	20	0	20		
Head nurse	4	0	4		

X^2= Chi-square test. (*) Statistically significant at p<0.05. (**) highly statistically significant at p<0.01.

Table (4): Correlation between total knowledge and practice levels among the studied nurses.

	Total knowledge		Total Practice	
	R	p-value	R	p-value
Total knowledge			**0.544**	**0.000***
Total Practice	**0.544**	**0.000***		

(*) Statistically significant at p<0.05. r= Pearson Correlation Coefficient.

Discussion

Regarding distribution of the studied nurses according to their characteristic (**Age of the nurses**), the present study showed that nearly half of the nurses were between 20- 30 years. This result was in agreement with **Mohamed et al., (2019)** they found more than one third of nurses were aged between 20 to 30 years old, On the other hand, this result was in disagreement with **Sabour et al., (2020)** they founded that about half of the nurses were primarily in the middle-aged group, ranging from 31 to 40 years old. From researcher point of view this may be because many nurses enter the workforce soon after completing their nursing education, which typically occurs in their early 20s.

Concerning to sex, the current study revealed that over half of the participating nurses were female and married. This finding was supported by **Sabour et al., (2020),** they mentioned that more than one half of studied nurses were females and married. Also, this

result agreed with **Jóźwiak et al., (2022)**, they revealed that more than half of nurses were females. From the researcher's perspective, this is due to nursing still being a profession largely dominated by females.

Concerning years of experience, the present study demonstrated that less than one-third of the nurses surveyed had 1-5 years. This result was in agreement with **Abd-Elghany et al., (2024)** they noted that less than one-third of the nurses included in the study had 1-5 years. Also, the result was disagreement with **Nekouei et al., (2024)** , they noted that the majority of nurses had experience from 10 to 20 years. Based on the researcher's viewpoint , this may be explained by the study setting may have employed a larger proportion of experienced nurses, possibly due to retention strategies, promotion opportunities, or preference for staff with more clinical experience.

Regarding to training program, the current study illustrated that all of studied nurses had not attending previous training program about negative pressure wound therapy. The result was in consistent with **Mohamed et al., (2019)** they indicated that none of the nurses had undergone any training courses. In the researcher's opinion, this could be due to various factors, including limited time caused by heavy workloads, which left many nurses unable to participate in educational sessions, as well as a lack of motivation to acquire new knowledge.

Regarding to job position, the present study revealed that more than three quarters of the nurses were staff nurses**.** This finding was supported with **Fernández-Araque et al., (2024)** they found more than three quarters of the studied nurses were staff nurse regarding their job position. On the other hand, this result was in disagreement with the study done by **Sheta, (2020)** founded the majority of them were staff nurse regarding their job position. From the researcher's perspective , this may be attributed to most healthcare settings, staff nurses represent the largest group within the nursing hierarchy.

As regards to distribution of the studied nurses according to their levels of total knowledge regarding negative pressure wound therapy (Fig 1) , the study highlighted that more than two-thirds of the nurses surveyed possessed an unsatisfactory overall knowledge level about negative pressure wound therapy. These results was consistent with the findings of the study conducted by **Miyanaga et al., (2023)** , they indicated that more than two-thirds of the nurses possessed an unsatisfactory overall knowledge level concerning negative pressure wound therapy. From the researcher point of view, this result might be influenced by several factors, including a shortage of nursing staff, limited time for patient care due to heavy workloads, and the fact that wound care falls within nurses' responsibilities, especially for those managing patients receiving NPWT. To provide effective wound management, nurses must possess adequate knowledge and skills to implement this advanced technique properly. The current study supports this by emphasizing that ongoing education has been shown to enhance professional conduct among nurses, improve their awareness of patient management, and elevate nursing practices across various healthcare settings. Also, this result was consistent with the findings of **Swaminathan et al., (2024)** they reported that less than one-third of nurses demonstrated an adequate overall understanding of negative pressure wound therapy. In the researcher's view, this may be attributed to several factors, including the perception among nurses that wound care is not a core nursing responsibility, the absence of specialized training programs focused on wound management, and the influence of both educational background and professional development on their level of knowledge.

Regarding distribution of the studied nurses according their levels of total practices regarding negative pressure wound therapy (**Figure 2**), this study showed that the majority of the studied nurses had inadequate level of total practice concerning negative pressure wound therapy, whereas only one fifth of them has adequate overall practice level. This result was accordance with **Abd El-Ghany & Elsharkawy, (2023)** they found that the majority of the studied nurses have inadequate level of total practice regarding negative pressure wound therapy.

Conversely, this finding contradicts **Whelan & Whittaker, (2022)** they found that half of the studied nurses have inadequate level of total practice regarding negative pressure wound therapy. According to the researcher's perspective, this could be attributed to insufficient training, limited experience, lack of knowledge, complexity of therapy, lack of institutional support, heavy workloads, and attitudinal barriers.

Regarding relationship between demographic characteristics of the nurses and their total knowledge levels (Table 2), the current study stated that, there was a highly statistical significant difference between total knowledge levels among the studied nurses and their age, and qualification. This result was in accordance with the study done by **Zaver & Kankanalum , (2023)**, they found that there were a highly statistical significant difference between total knowledge level among the studied nurses and their age group, and their qualification. Also, this result was agreement with **Tegegne et al., (2022)** they found that there were statistical significant difference between nurses' knowledge levels and their years of experiences and marital status. From the researcher point of view, this may be explained by advanced

qualifications typically involve more in-depth coursework, critical thinking skills, and clinical training, which enhance knowledge. Additionally, older or more experienced nurses tend to have higher knowledge levels due to accumulated clinical experience over time.

Conversely, there was no statistical significant difference between total knowledge levels among the studied nurses and their sex and job position. This result matching with study done by **Abd-Elghany et al. (2024)** they found that there was no statistical significant difference between total knowledge level among the studied nurses and their sex and job position. But ,there was another study conducted by **Zuniga et al., (2024)** they found that there were no statistical significant difference between total knowledge level among the studied nurses and their sex and job position. From the researcher point of view, these result may be due to both male and female nurses typically receive the same education, training, and clinical experiences, leading to similar knowledge levels. Additionally, nurses' job positions differ in responsibilities, they do not always correspond to differences in theoretical knowledge, especially if the job roles do not require advanced specialization.

Regarding relationship between demographic characteristics of the nurses and their total practice levels (Table 3), the present study showed that there was a highly statistical significant difference between total practice levels among the studied nurses and their age, qualification and marital status. This result was in agreement with the study performed by **Tseng et al ., (2022)** , they found that there was a highly statistically significant difference between total practice level among the studied nurses and their age group, qualification and marital status. Also, this result was agreement with **Anh et al ., (2024)** they found that there was a statistical significant difference between nurses' practice levels and their years of experiences and job position. From the researcher point of view, nurses with more years of experience and higher job positions typically have increased exposure to clinical situations, enhancing their skills. This practical experience contributes to a higher level of competency in their NPWT practice.

On the other hand there was no statistical significant difference between the nurses' overall practice levels and their sex. This result was in disagreement with study done by **Basuony et al ., (2023)** they revealed that no significant statistical difference between the nurses' overall practice levels and their sex . But , there was another study conducted by **Vera et al ., (2024)** , they found there was no significant statistical relationship between the overall practice levels of the participating nurses and their sex. According to the researcher's perspective, this may be because practice competency is more strongly influenced by factors like years of experience, continuing education, and hands-on exposure rather than sex.

Regarding correlation between total knowledge and practice levels among the studied nurses. (Table 4), The present study demonstrated a statistical significant and positive correlation between the overall knowledge and practice levels of the nurses concerning negative pressure wound therapy .This result was in accordance with the study done by **Haidari et al. (2021)** , they found that there was a statistical significant and positive correlation between the studied nurses' total knowledge and total practice scores regarding negative pressure wound therapy. From the researcher point of view, this may be because clinical practice, especially in specialized procedures like NPWT, depends heavily on accurate theoretical knowledge. Additionally, when nurses understand what they are doing and why, they tend to be more confident, efficient and proactive in their clinical actions.

Conclusion

Based on the finding of this study, it was concluded that, more than two thirds of the studied nurses had unsatisfactory level of total knowledge regarding negative pressure wound therapy and four fifth of the nurses demonstrated an inadequate overall practical skills related to this therapy and only one fifth were found to have an adequate level of practice. In addition, the study found highly statistical significant difference in the overall practice levels of the nurses based on their age, qualification, and marital status. Practice levels also varied significantly according to the nurses' years of experience and job position. While, no significant statistical difference was observed between overall practice levels and sex of the participants.

Recommendations

***Based on the findings of the present study, the following recommendations are proposed*:**

Recommendations for Nurses:

1- Organize regular in-service training sessions to enhance the knowledge and clinical skills of nursing staff concerning negative pressure wound therapy (NPWT).
2- Encourage educational activities directly on the ward, including hands-on demonstrations and interactive workshops, to strengthen learning in a practical environment.
3- Ensure the availability of educational materials, including booklets with color images, to support nurses in understanding NPWT procedures.

4- Encourage nurses to engage in continuous learning by providing dedicated time and motivation to update their knowledge and competencies.

Recommendations for Patients:

Educate Patients on NPWT and Wound Care Provide patients with simple, illustrated educational materials and verbal instructions on how to care for their NPWT devices at home, monitor for complications, and maintain hygiene to prevent infection.

Recommendations for Research:

- Replication of the study with large group of nurses for generalization of results.

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