

Effect of Educational Program on Nurses' Knowledge and Practice Regarding Negative Pressure Wound Therapy among Patients with Acute and Chronic Wounds

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Abstract

Background: Negative pressure wound therapy (NPWT) is new strategy for wound management that can be helpful to accelerate wound healing in both acute and chronic wounds. The application of NPWT dressing requires an understanding of how the therapy works and training in the use of device. Staff responsible for dressing changes should have the appropriate knowledge and practice to ensure optimum wound care. **The aim of this study:** To evaluate effect of educational program on nurses' knowledge and practice regarding negative pressure wound therapy among patients with acute and chronic Wounds. **Research design:** A quasi-experimental research design was utilized to conduct the current study. **Setting:** The current study was conducted in general surgery department at Zagaziguniversity hospital. **Subjects:** Purposive sample of 60 nurses were included in this study. **Tools of data collection:** Two main tools were used; Tool I-A structured interviewing questionnaire: consisted of 2 parts to assess: 1) Demographic characteristics of nurses staff. 2) Nurses' knowledge about NPWT. Tool II -Observational checklist to assess nurses' practice for applying NPWT dressing. **Results:** Knowledge and practice levels were found to differ significantly in relation to years of experience. There was a highly statistically significant difference in nurses' practice between pre, post and after 3 months following educational program regarding to NPWT among patients with acute and chronic wounds. There were statistically significant relations between levels of knowledge and practice Pre, post and after 3 months following educational program. **Conclusion:** Nurses' knowledge regarding to NPWT among patients with acute and chronic wounds showed obvious improvement and good practice after educational program. **Recommendations:** Setup a project that aims to improve nurses' performance by implementing evidence based practice. Provision of guidance to staff nurses' caring for patients who receiving NPWT to correct poor practices in the use of device and understanding of how the therapy works to ensure optimum wound management.

Keywords: Educational Program, Negative pressure wound therapy, Nurses' Knowledge and Practice.

Date of Submission: 08-04-2020

Date of Acceptance: 23-04-2020

I. Introduction

Negative pressure wound therapy (NPWT), refers to wound dressing systems that continuously or intermittently apply subatmospheric pressure to the surface of a wound (Gombert et al., 2018). Negative pressure wound therapy is a widely utilized treatment for many different wound types and has become noninvasive modality in wound management (Sabouret et al., 2017) and (Mohamed et al., 2019). Wound healing in both acute and chronic wounds can be an uncomfortable and painful process that may lead to impaired quality of life, infection, hospitalization, amputation, and even death of the patient (Webster et al., 2019). The treatment of large wounds remains a significant challenge to practitioners (Nagaraj et al., 2015). Negative pressure wound therapy is very fast developing method of the wounds treatment (Mohamed et al., 2019).

Negative pressure wound therapy has been described as the preferred method of wound management as infected sternotomy wounds, degloving injuries, soft tissue injuries, open fractures of lower extremities, and diabetic foot ulcers due to its ability to reduce healing time, help in prevention of infection and being cost-effective (Webster et al., 2019). Utilizing NPWT can be recommended in wide spectrum of wound management to accelerate wound healing in chronic, acute and complex wounds. The technique includes negative pressure and an airtight wound and the suction force created by the NPWT equipment that helps to drain excess fluid leading to the removal of edema and bacterial count reduction, thus promoting granulation tissue formation as well as affecting blood flow and perfusion in the wound to enhance the healing process (Ibrahim, 2013) and (Mohamed et al., 2019). Wound care is the duty of nursing and nurses' responsibilities for caring patients with

NPWT; thus nurses need to enhance their level of knowledge and skills about how to apply this new modality to ensure optimum wound care (Sabouret et al., 2017).

Significance of the study

Wound healing does not always follow a simple path; some acute wounds fail to heal and some become chronic and fail in the treatment of large wounds is associated with numerous comorbid conditions, often have prolonged hospitalizations, which may be marked by many complications and is related to earlier death, Wound healing in acute, chronic and complex wounds, is a major significant insult they are remains a challenge to wound care professionals and consume a great deal of healthcare resources around the globe and substantial healthcare burden in Egypt (Mohamed et al., 2019). Negative pressure wound therapy (NPWT) can be used to aid healing in acute, chronic, closed incisional, closed skin graft, open abdomen wounds and is a widely utilized treatment for many different wound types, therefore requiring the integration of knowledge and skills from numerous different specialties in nursing. Current literature and best nursing practice recommended to apply NPWT have likely to reduce hospital stay and enhance the healing process, thus achieving cost savings (Dingemans et al., 2019).

Aim of the study

The current study aimed to evaluate the effect of educational program on nurses' knowledge and practice regarding negative pressure wound therapy among patients with acute and chronic wounds.

Research hypothesis:

The nurses' knowledge and practice will be improved positively after the implementation of educational program regarding negative pressure wound therapy among patients with acute and chronic wounds.

II. Subjects and Methods

Research design:

Quasi-experimental research design was utilized to meet the aim of this study.

Study setting:

This study was carried out in the general surgery department at Zagazig University Hospitals

Subjects:

The sample comprised of sixty nurses who were working in the above mentioned setting, according to the following criteria:

Inclusion criteria:

- 1- Nurses' qualifications (diploma or diploma with specialty and baccalaureates degree).
- 2- Nurses not less than a year general surgery experience.
- 3- Both male and female.
- 4- Nurses working at general surgery department and have the ultimate responsibility and accountability for patients applying negative pressure wound therapy.
- 5- Nurses who accepted to participate in the study.

Data Collection Tools:

Two tools were used to collect study data:

Tool I- A structured interviewing questionnaire, developed by the researcher after reviewing recent relevant literatures and scientific references. It was based on (Kwon et al., 2019; Webster et al., 2019; Svensson et al., 2019) and (Mohamed et al., 2019). It included two parts to cover the following data:

Part (1): Demographic Data Sheet: It consisted of characteristics of studied nurses to collect baseline data which included five items: age, sex, qualification, years of experience and previous participation in training program on NPWT.

Part (2): Nurses' knowledge questionnaire: It was devoted to assess nurses' knowledge regarding negative pressure wound therapy. This part consisted of 36 questions: 11 multiple choice questions and 25 true or false questions as regard definition of NPWT, advantages, disadvantages, precautions, complications, device alarms and what it indicates.

Knowledge scoring system: for each question the score was graded as (1) for correct answer and (zero) mark for wrong answer. Total knowledge score presented in three categories as, Good knowledge nurses have a score of 27-36 (>75%), average knowledge nurses have a score of 18-26 (50 – 75%), and poor knowledge nurses with a score of <18 (<50%).

Tool II: Observational checklist to assess nurses' practice for applying negative pressure wound therapy, It was based on (Taylor et al., 2015), which consist of 23 steps of applying negative pressure wound dressing namely, review medical order, hand washing, preparing equipment's, identifying the patient, keep patient privacy and explaining the procedure, assessment patient need for analgesics, good positioning, using sterile technique, using personal protective equipment, removing previous dressing, cleansing and assessment and measurement of the wound, wiping pre wound, cutting and foam placement, trimming of dressing drape, application of therapeutic regulated accurate care pad, assessing sealing of the drape, labeling of the drape, checking of the drape, patient education during therapy and all nursing documentation as regard to negative pressure wound therapy.

Practicescoring system: For each step the score were calculated as, from 0-2. zero means the nurse not done the practice, 1 means the nurses incorrectly done the practice and 2 means the nurses correctly done the practice all items scores were summed up and the total scores was ranged from (0-26). The scoring system was categorized as follow: **a)** Satisfactory nursing practice from 75% to 100% (from 19 to 26) and **b)** Unsatisfactory nursing practice less than 75% (less than 19).

III. Method:

Ethical Consideration

Nurses' approval was taken by explaining the aim and benefits of the study as well as the procedure of data collection to all participants clearly. The participants were informed that their participation is optional, and that they have the right to withdraw at any time without any consequences. Then, Verbal consent was obtained from each nurse enrolled into the study. The researcher assured maintaining anonymity and confidentiality of data.

Pilot study:

A pilot study was conducted on 10% of total study sample (6 nurses) recruited to test the clarity and applicability of the tool and the necessary modification was done prior to data collection. Nurses who participated in the pilot study were included in the main study sample.

Field of work:

Sampling and data collection were started and completed during the period from the beginning of September 2019 to the end of February 2020. The study was conducted through the following four phases:

Phase I: Preparatory and planning phase:

In the planning stage, approval was obtained from the head of general surgery department at Zagazig University Hospitals, and by the submission of a formal letter from the Faculty of Nursing, Benha University. Meeting and discussion was held between the researcher and the nursing administration to make them aware about aims and objectives of the study, as well as, to get better cooperation during the implementation phase of the study. Based on the information obtained from pilot study, in addition to the recent related literatures, the researcher designed an educational program. Its main aim was to improve knowledge and practices among nurses regarding negative pressure wound therapy.

Phase II: Prior educational program implementation (Pre-test phase):

This phase was followed by collecting baseline data, the study sample was recruited according to the set criteria. Pre- test questionnaire was administered to the study sample to examine their actual level of knowledge and practices regarding negative pressure wound therapy. The researcher interviewed the nurses and took the consent of them to be recruited in the study after explaining the aim of the study, and then distributed the questionnaire sheet after clear explaining the way to fill out. The researcher used tool 1, and tool 2 in this phase.

Phase III: Program implementation phase:

- The researcher was available in the morning shift at the clinical field for three days / week by rotation.
- The appointment for starting educational sessions was scheduled with the nurses according to their circumstances.
- The nurses were divided into six groups each group consists of 10 nurses, considering time table for their circumstances.
- The program was conducted with three sessions; (1 session /week), the duration of each session took about 30- 45 minute for each group regarding knowledge and demonstrate the practice related to negative pressure wound therapy.

- Each educational session was guided by simple written instructions, and then orientation about objectives outline and expected outcomes was done.
- Different teaching and learning methods were used during the sessions which included; interactive lectures, group discussion, instructional media include: data show, posters, pictures, printed handout and video programs. Which was presented in clear and concise form to be used as memorial reference.
- The researcher offered the booklet for every nurse and showed a video for demonstration and re-demonstration.
- Nurses were allowed to ask questions, explanation, or elaboration in case of misunderstanding.

Phase IV: Program evaluation phase:

At the end of the educational program implementation evaluation was done to assess nurses' knowledge and practice regarding negative pressure wound therapy, by using the same data collection tools, and comparing the results of the data collected to the pretest results to evaluate the effectiveness of the educational program.

Statistical analysis:

The collected data were tabulated and analyzed using Statistical Package of Social Science (SPSS) version (20). A variety of statistical methods were used to analyze the data in this study as Qualitative variables were presented as number and percentage distribution., Quantitative variables were presented as Mean and standard deviation were used to estimate the statistical significance difference. Statistical significance was considered at: P- Value > 0.05 insignificant- Value < 0.05 significant, P- Value < 0.001 highly significant.

III. Results

Table (1) reveals that, more than half of the nurses (51.7 %) at the age between 25 -30 years old with mean age 58.49 ± 9.53 ; the majority of them (85%) were females; half of the nurses (50%) carrying technical institute. As regard their years of experience it was found that more than half of the nurses (58.3%) were 5 to 10 years. The majority of studied nurses (85%) did not participate in any previous training program.

Table (2) illustrates that, there were highly significant differences between pre and post program implementation in relation to total mean score of nurses' knowledge regarding negative pressure wound therapy and nurses' knowledge was improved significantly post program implementation ($P < 0.001$).

Table (3): shows that, there were highly significant differences between pre and post program implementation in relation to total mean score of nurses' practices regarding to negative pressure wound therapy and nurses' practices was improved significantly post program implementation ($P < 0.001$).

Table (4): displays that, the majority of studied nurses (86.7%) had good knowledge regarding negative pressure wound therapy and there was obvious improvement in the percentage of good knowledge post program.

Table (5): demonstrates that, nurses' practices regarding negative pressure wound therapy through observational checklist it revealed that the majority of studied nurses (88.3%) had satisfactory practice and the practice level improved post educational program.

Table (6): indicates that, there was highly statistically significant relation between total nurses' knowledge score and practices level regarding negative pressure wound therapy pre and post program implementation, this means that when knowledge increased, the satisfactory nursing practice increased.

Table (1): Number and percentage distribution of demographic variables among nurses under study (n=60).

Demographic variables	Study group N=(60)	
	Number (N)	Percentage (%)
Age (years)		
< 25	10	16.7
25-30	31	51.7
≥ 30	19	31.7
Mean \pm SD	58.49\pm9.53	
Sex		
Male	9	15.0
Female	51	85.0
Qualification		
Diploma in Nursing	32	53.3
Technical Institute of Nursing	14	23.3
Bachelor in Nursing (B.Sc. degree)	9	15.0
B.Sc. Plus higher education	5	8.3
Years of experience:		
2<5 years	10	16.7
5 – 10 years	35	58.3
>10 years	15	25.0

Attending previous training program		
Yes	9	15.0
No	51	85.0

Table (2):Mean score of nurses' knowledge regarding negative pressure wound therapy pre and post implementation of educational program (n=60).

Nurses' knowledge	Study group N=(60)			
	Pre-program Mean ± SD	Post-program Mean ± SD	Paired-t test	p-value
Definition of NPWT	0.75 ± 0.70	1.77 ± 1.17	5.64	<0.001
Advantages of NPWT	0.98 ± 0.79	2.40 ± 1.39	6.61	<0.001
Disadvantages of NPWT	0.73 ± 0.76	2.22 ± 0.98	8.87	<0.001
precautions when use NPWT	0.55 ± 0.59	1.38 ± 0.74	7.13	<0.001
Complications of NPWT	0.68 ± 0.65	1.40 ± 0.83	5.02	<0.001
Indications for using NPWT	4.62 ± 2.08	11.32 ± 4.03	12.81	<0.001
Device alarms	1.27 ± 1.05	3.32 ± 1.78	8.36	<0.001
Total knowledge score	15.85 ± 6.53	37.10 ± 16.09	21.01	<0.001

N.B. For all statistical tests done; P value > 0.05 insignificant, P value P ≤ 0 .05 significant, and P value <0.001 highly significant.

Table (3):Mean score of nurses' practices regarding to negative pressure wound therapy pre and post program implementation (n=60).

Nurses' Practices	Study group N=(60)			
	Pre-program Mean ± SD	Post-program Mean ± SD	Paired-t test	p-value
Review medical order	1.25 ± 0.93	3.700 ± 1.51	11.64	<0.001
Hand washing	0.900 ± 1.07	2.95 ± 1.19	9.93	<0.001
Preparing equipment's	1.27 ± 1.05	3.32 ± 1.78	8.36	<0.001
Identifying the patient	1.23 ± 0.91	3.60 ± 1.68	11.62	<0.001
Keep patient privacy	0.75 ± 0.70	1.77 ± 1.17	5.64	<0.001
Explaining the procedure	5.40 ± 1.68	9.07 ± 0.95	14.55	<0.001
Assessment patient need for analgesics	0.48 ± 0.65	1.40 ± 0.83	6.01	<0.001
Good positioning	0.900 ± 0.82	2.12 ± 1.04	7.09	<0.001
Using sterile technique	1.12 ± 0.75	2.62 ± 1.10	8.48	<0.001
Using personal protective equipment	0.76 ± 0.66	2.02 ± 1.11	5.71	<0.001
Removing previous dressing	0.55 ± 0.59	1.38 ± 0.74	7.13	<0.001
Assessment the wound	1.32 ± 0.99	3.38 ± 1.69	8.72	<0.001
Cleansing the wound	4.82 ± 0.97	9.14 ± 1.22	23.33	<0.001
Measurement of the wound	0.71 ± 0.74	2.22 ± 0.97	8.86	<0.001
Wiping pre wound	0.80 ± 0.72	1.12 ± 1.02	6.08	<0.001
Cutting and foam placement	0.77 ± 0.78	2.71 ± 1.42	9.37	<0.001
Trimming of dressing drape	0.63 ± 0.65	1.21 ± 0.88	7.86	<0.001
Application of therapeutic regulated accurate care pad	10.18 ± 2.23	19.03 ± 2.31	26.81	<0.001
Assessing sealing of the drape	7.15 ± 1.67	9.77 ± 2.93	6.07	<0.001
Labeling of the drape	0.33 ± 0.55	1.33 ± 0.72	5.52	<0.001
Checking of the drape	0.52 ± 0.57	1.36 ± 0.73	6.12	<0.001
Patient education during therapy	0.64 ± 0.60	1.07 ± 1.03	5.62	<0.001
Nursing documentation for all items as regard to NPWT	0.42 ± 0.64	1.32 ± 0.81	6.61	<0.001
Total practice score	19.85 ± 7.58	49.17 ± 18.09	28.09	<0.001

N.B. For all statistical tests done; P value > 0.05 insignificant, P value P ≤ 0 .05 significant, and P value <0.001 highly significant.

Table (4):Number and percentage distribution of nurses' total knowledge score regarding negative pressure wound therapy pre and post program implementation (n=60).

Nurses' knowledge	Pre-program N=(60)		Post-program N=(60)	
	(N)	(%)	(N)	(%)
Poor	49	81.7	5	8.3
Average	5	8.3	3	5.0
Good	6	10	52	86.7

Table (5):Number and percentagedistribution of nurses’ practices level regarding negative pressure wound therapy pre and post program implementation (n=60).

Nurses' practices	Pre-program N=(60)		Post-program N=(60)	
	(N)	(%)	(N)	(%)
unsatisfactory	54	90	7	11.7
satisfactory	6	10	53	88.3

Table (6):Relationship between total nurses’ knowledge score and practices level regarding negative pressure wound therapy pre and post program implementation (n=60).

Variables	Score	Study group N=(60)			
		Pre-program Mean ± SD	Post-program Mean ± SD	Independent t- test	p-value
Total knowledge	Poor	63.47 ± 7.18	109.80 ± 3.44	40.17	<0.001**
	Average	64.01 ± 4.97	111.81 ± 3.48		
	Good	68.69 ± 9.89	117.89 ± 2.69		
Total practice	unsatisfactory	64.63 ± 7.28	108.72 ± 5.26	4.04	<0.001**
	satisfactory	64.10 ± 4.72	115.49 ± 3.65		

** *Highly statistically significant difference (P < 0.001).*

IV. Discussion

Patients with problematic wounds constitute a significant workload burden for health care organizations and improper wound care can lead to impaired quality of life, infection, hospitalization, amputation, and even death of the patient **Webster et al.,(2019)**. So, managing and treating chronic wounds, remains a challenge because of the multitude of factors and wound types. Therefore; negative pressure wound therapy (NPWT) has become a useful option in the management of different wounds **Ban et al.,(2017)**. It can be applied with effectiveness to treat acute, chronic and complex wounds, and several studies have shown it to be more effective than traditional moist therapy in terms of healing and rate of wound closure **Nagarajet al.,(2015)**. So, the current study aimed to evaluate the effect of educational program on nurses' knowledge and practice regarding negative pressure wound therapy among patients with acute and chronic wounds. This discussion of the results will be presented in four sections; First section concerned with the demographic variables among nurses under study. The second section will highlight the nurses’ knowledge regarding negative pressure wound therapy pre and post program implementation. Third section concerned with nurses’ practices regarding negative pressure wound therapy pre and post program implementation. Fourth section illustrates relationship between total nurses’ knowledge score and practices level regarding negative pressure wound therapy pre and post program implementation.

I- Demographic variables among nurses under study:

The current study showed that, more than half of the nurses at the age between 25 -30 years old, this finding was in accordance with **Mohamed et al.,(2019)** who illustrated that that around one half of nurses were aged between 20 to 30 years old, this disagrees with **Sabouret et al.,(2017)** who reported that, around half of nurses were mostly in the middle age between 31 to 40. Concerning sex, it was found that the majority of studied nurses were females. From the researcher point of view, this could be explained in light of the known fact that the majority of females in Egypt and the nature of nursing profession is a job for females, this findings supported by **Sabouret et al.,(2017)** who mentioned that the majority of the nurses are females. The result also comes in agree with **Mohamed et al.,(2019)** whose study results revealed that all participants were females. As regards to their qualification the present study revealed that, more than half of the nurses had diploma in nursing while only (15% and 8.3%) respectively were bachelor degree and bachelor degree plus higher education in nursing, this result is in line with **Mohamed et al.,(2019)** who found that, around one half of the sample had nursing diploma while only 10% were bachelor degree in nursing. This means that majority of nurses dealing with wound and in contact with patient are diploma nurses. This finding in contrast with **Ibrahim(2013) and Brouwers et al.,(2018)** whose study results mentioned that around half of the nurses were holding bachelor degree. In relation to nurses' years of experience, the result of the current study showed that, more than half of the nurses were from 5-10 years. The result comes in incongruent with **Mohamed et al.,(2019)** who noted in their study that, the majority of nurses had experience from 10-20 years. Regarding training program, the present study revealed that the majority of nurses had no training program. From the researcher point of view this attributed to several factors such as, lack of time due to natural workload in their workplace as the numbers of nurses did not had enough time to attend any educational sessions and lack of motivation to gain new knowledge. The result comes in consistent

with **Mohamed et al., (2019)** who reported that, most of nurses did not receive a training course. Furthermore, **Australian Wound Management Association (2015)** mentioned that patients with different wound types require complex assessment, interventions and continuous nursing vigilance, so the nurse must be supplied with the best and newest technology, skills and experiences through the continuous training program. So, it's important to create a comprehensive wound care program that teaches nurses how to address, Managing different wounds and ways to best identify changes in the wound healing process.

II) Nurses' knowledge regarding negative pressure wound therapy pre and post program implementation:

In relation to nurses' knowledge regarding negative pressure wound therapy the current study illustrates that, there were highly statistical significant difference between pre and post program implementation in relation to total mean score of nurses' knowledge and nurses' knowledge was improved significantly post program implementation. These results come in agree with **Mohamed et al., (2019)** whose study results revealed that more than a third of nurses had inadequate knowledge related to negative pressure wound therapy; education programs may have a positive effect on imparting knowledge of the nurses. Also, this finding was in agreement with **Ibrahim (2013)** who found that the nurses had inadequate knowledge about negative pressure wound therapy before implementing the educational program. In addition, **Sabouret al., (2017)** demonstrates that nurses had inadequate awareness about nursing rules. Additionally, this may be related with fact that wound dressing is done generally by the clinicians' staff other than nurses. From the researcher point of view this related to some factors as; nurses didn't consider wound care as nursing role, lack of specialized training program about wound care and nurses' knowledge was affected by professional training and education.

III) Nurses' practices regarding to negative pressure wound therapy pre and post program implementation:

As regarding to nurses' practice related to negative pressure wound therapy, the present study showed that the total practices scores was improved significantly post program implementation, this attributed to modernity of the NPWT dressing application in the department, dressing application were done by only physicians. Nurses were not attended any training programs about negative pressure wound therapy. This is confirmed with **Mohamed et al., (2019)** whose study results illustrated that, there was an enhancement of nurses' practices about NPWT after providing an education program. Also, these findings are supported by **Anderson et al., (2018)** who concluded that continuous in-service training program for nurses is considered very important concern that help the professional nurse to know the new in the nursing science which enhance nursing practice. Also, this finding was in accordance with **Carville (2017)** who reinforced that the educational programs have a duty to offer the nursing staff with the essential behavioral skills basic to efficient work practice.

IV) Relationship between total nurses' knowledge score and practices level regarding to negative pressure wound therapy pre and post program implementation:

The study revealed that, there was highly statistically significant relation between total nurses' knowledge score and practices level regarding negative pressure wound therapy pre and post program implementation, this means that when knowledge increased, the competent nursing practice increased. The result comes in consistent with **Ibrahim (2013) and Mohamed et al. (2019)** whose study result emphasized on that progress in the total practice score of nurses after the program's application with statistical significant difference between before and after the program's application. Also, these results agree with **Hussein and Ali (2015)** who illustrated that empowering education is a model designed for in-service training for nurses that advisable to match the training programs according to educational needs related to practical skills for nursing staff. The empowering education assisted nurses for completing the professional tasks competently and correctly. Also, the above findings comes in the same line with **Acosta et al., (2017) and Kwon et al. (2018)** whose study results stated that technical skills can not be separated from intellectual and interpersonal skills. Intellectual skills related to technical skills include the nurses' knowledge of the principles and steps of the procedure. Additionally, every practicing nurse needs to acquire theoretical and technical information which is necessary to develop her skills in clinical practice. From the researcher point of view this result might be clarified by the fact that, these differences in level of practice among staff may be related to several factors such as, the nursing staff shortage, inadequate time of patients care due to natural workload, and as wound care is the nursing duty and nurses are responsible for patients with NPWT. Nurses need a particular level of knowledge and skills about how to apply this new modality to ensure optimum wound care, so the present study reinforced this by stressing that the continuous education was proved to raise the professional behavior of the nursing staff and increase the patient management awareness and nursing practice at different care settings.

V. Conclusion

The current study concluded that, implementation of health education program has a positive effect on improvement of the nurses' knowledge and practices level regarding negative pressure wound therapy post program implementation compared to preprogram implementation. These results achieved the research hypothesis.

VI. Recommendations

The current study recommended that emphasize the importance of implementation of a continuous in-service educational program regarding negative pressure wound therapy for nurses as an essential part on outcomes of patients with acute, chronic and complex wounds, to replace the traditional moist therapy in terms of healing and rate of wound closure. Wound care manager should motivate and encourage nurses for self-learning ward-based education through demonstrations and workshops rather than lectures only. This will help close the gap between theory and practice in wound care performance. Further study with replication of the current study on a larger sample is recommended to achieve wider utilization of the designed educational program for better quality of care.

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Hala Abd El-Salam Sheta. "Effect of Educational Program on Nurses' Knowledge and Practice Regarding Negative Pressure Wound Therapy among Patients with Acute and Chronic Wounds." *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*, 9(2), 2020, pp. 55-62