Journal of Natural Sciences Research www.iiste.org
ISSN 2224-3186 (Paper) ISSN 2225-0921 (Online)
Vol.4, No.4, 2014

Impact of A Designed Skin Care Bundle Protocol on Nurse's Knowledge, Practices and on Patients Outcomes at Intensive Care Unit

*Amal Said Taha
Lecturer of medical surgical nursing,Faculty of Nursing, Benha University
* E-mail of the corresponding author: Amal.said22@yahoo.com

ABSTRACT

Pressure ulcers can affect patients in every healthcare setting and are seen in all age groups. Not only are they costly in terms of patients' quality of life, but they also place a huge drain on health service resources.Presure ulcers represent a major problem both for affected patients and for the nurses who care for these patients. The present study ***aimed to*** *examine the impact of a designed skin care bundle protocol on nurse's knowledge, practices and on patients outcomes at both Benha university and Benha teaching hospital.Quasi experimental research* ***design*** *was adopted to conduct the study on (60)* ***nurses*** *working in the intensive care units at both Benha university and Benha teaching hospital, in addition to 60 patients admitted to these units were included in the current study. The study subjects were randomly assigned into two equally homogeneous groups (control and study) (30 subjects each).****Three tools*** *were used for data collection: knowledge questionnaire sheet, observational checklist and patient assessment sheet that include Scio demographic data related to patients, Braden scale and designed skin care bundle sheet.* ***Results:*** *All research hypothesis were supported , the present study revealed that (a) The mean total and subtotal knowledge scores of nurses were increased immediately after implementation of a designed skin care bundle protocol with statistical significant difference compared to pre implementation. (b) The mean total and subtotal practice scores of nurses were higher immediately after a designed skin care bundle protocol with a high statistical significant difference compared to pre implementation.(c) There were a positive correlation between nurses knowledge and practices with a high statistical significant difference.(d)There were a positive patients outcomes as evidence by less incidence of pressure ulcers among study group compared by control group subjects.* ***Conclusion:*** *The designed skin care bundle protocol could be beneficial in improving the knowledge and the practices of the critical care nurses working in critical care unit as well on patient's outcome in relation to prevention of pressure ulcer at the intensive care unit.* ***Recommendations:*** *The present study emphasized on empowering staff nurses to provide skin care bundle protocol and identifying risk assessment. As well, planning staff development programs based on staff,organization,and patient needs.*

Key words: Impact**,** designed, skin care bundle, protocol, knowledge, practices, outcomes.

1.Introduction:

Pressure Ulcers are also known as 'pressure sores, bed sores and decubitus ulcers'. A pressure ulcer is localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear and/or friction. Because muscle and subcutaneous tissue are more susceptible to pressure-induced injury than skin, pressure ulcers are often worse than their initial appearance. Pressure ulcers are then staged according to the European Pressure

Ulcer Advisory Panel (EPUAP) to guide clinical description of the depth of observable tissue destruction ***(European Pressure Ulcer Advisory Panel (EPUAP), 2010).***Unrelieved interface pressure can lead to decrease in capillary blood flow or occlusion of blood vessels. This can decrease tissue oxygenation, thus leading to tissue ischemia and eventually tissue necrosis and breakdown ***(Benbow, 2008).***The most common sites include the buttocks, hips and heels but they can occur over any bony prominence ***(Stephen-Haynes 2006).***

Pressure ulcers represent a very common complication in patients receiving abed ridden care. pressure ulcers, regardless of their origin, represent negative outcomes for patients including pain, longer hospital stays, intensive nursing and medical care, additional treatment and a financial burden to the health care system.Moreover,infection,dehydration,anaemia,electrolyte imbalance and malnutrition often complicate pressure ulcers. Infection may be manifested by generalized sepsis and carries substantial mortality ***(Ibrahim,2007).***

Most of pressure ulcers can be prevented through identification of patients at risk and application of appropriate preventive measures.Management of pressure ulcer has been directed towards expensive measures like special beds and special mattresses.These measurements are not appropriate especially in developing countries.Simple guidelines that involve shifts in body position,cushions for bony prominences, and frequent turning, all of which reduce compression and pressure on vulnerable parts have proved to reduce pressure ulcers in Intensive Care Unit(ICU) ***(Vollman, 2006).***

Skin care bundle is a set of straightforward practices—simple interventions that when combined, lead to positive patient outcomes. Components of this bundle include "S" (support surface), "K" (keep turning every two hours),

"I" (improve moisture management/incontinence management), and "N" (nutrition consultation).The other typical elements of a bundle include bed elevation and pressure relief. Manage incontinence and moisture with a skin-care regimen, such as frequent cleansing and use of a moisture-barrier ointment. Clean the incontinent patient immediately and apply Zinc Oxide after every incontinence episode. Together, these simple interventions can yield great results ***(Paciella,2009)*.**

For the bundle concept to work, the educational rollout, reinforcement, and culture change are mandatory. All nursing staff, including nursing assistants, should be included in the educational effort. As nurses, this is our opportunity to make an impact and show the quality of the care we provide. Once everyone has been educated about the bundle concept and elements, compliance with these elements must be audited. Ideally, nursing staff should go from patient to patient to see which bundle elements are being completed and which ones may require staff reeducation. Then staff can educate peers on the findings. Audit results also may show areas where improvements should be made and may identify other educational deficiencies that must be corrected to achieve positive patient outcomes ***(Baldelli and Paciella,2008)*.**

2.Significance of the study:

Chronic wounds represent a serious threat to patients' quality of life, and a loss of income. An estimated 2 million adult workdays are lost each year because of chronic ulcers. The cost to manage these ulcers is excessive. Although the direct cost to heal pressure ulcers is elusive, the U.S.A. national cost is estimated at between $1.68 billion and $ 6.8 billion annually. Despite implementation of evidence-based pressure ulcer (PU) prevention protocols, patients continue to suffer from these injuries. The total number of hospitalizations with a secondary diagnosis of PU in the United States increased by 80% between 2006 and in 2009, the incidence of facility acquired PUs was determined to be 5% on the basis of assessments of more than 92,000 patients *(Fogerty, et al,2008).*

Based on a previous study by *Taha (2013)* who studied " nurses knowledge and practices related to pressure ulcer at intensive care unit" at both Benha university and Benha teaching hospital. Reported that more than two thirds(70%) of the studied sample had unsatisfactory knowledge level and two thirds(67%) of the studied sample had unsatisfactory practice level related to pressure ulcer prevention and management and the nurses' knowledge was correlated with their practice ($r = 0.7846$, $p < 0.001$) regarding pressure ulcer.

Also, the medical records of the study hospitals have no statistical data related to early detection and management of patients suffering from ICU pressure sores; some of these problems are; absence of assessment tool, and subsequently pressure ulcer is treated inappropriately or even neglected. This situation boosts the potential for substantial increases in morbidity and mortality. That is why there is interest to conduct such type of research which might safeguard this category of patients against these serious complications. In addition scattered researches where done in this area especially on national level. Furthermore, this research could provide health professionals with an in depth understanding related to this category of patients holistic care which could be reflected positively on the quality of patients outcomes. Also it is hoped that findings of this study might help in improving quality of patient care and establish evidence based data that can promote nursing practice and research.

3-Aim of the study:

The aim of the current study is to examine the impact of a designed skin care bundle protocol on nurse's knowledge, practices and on patients outcomes at both Benha university and Benha teaching hospital.

4-Research Hypothesis:

4.1: The post mean knowledge scores of critical care nurses who are exposed to a designed skin care bundle protocol will be higher than their pre knowledge mean scores.

4.2: The post mean practice scores of critical care nurses who are exposed to a designed skin care bundle protocol will be higher than their pre practice mean scores.

4.3: There will be a positive correlation between nurse's knowledge and practices scores.

4.4: The frequency of pressure ulcer post-skin care bundle protocol implementation will be lesser than that of the pre- skin care bundle protocol implementation.

5-Subjects & Methods:

5.1.*Research design:* A quasi experimental research design was used in the current study (pre-test/post-test design).

5.2.*Variables:* The independent variable is the designed teaching protocol while the dependant variables are nurse's knowledge and practices related to skin care bundle.

5.3.*Sample:* Convenience sample of 60 critical care nurses with different educational background who are willing to participate in the study working in the intensive care units and 60 male and female patients admitted to The intensive care unit were included in the current study. The critically ill patients were randomly assigned into two equally homogeneous groups (control and study) (30 subjects each). Matching was done according to age, education, gender, co morbidity diseases (diabetes& hypertension) and diagnosis.

5.4.Setting: The study was conducted at the intensive care units of Benha University and Benha Teaching

Hospital.

6.Procedure:

The study was conducted on 3 phases (preparatory phase, implementation phase and evaluation phase).

6.1- The Preparatory phase:

The researcher reviewed the related materials and literature extensively. Assessment of the nurse's knowledge and practical skills were made in a previously mentioned study. The designed skin care bundle protocol was developed by the researcher: detected needs, requirements and deficiencies were translated to aims and objectives of the program. Moreover, teaching materials were prepared i.e. audiovisual materials on prominence areas within the human body, areas that are susceptible to pressure ulcer, degrees of pressure ulcer, types of skin assessment, types of pressure scales that are used to detect pressure ulcer. The three study tools are:

6.1.1.Tool1: knowledge questionnaire sheet (pre/post-test): It was utilized for testing theoretical information related to all aspects of skin care bundle protocol for pressure ulcer patients. It consists of 6 items including: pressure ulcer development factors, risk assessment, skin care, nutrition to maintain a healthy skin, dealing with mechanical load and pre discharge instructions. Scoring system: Each answer was given "1" score for correct answer and "0" for incorrect answer. The total score was (22) and it was then converted into percentage as follows: Those who obtained less than 60%(13 score) are considered having an unsatisfactory knowledge level and from 60% to < 75%(14 to 16 score) are considered satisfactory and 75% to < 90 % (17 to 19 score) are considered good and 90% or above(20score or above) are considered excellent.

6.1.2.Tool1:Observational checklist: Was utilized to assess nurses' performance level. It comprised (6) procedures including: pressure ulcer development factors, risk assessment, skin care, nutrition to maintain a healthy skin, dealing with mechanical load and pre discharge instructions.Scoring system: Each item was scored as follow:(Zero) = Not done or done incorrect. (1)= Incomplete. and (2) = Done correctly.The total scores were 44 as follows: Less than 60% (26 score) is considered unsatisfactory.,-From 60% to less than 75% (27 to 32 score) are considered satisfactory.,-75% to less than 90%(33 to 39 score) is considered good. And From 90% to above (40 score or above) is considered excellent.

6.1.3. Tool1I: An assessment sheet that was developed to evaluate the patient's status as regard to development of pressure ulcer based on the clinical data and this sheet was used also as a follow-up assessment sheet to the patients. It was included the following parts:

Part 1: Socio-demographic data of the studied patients (e.g. age, sex, education,occupation,marital status and residence) and medical data that related to patient's status (e.g.diagnosis,risk factors, level of consciousness, degree of mobility, presence of soiling, restricted devices and history of pressure ulcer).

Part 2: Braden scale risk assessment tool: Is a tool designed to facilitate that assessment.Developed in 1987 by Barbra J.Braden, and Nancy Bergstrom.The Braden scale consists of six subscales that evaluate a patients sensory perception, activity level,mobility,and nutrition status and the skin exposure to moisture,friction,and shear forces. The six subscale scores yields a total Braden scale score, which can range from 6 to 23.Lower total scores are associated with a higher risk of developing pressure ulcers. In ***(Bergstrom & Braden,2002).***

Part 3 : A designed skin care bundle protocol compromise 4 main items: Surface (e.g,type of matters, linens of bed), Keep turning(e.g,reposition every 2 hours in bed and chair), Incontinence care and Nutrition(e.g., assess nutritional deficit, weight loss, hydration status and nutritional supplements) ***(Gibbons et al,2006 & Orchard, 2010 & Kimpton,2011).***

6.2.Tool validity:

Tool validity was checked by a group of 6 experts who were specialized in critical care nursing, critical care medicine, and medical surgical nursing. The necessary modifications were done.

6.3.Tool Reliability:

The reliability of the tool was tested by Cronbach s Alpha coefficient test which revealed that each item consisted of relatively homogenous items(0.93).

6.4.Pilot study:

This phase was ended by conduction of the pilot study .The pilot study was carried out on 6 nurses. This was done to test clarity, applicability, feasibility &relevance of the tools used, to estimate the length of the required time for data collection .A modification on tools was made based on the results of the pilot study. Hence, pilot study sample was excluded from the final sample.

6.5.The Implementation & evaluation phase:

Data were collected from July, 2012 till April, 2013. (2months) for pre-test for nurses and assessment sheet for control group of studied patients and 3 months for the post-test and then after one and two months post designed skin care bundle protocol implementation. This is in order to ensure the exposure of all nurses to same learning experiences. All members received the same program content using the same teaching methods, discussion, videotape and same handouts.

The total number of sessions were (20 session). It divided as follows: A total of (10) sessions for theoretical part (1hour for each), and (10) sessions (2 hours for each) for the practical part. The total number of group was (10

groups) (for each 6 nurses)and the total time for achieving the program was 3 months given in an average of two days (one session in day) per week.

6.5.The program consisted of two parts:

6.5.1.*The first part: Theoretical part:*

For theoretical contents, a teaching sessions were conducted, each session takes around 45 minutes. The number of sessions (10) sessions for each group (6 nurses) to acquire the related information. Each nurse was supplemented with the knowledge booklet, a head and utilized each session to assure understanding and clear any misconception or misunderstanding. The researcher continued to reinforce the gained information, answer any raised questions and gave feedback. Communication channel was kept open between the researcher and the study group subjects. Then, immediately post, and after three months, knowledge tests were carried out.

6.5.2.*The second part: The practical part:*

For practical contents, each nurse's performance as regards the pre determined procedure was evaluated before provision of any information (pre-test) utilizing the formulated checklists (second tool). Then subjects were divided into the small groups (6) nurses in each group). Demonstrations and redemonstraion were carried on (10) sessions for each nurse. Practical booklet was given to each nurse and the immediate post practice test was done. Then after one and two months tests were carried out. Each skill was evaluated 4 times and the mean was calculated. Theoretical part was achieved in the head of the department office and practical part in clinical area. Teaching methods were lectures, small group discussion, and problem solving situations .Teaching aids were utilized, posters about skin care bundle, videotape, handouts, pen & paper test. The setting was equipped and prepared to be used.

6.6.Ethical Considerations:

An official and non official Permission for data collection and implementation of a designed skin care bundle protocol in ICUs of both Benha University and Benha teaching Hospitals was obtained from the heads of the Critical Care Department and from all health personal who will be included in the conduction of the study. The researcher emphasized that the participation is voluntary. As well anonymity and confidentiality were assured through coding the data. As well, these data will used for the purpose of this research only and if it will be reused another agreement will be seeked. The reactions of the administrative personnel were very supportive for the program and they offered all available facilities that might help in the success of the program.

6.7.Data Analysis:

Upon completion of data collection each sheet was manually scored. The background data sheet was coded and listed into numbers for calculation. Calculations were made manually. The following tests for significance were used: Means and standard deviation as well percentage, frequency, correlation coefficient, and t-test. Probability level of 0.05 was adopted as the level of significance for testing hypothesis.

6.8.Limitations of the study:

- Dropout of some nurses from the study group because of long term leaves e.g. sick-leaves or rotating-shifts.
- Insufficient equipments, especially the disposable items.
- Some patients died, discharged and transformed so they are excluded from the study sample.
- There is no accurate available statistical census about actual number of patients with pressure ulcer at both Benha University and Benha Teaching Hospital.

7. Results:

- **Table(1):** demonstrated that more than half (53.3%) of nurses were of less than 25 years old with a mean age of($\bar{x}$ = 23.86 ± 4.12 SD years) , married (80%) , not having offspring (66.7%),nurse(60%) with technical school education (46.7%) and not receiving any previous training (93.3%).
- **Hypothesis (I)** state: The post mean knowledge scores of critical care nurses who are exposed to a designed skin care bundle protocol will be higher than their pre knowledge mean scores. Table (2) is related to this hypothesis.
- **Table(2):**demonstrated that a general improvement in knowledge scores of nurses in all items of the study during different four assessment periods as compared to pre-designed skin care bundle protocol mean scores. However, a slight decline occurred after one and two months of a designed skin care bundle protocol implementation. A statistical significant differences were observed at p-values of <0.005. All through the four assessments except in knowledge of nurses related to factors related to pressure ulcer development, risk assessment and skin care with t-test (0.189,0.350& 0.493,Respectively) & p-value >0.05.Thus hypothesis (I) was supported.
- **Table (3):** documented that an unsatisfactory knowledge level among 70% of the studied sample pre skin care bundle protocol implementation. However, immediately post skin care bundle protocol implementation,10% got an unsatisfactory knowledge level. With an increment to 26.7% by the end of one month post implementation and 50% by the end of second months among the studied sample. A highly statistical significant differences were observed at p-value ≤0.001
- **Hypothesis (II)** state: The post mean practice scores of critical care nurses who are exposed to a designed

skin care bundle protocol will be higher than their pre practice mean scores. Table (3) is related to this hypothesis.

- **Table(4):**demonstrated that a general improvement in practice mean scores of nurses in all items of the study during different four assessment periods as compared to pre-designed skin care bundle protocol mean scores. However, a slight decline occurred after one and two months of a designed skin care bundle protocol implementation. A statistical significant differences were observed at p-values of <0.005. All through the four assessments except in practice of nurses related to factors related to pressure ulcer development and skin care with t-test (0.947& 0.00,Respectively) & p-value >0.05.Thus hypothesis (II) was supported.
- **Table (5)** illustrated that an unsatisfactory practice level among 66.7% of the studied sample pre skin care bundle protocol implementation. However, immediately post skin care bundle protocol implementation,16.7% got an unsatisfactory practice level. With an increment to 33.3 % by the end of one month post implementation and 43.3% by the end of second months among the studied sample. A highly statistical significant differences were observed at p-value ≤0.001

- **Hypothesis (III)** state: There will be a positive correlation between nurse's knowledge and practices scores. Table (4) is related to this hypothesis.

- **Table (6)** shows that, there was a positive correlation between pre designed skin care bundle protocol, immediately post, one month and two months of study group subjects knowledge and practice with age and years of experience. With significant statistical difference at p values of < 0.001. Thus hypothesis (III) was supported.
- **Table (7)** shows that a general improvement in nurses knowledge during the different assessment periods as compared to pre- designed skin care bundle protocol mean scores. But specifically as seen from above table that, the bachelor degree educational nurse, married, with offspring, and has a previous training obtained a high mean scores in different assessment periods as compared to pre- designed skin care bundle protocol mean scores. A statistical significant differences occurred at P- values of < 0.005.except related to bachelor degree ,head nurse, single, and not received a previous training with t value (1.538,1.538,0.290&1.178,Respectively)with p- value of >0.05.
- **Table (8)** illustrated that a general improvement in nurses practice during the different assessment periods as compared to pre- designed skin care bundle protocol mean scores. But specifically as seen from above table that, the bachelor degree educational nurse, married, with offspring, and has a previous training obtained a high mean scores in different assessment periods as compared to pre- designed skin care bundle protocol mean scores. A statistical significant difference occurred at P- values of < 0.005. Except related to head nurse without offspring's with t value (1.752 & 0.802, respectively) with p- value of >0.05.

- **Hypothesis (IIII) state**: The frequency of pressure ulcer post-skin care bundle protocol implementation will be lesser than that of the pre- designed skin care bundle protocol implementation.(Tables from 7 to 15).

- **Table(9):** Illustrated that the majority of both control and study group subjects were respectively married (76.7% & 83.3%), males (66.7% & 66.7%), half of them were illiterate (50% & 50%), their age from 50-60 years old with a mean of (52.2± 15.096 and 52.1 ± 14.965 years old). As regards occupation, it was found that one third (30%) of both groups were worker. As regards residence, it was found that around two thirds (66.7%) of both groups were residents of rural areas. No significant statistical differences were seen between the two groups in relation to the above mentioned demographic variables which indicates that the two groups were nearly homogenous.

- **Table (10):** demonstrated that regarding diagnosis. It was found that more than half and less than two fifths (53.3% & 40%,respectively) of both groups were having pulmonary diseases. while, regards to risk factors, it was found that more than & three fifths (63.3% & 60%) of both control and study group were having a risk factors of both hypertension and diabetes. No significant statistical differences were seen between the two groups in relation to the above mentioned variables.

-**Table(11):** delineated that regarding level of consciousness. It was found that three fifths (60% & 60%) of both groups were confused .As well, regards to restricted devices. It was observed that more than half (53.3% & 56.6%)of both groups were restricted by a ventilator device. while regarding to presence of soiling, it was found that half (50% & 50%) of both groups were having a complex soiling of both urine and faces. Chi-square test shows that there was no statistical significance difference between both groups with p value >0.05.

-**Table (12):**demonstrated that more than half and three fifths (53.3% & 60%) of both groups were having a first degree of pressure ulcer. While two thirds and three fifths (66.6% & 60%) of both groups were having pressure ulcer at buttocks. As well, all the studied sample were used antidecubitous matters. Chi-square test shows that there was no statistical significance difference between both groups with p value >0.05.

-**Table (13):** Revealed that before designed skin care bundle protocol implementation, the majority (86.7% &90% respectively) of both control and study group subjects were not having pressure ulcer with a mean score on Braden scale of (13.166± 4.502 & 14.7±3.38).After skin care bundle protocol implementation, the above mentioned percentage increased immediately after, after 3 days, after one week and after two weeks or

more to (90%,86%,86%,93%) for the study group compared by (80%, 70%, 66.7%, 63.3%) for the control group with a mean score on Braden scale of (14.7± 3.3,15.93 ±3.15, 16.16±2.58, 17.16± 1.52, 18.6±1.33) for the study group compared by (13.03 ± 3.78, 11.9 ±3.73,12.83±2.94,13.8±2.22) for the control group. There was a statistical significant differences between two groups with p value <0.05 except before skin care bundle protocol implementation with T=1.066 &p >0.05.

- **Table (14):** Illustrated that regarding nursing activities before skin care bundle protocol implementation. It was found that all of the studied subjects of both group patients (100%,100%,100%,100%,Respectively) were not receiving any nursing activities about message,reposition,care of patient according to pressure ulcer guidelines and assessment of pressure ulcer healing. Chi-square test shows that there was no statistical significance difference between both groups with p value >0.05.
- **Table (15):** delineated that regarding nursing activities immediately after skin care bundle protocol implementation. It was found that all of control group patients(100%,100%,100%,100%,Respectively) were not receiving any nursing activities about message,reposition,care of patient according to pressure ulcer guidelines and assessment of pressure ulcer healing compared by (13.3%,16.7%,0.0%,23.3%,Respectively) of the study group patients not receiving the above mentioned nursing activities. A highly statistically significant differences were observed at p-value <0.001.
- **Table (16):** delineated that regarding nursing activities after one week post skin care bundle protocol implementation. It was found that the majority (93.3%,93.3%,93.3%93.3%,Respectively) of control group patients were not receiving any nursing activities about message,reposition,care of patient according to pressure ulcer guidelines and assessment of pressure ulcer healing compared by (23.3%,30%,6.7% ,33.3%,Respectively) of the study group patients not receiving the above mentioned nursing activities. A highly statistically significant differences were observed at p-value <0.001.
- **Table (17):** delineated that regarding nursing activities after two weeks or more post skin care bundle protocol implementation. It was found that the majority (93.3%,93.3%,93.3%93.3%,Respectively) of control group patients were not receiving any nursing activities about message,reposition,care of patient according to pressure ulcer guidelines and assessment of pressure ulcer healing compared by (40%,46.7%,30%,53.3%,Respectively) of the study group patients not receiving the above mentioned nursing activities. A highly statistically significant differences were observed at p-value <0.001

Table (1): Distribution of the study subjects according to age, marital status, job, off springs, years of experience, education and previous training(N=60).

Frequency / Socio demographic data	No n = 60	Percentage % 100.0
*** Aging groups:**		
< 25 years	32	53.3
25 years	24	40
25 - 35 years	4	6.7
$\overline{X}$ = 23.86± 4.12 SD		
*** Marital status:**		
Married	48	80
Not married	12	20
*** Job**		
Head nurse	24	40
Nurse	36	60
*** Off springs**		
Present	40	66.7
Absent	20	33.3
*** Experience:**		
< 5 years	30	50
5 – 10 years	26	43.3
10 – 15 years	4	6.7
$\overline{X}$ = 4 ± 3.924 SD		
*** Education:**		
Secondary school	8	13.3
Technical school	28	46.7
Bachelor degree	24	40
*** Previous training:**		
Yes	4	6.7
No	56	93.3

Table (2): The mean total & subtotal knowledge scores of study group subjects all through the study periods(N=60).

Assessment periods / Knowledge items	Before program	Immediately after			After one month			After two months		
	$\overline{X}$ ± SD	$\overline{X}$ ± SD	Paired t	P value	$\overline{X}$ ± SD	Paired t	P value	$\overline{X}$ ± SD	Paired t	P value
Factors related to pressure ulcer development	3 ± 0.63	3.3 ± 0.458	2.142	<0.05*	3.133 ± 0.618	0.831	>0.05 n.s	3.03 ± 0.604	0.189	>0.05 n.s
Risk Assessment	2.76 ± 0.42	3.966 ± 0.657	8.739	<0.001 ***	3.333 ± 0.596	4.407	<0.001 ***	2.8 ± 0.476	0.350	>0.05 n.s
Skin care	2.96± 1.01	4 ± 0.774	8.965	<0.001 ***	3.5 ± 0.763	4.695	<0.001 ***	3.033 ± 1.015	0.493	>0.05 n.s
Nutrition to maintain a healthy skin	2.06± 0.24	2.933 ± 0.249	14.080	<0.001 ***	2.766 ± 0.422	8.404	<0.001 ***	2.266 ± 0.442	2.367	<0.05 *
Dealing with mechanical loads	0.93± 0.24	2.9 ± 0.3	28.970	<0.001 ***	2.066 ± 0.442	13.057	<0.001 ***	1.166 ± 0.372	3.025	<0.01 **
Pre discharge teaching instructions	0.9± 0.3	1.933 ± 0.249	14.757	<0.001 ***	1.533 ± 0.498	6.205	<0.001 ***	1.033 ± 0.176	2.216	<0.05 *
Total score	12.666± 1.699	19.1 ± 1.577	15.222	<0.001 ***	16.33 ± 2.195	7.298	<0.001 ***	13.366 ± 2.152	1.411	>0.05 n.s

n.s = no statistical significance. *= statistical significant at 0.05 **= statistical significant at 0.01 ***= statistical significant at 0.001

Table (3): Percentage distribution of the study group subjects related to knowledge level all through the study periods.

Knowledge items	Unsatisfactory <60%		Satisfactory 60-<75 %		Good 75- <90%		Excellent 90% and above		X2/Pvalue	
	N	%	N	%	N	%	%	N	X2	P-value
Pre-designed protocol	42	70	16	26.7	2	3.3	0	0.0	72.021	<0.001*
Immediately after	6	10	30	50	12	20	12	20		
After one month	16	26.7	26	43.3	10	16.7	8	13.3	52.001	<0.001*
After two months	30	50	22	36.7	8	13.3	0	0.0	24.031	<0.001*

*= indicates statistical significant at p ≤0.001

Table (4): The mean total & subtotal Practice scores of study group subjects all through the study periods.

Assessment periods / Practice items	Before program	Immediately after			After one month			After two months		
	$\overline{X}$ ± SD	$\overline{X}$ ± SD	Paired t	P value	$\overline{X}$ ± SD	Paired t	P value	$\overline{X}$ ± SD	Paired t	P value
Factors related to pressure ulcer development	5.86 ± 0.92	7.566 ± 0.495	9.425	<0.001 ***	6.733 ± 0.628	4.386	<0.001 ***	6.06 ± 0.727	0.947	>0.05 n.s
Risk Assessment	5.56± 0.55	8.166 ± 0.859	14.397	<0.001 ***	6.865 ± 1.056	6.304	<0.001 ***	5.9 ± 0.472	2.595	<0.01 **
Skin care	6.9 ± 1.04	9.1 ± 0.746	9.565	<0.001 ***	7.332 ± 0.869	1.756	>0.05 n.s	6.9 ± 0.830	0.00	>0.05 n.s
Nutrition to maintain a healthy skin	3.76 ± 0.55	5.466 ± 0.498	12.637	<0.001 ***	4.51 ± 0.591	5.102	<0.001 ***	4.1 ± 0.597	2.297	<0.01 **
Dealing with mechanical loads	1.9 ± 0.3	5.033 ± 0.60	27.243	<0.001 ***	3.833 ± 0.582	17.106	<0.001 ***	2.8 ± 0.541	8.411	<0.001 ***
Pre discharge teaching instructions	1.83 ± 0.37	3.233 ± 0.558	12.754	<0.001 ***	2.565 ± 0.558	6.176	<0.001 ***	2.366 ± 0.546	4.581	<0.001 ***
Total score	25.83 ± 2.75	38.566 ± 2.216	19.868	<0.001 ***	31.833 ± 3.120	7.929	<0.001 ***	28.433 ± 2.654	3.734	<0.001 ***

n.s = no statistical significance. *= statistical significant at 0.05 **= statistical significant at 0.01
** *= statistical significant at 0.001

Table (5): Percentage distribution of the study group subjects related to practice level all through the study periods.

Practice Items	Unsatisfactory <60%		Satisfactory 60-<75 %		Good 75- <90%		Excellent 90% and above		X2/Pvalue	
	N	%	N	%	N	%	%	N	X2	P-value
Pre-designed protocol	40	66.7	16	26.7	4	6.6	0	0.0	60.030	<0.001*
Immediately After	10	16.7	20	33.3	10	16.7	20	33.3		
After one Month	20	33.3	12	20	14	23.3	14	23.3	48.002	<0.001*
After two months	26	43.3	14	23.3	16	26.7	4	6.7	32.011	<0.001*

*= indicates statistical significant at p ≤0.001

Table (6): Correlation coefficient for nurses' knowledge, practice, hospital resuscitation policy, age and years of experience.

r-p values Variables	r	p
Age with knowledge		
Pre – designed protocol	0.4405	< 0.001*
Immediately post	0.4439	< 0.001*
After one month	0.43479	< 0.001*
After two months	0.3061	<0.001*
Age with practice		
Pre – designed protocol	0.7098	< 0.001*
immediately post	0.3732	< 0.001*
After one month	0. 3138	< 0.001*
After two months	0.3252	<0.001*
years of experience with knowledge:		
Pre – designed protocol	0.7053	< 0.001*
immediately post	0.2637	< 0.001*
After one month	0.1044	< 0.001*
After two months	0.328	<0.001*
years of experience with practice		
Pre – designed protocol	0. 6035	< 0.001*
immediately post	0. 210	< 0.001*
After one month	0. 068	< 0.001*
After two months	0.028	<0.001*

*= indicates statistical significant at $p \leq 0.001$

Table (7): The relationship between nurse's knowledge and selected sociodemographic variables all through the 4 assessments

Assessment Periods	**Before** $\overline{X}$ **± SD**	**after** $\overline{X}$ **± SD**	**Paired t**	**P value**	**after one month**	**Paired t**	**P value**	**after two months**	**Paired t**	**P value**
Knowledge With marital status				**Marital status**						
Married (n=48)	12.708 ± 1.881	19.2083± 1.7315	12.5	<0.001 ***	16.5416± 2.397	6.222	<0.001 ***	13.583± 2.347	1.436	>0.05 n.s
Single (n=12)	12.5±0.5	18.667± 0.4714	22.103	<0.001 ***	15.5±0.5	10.416	<0.001 ***	12.583± 0.493	0.290	>0.05 n.s
			Job							
Nurse (n =36)	11.611 ± 0.890	18.111± 0.7370	24.074	<0.001 ***	15 ± 0.8819	11.527	<0.001 ***	12.055± 0.705	1.675	>0.05 n.s
Head nurse (n =24)	14.25 ± 1.3616	20.5833± 1.3202	11.598	<0.001 ***	18.333± 2.0548	5.866	<0.001 ***	15.333± 2.095	1.538	>0.05 n.s
			Offspring's							
Present (n=40)	12.8 ± 1.8055	19.25± 1.728	11.559	<0.001 ***	16.55± 2.3764	5.681	<0.001 ***	13.85± 2.286	1.625	>0.05 n.s
Absent (n=20)	12.4 ± 1.428	18.8± 1.1662	11.053	<0.001 ***	15.7±1.9	4.441	<0.001 ***	12.4± 1.4283	0.00	>0.05 n.s
			Previous training							
Yes (n =4)	10.5 ± 0.5	18.5± 0.5	16	<0.001 ***	14.5±0.5	8	<0.001 ***	12.5± 0.5	4	<0.001 ***
No (n = 56)	12.821 ± 1.648	19.142 ± 1.619	14.497	<0.001 ***	16.464 ± 2.211	7.073	<0.001 ***	13.428 ± 2.210	1.178	>0.05 n.s
			Education							
Secondary school (n=8)	10.75 ± 0.433	17.75± 0.829	15.695	<0.001 ***	14± 0.707	8.084	<0.001 ***	12±0.707	3.109	<0.01**
Technical school (n=28)	11.857± 0.833	18.214± 0.6738	23.383	<0.001 ***	15.285 ±0.699	11.861	<0.001 ***	12.071± 0.703	0.740	>0.05 n.s
Bachelor degree (n=24)	14.25± 1.361	20.583± 1.320	11.598	<0.001 ***	18.333± 2.0548	5.866	<0.001 ***	15.333 ±2.095	1.538	>0.05 n.s

n.s = no statistical significance. *= statistical significant at 0.05 **= statistical significant at 0.01
** *= statistical significant at 0.001

Table (8): The relationship between nurse's practice and selected sociodemographic variables all through the 4 assessments

Assessment Periods	Before $\overline{X}$ ± SD	After $\overline{X}$ ± SD	Paired t	P value	After one month	Paired t	P value	After two months	Paired t	P value
Practice With marital status				**Marital status**						
Married (n=48)	26.041 ± 3.020	38.667 ± 2.4094	16.145	<0.001 ***	32.125 ±3.4194	6.556	<0.001 ***	28.583 ± 2.8855	2.987	<0.05*
Single (n=12)	25 ± 0.816	38.1667 ± 1.0672	24.246	<0.001 ***	28.4166 7 ± 7.6861	1.392	>0.05 n.s	27.833 ± 1.21335	4.842	<0.001* **
		Job								
Nurse (n =36)	23.944 ± 1.4709	37.889±1. 0482	**33.281**	<0.001 ***	30.333± 1.29099	13.889	<0.001 ***	27.222±1 .58308	6.452	<0.001 ***
Head nurse (n =24)	28.666 ± 1.545	39.5833± 2.9849	11.814	<0.001 ***	34.0833 ±3.6619	5.100	<0.001 ***	30.25± 2.8903	1.752	>0.05 n.s
				Offspring's						
Present (n=40)	26.1 ± 3.208	38.6± 2.4166	14.060	<0.001 ***	32.1± 3.3749	11.257	<0.001 ***	28.75± 2.930	2.73	<0.01 **
Absent (n=20)	25.3 ± 1.345	38.5± 1.7464	19.130	<0.001 ***	31.3± 2.4515	7.075	<0.001 ***	26.6± 5.9194	0.802	>0.05 n.s
				Previous training						
Yes (n =4)	22.5 ± 0.5	38.5±0.5	32	<0.001 ***	29.5± 0.5	14	<0.001 ***	25.5± 0.5	6	<0.001 ***
No (n = 56)	26.071 ± 2.698	38.571± 2.290	18.768	<0.001 ***	32.035± 3.145	7.646	<0.001 ***	28.642± 2.621	3.621	<0.001 ***
				Education						
Secondary school (n=8)	22.75±0. 433	37.25± 1.4790	21.481	<0.001 ***	29±0.70 71	15.547	<0.001 ***	25.5± 0.5	8.358	<0.001 ***
Technical school (n=28)	23.071± 1.162	38.0714± 0.7986	40.650	<0.001 ***	30.7143 ± 1.1605	17.449	<0.001 ***	27.714± 1.4357	9.475	<0.001 ***
Bachelor degree (n=24)	34.166± 4.374	39.583± 2.985	3.608	<0.001 ***	34.083± 3.662	0.05	>0.05 n.s	30.25± 2.890	2.644	<0.01 **

n.s = no statistical significance. *= statistical significant at 0.05 **= statistical significant at 0.01
** *= statistical significant at 0.001

Table (9): Distribution of the studied patients according to sex, age, education, occupation, marital status and residence.

Assessment Items	Control group(30)		Study group(30)		X2	p-value
	N	%	N	%		
Sex						
Male	20	66.7	20	66.7	0.00	>0.05
Female	10	33.3	10	33.3		n.s
Age						
<40	5	16.7	5	16.7	4.010	>0.05
40-<50	6	20	7	23.3		n.s
50-60	13	43.3	11	36.6		
>60	6	20	7	23.4		
X±SD	52.2± 15.096		52.1 ± 14.965			
Education						
Illiterate	14	46.7	14	46.7	1.001	>0.05
Read & write	5	16.7	6	20		n.s
Diploma	7	23.3	6	20		
University	4	13.3	4	13.3		
Occupation						
Worker	9	30	9	30	1.001	>0.05
Housewife	6	20	6	20		n.s
Farmer	7	23.3	8	26.7		
Student	2	6.7	3	10		
Employee	4	13.3	4	13.3		
Retirement	2	6.7	2	6.7		
Marital status						
Single	3	10	2	6.7	4.001	>0.05 n.s
Married	23	76.7	25	83.3		
Widow	4	13.3	3	10		
Divorced	0	0.0	0	0.0		
Residence						
Urban	10	33.3	10	33.3	0.00	>0.05 n.s
Rural	20	66.7	20	66.7		

n.s = no statistical significance

Table (10): Differences in diagnosis and risk factors among control and study group subjects.

éAssessment Items	Control group(30)		Study group(30)		X2	p-value
	N	%	N	%		
Diagnosis						
Brain stroke	7	23.3	5	16.6		
Pulmonary disease	16	53.3	12	40		
Liver disease	3	10	7	23.3		
Accident	4	13.3	5	16.6		
MI	1	3.3	1	3.3		
Renal failure	1	3.3	1	3.3	13.001	>0.05
Circulatory impairment	1	3.3	1	3.3		n.s
Heart failure	3	10	2	6.6		
Diabetic coma	3	10	2	6.6		
Risk Factors						
Hypertension	5	16.6	4	13.3		
Diabetes	1	3.3	2	6.6		
Smoking	11	36.6	10	33.3		
Obesity	6	20	7	23.3		
Hypertension+diabetes	19	63.3	18	60	5.002	>0.05
No risk factors	0	0.0	0	0.0		n.s

n.s = no statistical significance

Table (11) : Differences in present medical history among control and study group subjects.

Assessment Items	Control group(30)		Study group(30)		X2	p-value
	N	%	N	%		
Consciousness level						
Conscious	2	6.6	3	10		
Confused	18	60	18	60	2.002	>0.05
Comatose	10	33.3	9	30		n.s
Mobility						
Mobile	0	0.0	0	0.0		
With assistant	20	66.6	21	70	2.010	>0.05
Complete dependent	10	33.6	9	30		n.s
Presence of soiling						
Urine	4	13.3	3	10		
Faces	6	20	7	23.3	2.001	>0.05
Complex soiling	15	50	15	50		n.s
No	5	16.6	5	16.6		
Restricted device						
Cast	1	3.3	2	6.6		
Traction	2	6.6	1	3.3	4.002	>0.05
Ventilator	16	53.3	17	56.6		n.s
No	11	36.6	10	33.3		

n.s = no statistical significance

Table (12): Differences in present history of pressure ulcer among control and study group subjects.

Assessment Items	Control group(30)		Study group(30)		X2	p-value
	N	%	N	%		
Degree of pressure ulcer						
Free	7	23.3	8	26.6		
First degree	16	53.3	18	60	6.001	>0.05
Second degree	6	20	4	13.3		n.s
Third degree	1	3.3	0	0.0		
Fourth degree	0	0.0	0	0.0		
Site of pressure ulcer						
Shoulder	11	36.6	10	33.3		
Buttocks	20	66.6	18	60		
Heel	3	10	2	6.6	6.002	>0.05
Back of head	3	10	2	6.6		n.s
Elbow	1	3.3	1	3.3		
Back	3	10	2	6.6		
Ears	1	3.3	1	3.3		
Coccyx	1	3.3	1	3.3		
Preventive methods						
Matters	30	100	30	100		
Position change	0	0.0	0	0.0	0.00	>0.05
Medical sharab	25	83.3	25	83.3		n.s

n.s = no statistical significance

Table(13): Braden scale score among control and study group subjects.

Assessment periods	Control group N=30		Braden score				Study group N=30		Braden score				T-test	p-value
	N	%	<16 N	<16 %	>16 N	>16 %	N	%	<16 N	<16 %	>16 N	>16 %		
Before skin care bundle implementation							27	90	16	53.3	14	47.7	1.066	>0.05 n.s
No	26	86.7	17	56.7	13	43.3								
1st degree	4	13.3					3	10						
2nd degree	0	0.0					0	0.0						
3rd degree	0	0.0					0	0.0						
4th degree	0	0.0					0	0.0						
X±SD			13.166 ± 4.502						14.7 ± 3.387					
Immediately after (on admission)	24	80	20	66.7	10	33.3	27	90	8	26.7	22	73.3	2.292	<0.05*
No														
1st degree	6	20					3	10						
2nd degree	0	0.0					0	0.0						
3rd degree	0	0.0					0	0.0						
4th degree	0	0.0					0	0.0						
X±SD			13.033 ± 3.781						15.933 ± 3.151					
After 3 days														
No	21	70	24	80	6	20	26	86.7	5	16.7	25	83.3	3.703	<0.001 ***
1st degree	7	23.3					4	13.3						
2nd degree	2	6.7					0	0.0						
3rd degree	0	0.0					0	0.0						
4th degree	0	0.0					0	0.0						
X±SD			11.9 ± 3.735						16.166 ± 2.583					
After one week														
No	20	66.7	25	83.3	5	16.7	26	86.7	4	13.3	26	86.7	5.310	<0.001 ***
1st degree	8	26.6					4	13.3						
2nd degree	2	6.7					0	0.0						
3rd degree	0	0.0					0	0.0						
4th degree	0	0.0					0	0.0						
X±SD			12.833 ± 2.944						17.166 ± 1.529					
After 2weeks or more														
No	19	63.3	26	86.7	4	13.3	28	93.3	2	6.7	28	93.3	7.395	<0.001 ***
1st degree	8	26.7					2	6.7						
2nd degree	2	6.7					0	0.0						
3rd degree	1	3.3					0	0.0						
4th degree	0	0.0					0	0.0						
X±SD			13.8 ± 2.225						18.6 ± 1.331					

n.s = no statistical significance. *= statistical significant at 0.05 ** *= statistical significant at 0.001

Table (14): Nursing activities before a designed skin care bundle protocol implementation for both control and study group subjects.

Items	Control group(n=30)				Study group (n=30)				X2	p-value
	Done		Not done		Done		Not done			
	N	%	N	%	N	%	N	%		
Skin inspected	4	13.3	26	86.7	6	20	24	80	2.010	>0.05 n.s
Message	0	0.0	30	100	0	0.0	30	100	0.00	>0.05 n.s
Reposition	0	0.0	30	100	0	0.0	30	100	0.00	>0.05 n.s
Nutrition	3	10	27	90	4	13.3	26	86.7	1.001	>0.05 n.s
Special diet	9	30	21	70	10	33.3	20	66.7	2.011	>0.05 n.s
Cream	7	23.3	23	76.7	8	26.7	22	73.3	2.002	>0.05 n.s
Consult wound team	3	10	27	90	4	13.3	26	86.7	2.022	>0.05 n.s
Care according to guidelines	0	0.0	30	100	0	0.0	30	100	0.00	>0.05 n.s
Assessment of sore healing	0	0.0	30	100	0	0.0	30	100	0.00	>0.05 n.s

n.s = no statistical significance.

Table (15): Nursing activities after a designed skin care bundle protocol implementation for both control and study group subjects.

Items	Control group(n=30)				Study group (n=30)				X2	p-value
	Done		Not done		Done		Not done			
	N	%	N	%	N	%	N	%		
Skin inspected	5	16.7	25	83.3	28	93.3	2	6.7	46.001	<0.001***
Message	0	0.0	30	100	26	86.7	4	13.3	52.002	<0.001***
Reposition	0	0.0	30	100	25	83.3	5	16.7	50.001	<0.001***
Nutrition	3	10	27	90	30	100	0	0.0	54.012	<0.001***
Special diet	10	33.3	20	66.7	30	100	0	0.0	40.003	<0.001***
Cream	7	23.3	23	76.7	30	100	0	0.0	46.002	<0.001***
Consult wound team	3	10	27	90	24	80	6	20	42.001	<0.001***
Care according to guidelines	0	0.0	30	100	30	100	0	0.0	60.04	<0.001***
Assessment of sore healing	0	0.0	30	100	23	76.7	7	23.3	46.031	<0.001***

** *= statistical significant at 0.001

Table (16): Nursing activities after one week post a designed skin care bundle protocol implementation for both control and study group subjects.

Items	Control group(n=30)				Study group (n=30)				X2	p-value
	Done		Not done		Done		Not done			
	N	%	N	%	N	%	N	%		
Skin inspected	7	23.3	23	76.7	24	80	6	20	34.010	<0.001***
Message	2	6.7	28	93.3	23	76.7	7	23.3	42.004	<0.001***
Reposition	2	6.7	28	93.3	21	70	9	30	38.002	<0.001***
Nutrition	5	16.7	25	83.3	27	90	3	10	44.003	<0.001***
Special diet	12	40	18	60	26	86.7	4	13.3	28.021	<0.001***
Cream	9	30	21	70	28	93.3	2	6.7	38.012	<0.001***
Consult wound team	5	16.7	25	83.3	22	73.3	8	26.7	34.021	<0.001***
Care according to guidelines	2	6.7	28	93.3	28	93.3	2	6.7	52.032	<0.001***
Assessment of sore healing	2	6.7	28	93.3	20	66.7	10	33.3	36.011	<0.001***

** *= statistical significant at 0.001

Table (17): Nursing activities after two weeks or more post a designed skin care bundle protocol implementation for both control and study group subjects.

Items	Control group(n=30)				Study group (n=30)				X2	p-value
	Done		Not done		Done		Not done			
	N	%	N	%	N	%	N	%		
Skin inspected	5	16.7	25	83.3	17	56.7	13	43.3	24.012	<0.001***
Message	2	6.7	28	93.3	18	60	12	40	32.032	<0.001***
Reposition	2	6.7	28	93.3	16	53.3	14	46.7	28.022	<0.001***
Nutrition	6	20	24	80	21	70	9	30	30.023	<0.001***
Special diet	11	36.7	19	63.3	20	66.7	10	33.3	18.021	<0.001***
Cream	8	26.7	22	73.3	22	73.3	8	26.7	28.100	<0.001***
Consult wound team	5	16.7	25	83.3	16	53.3	14	46.7	22.012	<0.001***
Care according to guidelines	2	6.7	28	93.3	21	70	9	30	38.002	<0.001***
Assessment of sore healing	2	6.7	28	93.3	14	46.7	16	53.3	24.011	<0.001***

** *= statistical significant at 0.001

8.Discussion

The present study aimed to examine the impact of a designed skin care bundle protocol on nurse's knowledge, practices and on patients outcomes at both Benha university and Benha teaching hospital. Because the development of pressure ulcer represent a major problem both for affected patients and for the nurses who care for these patients. Pressure ulcers cause discomfort, increase suffering and are costly to patients, families and the health care system. They predispose patients toward secondary infection; sepsis; repeated surgery ; and they increase the length of hospital stay ***(Trueman & Whitehead, 2010).***

Regarding Sociodemographic characteristics of nurses:

Findings of the present study indicated that more than half of nurses their age less than 25 years old. This might be due to almost of nurses were newly graduates from technical school of nursing and working together at intensive care unit .supporting to these findings ***El-Sayed ,Mohamed& El-Sonbaty (2003)*** in a study entitled as " Impact of in-service training program on bed sores identification, prevention and management among immobilized patients". Stated that almost all nurses working in intensive care unit their age ranged from 20 to 25 years old. Contradiction to these findings ***Islam (2010)*** who studied " Nurses knowledge,attitude,and practice regarding pressure ulcer prevention for hospitalized patients at Rajshahi Medical College Hospital in Bangladesh". Revealed that, the age range of most nurses was between 30 to 40 years old (56%).

Findings of the present study indicated that almost of nurses were married and having offsprings.In agreement of these findings ***Islam(2010)*** & ***Hamed, (2009)*** who studied "Nurse's performance during cardiopulmonary resuscitation in intensive care unit and cardiac care unit at Benha University Hospital", master thesis, Benha university .Revealed that the majority of the study subjects were married and having offspring's.

Study Findings Related To Hypotheses Testing:

I- Nurse's knowledge related to pressure ulcer :

Based on the results documented by ***Taha (2013)*** on his paper entitled that" nurses knowledge and practices related to pressure ulcer at intensive care unit at Benha university and Benha teaching hospital". Revealed that the majority of nurses who participated in the study had unsatisfactory knowledge level regarding the pressure ulcers management. There are three possible reasons to explain the unsatisfactory knowledge level of this group of subjects. First, their formal education background and training experience may be a factor related to this unsatisfactory knowledge in which more than half of nurses (60%) graduated with a diploma degree followed by a bachelor degree (40%). In addition, the highest percentage of nurses (93.3%) were not trained related to the prevention of pressure ulcers' program. Second, The lack of opportunity to be trained about up-dated on pressure ulcer prevention programs might preclude the nurses from remembering, understanding, and applying suitable knowledge regarding pressure ulcer prevention. Third reason, the lack of learning resources for nurses to up-date their knowledge would be another reason for the very low level of knowledge.

These findings are supported by ***El-Sayed,et al (2003)*** who studied " Impact of in-service training program on bed sores identification,prevention,and management among immobilized patients", published paper,Assuit University. Found that very low levels of knowledge as regards the identification, prevention and management of bed sores before program implementation and explained this result related to the lack of scientific preparation of nurses. And concluded that almost all nurses working in the ICU are in great need to develop and maintain their knowledge and skills in relation to the critical patients as regards the identification,

prevention and management of bed sores.

The present study findings indicated that a general improvement in nurses knowledge immediately post skin care protocol guidelines with decrement post one and two months after skin care guidelines. In agreement with these study findings ***El-Sayed,et al (2003)*** who found that the implementation of the training program showed an improvement in nurses knowledge regarding identification, prevention and management of bedsores among immobilized patients. This has been shown to occur immediately after implementation of the program with decrement after one and two months later on when the follow up test were administered to the nursing staff. On the same line ***Abd Alla (2000)*** stated that an in service program has a beneficial effect in improving the nurses knowledge and skills and recommended that educational programs should be organized according to the need of the nurses with continuous evaluation. Also ***Zulkowski, Ayello, and Wexler (2007)*** noted that nurses attending on an educational session on skin assessment and implementation of prevention protocols decreased the incidence of stage I and stage II pressure ulcers.

I- Nurse's practice related to pressure ulcer :

Based on the results documented by ***Taha (2013)*** who revealed that the majority of nurses who participated in the study had unsatisfactory practice level regarding the pressure ulcers management.

A possible reason for explaining this unsatisfactory level of practice may be due to certain factors. First, the shortage of nursing staff and the limited working time available for direct patient care in preventing pressure ulcers. In agreement with this study finding ***Langemo, et al (2008)*** who indicated that a majority of nurses reported lack of staff and lack of time as barriers to carry out pressure ulcer prevention care into effective practice. Also, ***El-Sayed,et al (2003)*** reported that very low levels of nurses practices as regards the identification, prevention and management of bed sores before program implementation and explained this result related to the lack of scientific preparation of nurses. And concluded that studied nurses were mostly not properly prepared prior to their working and dealing with such critically ill patients. As well, ***Lindholm, et al (2008)*** added that other factors might influence practice. Those factors may be insufficient equipment, absence of guidelines, lack of in-service training and nursing leadership, lack of learning resources to access, and patients' conditions. This results disagree with ***Islam (2010)*** who studied " Nurses knowledge,attitude,and practice regarding pressure ulcer prevention for hospitalized patients at Rajshahi Medical College Hospital in Bangladesh, Songkla University" In a published master thesis. Concluded that before program implementation the majority of nurses practices related to pressure ulcer was at moderate level.

The current study showed that increases in nurses practices immediately post skin care guidelines protocol implementation and there is a highly statistically significant differences. With a decrement after one and two months post skin care guidelines protocol implementation. Supporting to this study findings of ***Chaiken (2012)*** reported improvement in nurses practice after the attendance at continuing nursing education sessions. On the same line ***Banjar***, ***Mahran and Ali (2012)*** in his published paper " Effectiveness of prevention and management of pressure ulcers, as" a patient safety issues" among bed ridden Patients at University Hospital in Jeddah, Saudi Arabia". Concluded that The educational program for prevention of pressure ulcers should be implemented through evaluating nurses' effectiveness in preventing pressure ulcers as quality assurance standards and Health care providers should be functioning as a team, the incidence rates of pressure ulcers can decrease. Thus, pressure ulcers and their prevention implementation considered as important goal to provided as safety measures in patient care.

III- Correlation between nurses knowledge and practice:

Knowledge was found to be correlated with practice scores among nurses. Thus *hypothesis III* was supported. Regarding correlation between knowledge, practice scores , nurses age, and experience. The current study showed a positive correlation between knowledge and age in the present study, age was positively correlated there was a highly statistical significant between age and knowledge before,immedialely after, after one and two months of skin care bundle protocol implementation. As regarding relation between practice and age. In the present study, age was positively correlated with practice of nurses with a highly statistical significant before,immedialely after, after one and two months of skin care bundle protocol implementation. This agree with

IV- Patient's outcome as a result to skin care bundle protocol implementation

The present study findings demonstrated that the majority of both group were male,married,illiterate,worker,living in rural area ,their age from 50-60 years old. Also both control and study group had pulmonary disease .and having risk factor of both hypertension and diabetes ,had first degree of pressure ulcer at buttocks and all of patients using matters. In agreement with these findings ***Mohammed (2007)*** who found that the majority of the studied group patients were having pressure ulcer from the first degree, and the most risk factors for pressure ulcer development were both diabetes and hypertension .and the highest percentage from the patients were restricted by ventilator device, and were on mattress as a predictive method. Also, ***Fitzgerald (2010)*** illustrated that the most common bed sore location were sacrum and buttocks. As well, ***Black, et al(2011)*** mentioned that there are many factors affecting on developing pressure ulcers such as diabetes and hypertension.

The present study findings revealed that pre designed skin care bundle protocol implementation, all the studied nurses not performed the following nursing activities: message, reposition and assessment of the pressure ulcer. In agreement with these findings ***Banjar, Mahran and Ali (2012)*** who illustrated that no one of studied nurses providing care for high risk patients as comprehensive skin assessment is performed within 24 hours of admission; keep the patient's skin dry; use mild clean agent to minimize dryness and irritation; use absorbent under pad and topical agent which act as moisture barriers; don't elevate the high risk patient above 20 degree; turn and proper position to the patient at least every 2 hours; Nurse assess nutrition within 24 hours of risk identification; and Assess nutrition includes dietary consult. This finding congruent with ***Black,et al,(2011)*** who stated that most pressure ulcers are avoidable; there are situations that render Pressure Ulcers development unavoidable, including hemodynamic instability that is worsened with physical movement and inability to maintain nutrition and hydration status and the presence of an advanced directive artificial nutrition/hydration; pressure identify the limits of prevention.

Findings of this study supported *hypothesis IV* that The frequency of pressure ulcer post-skin care bundle protocol implementation will be lesser than that of the pre- skin care bundle protocol implementation.
The present study findings revealed that after designed skin care bundle protocol implementation, the percentage of patient who developed pressure ulcer was 20% for control group compared by 10% for the study group with a statistical significant differences between two groups with p value <0.05 . This might be related to the satisfactory impact of the designed training skin care bundle protocol on nurse's performance and patient's outcome. Supporting to these study findings ***Karada &Gumuskaya (2006)*** who reported that the percentage of patients who developed skin ulcer after program implementation was decreased to (7%).This agrees with ***Ibrahim (2007)*** in his published paper "skin care intervention for pressure ulcer prevention among cardiac surgical patients" who found that the effect of the skin care nursing intervention in improvement of ulcer stages was found to be statistically significant. As well, ***Aljezawi (2011*)** who found a significance difference in nursing care provided by nurses and patients ' that developed on admission & after 10 days. This finding supported with ***Rosenfeld (2008)*** Bed sores can be prevented by conducting daily skin inspections (especially for at risk patients), using pressure reducing mattresses, pressure-release wheelchairs, frequent position changes, minimizing friction, and healthy diet. And ***De Laat et al (2007)*** conducted a one day survey to evaluate the effectiveness of a new pressure ulcers prevention and treatment policy in a university hospital. In this study a significant decrease in hospital-acquired pressure ulcers after implementation the new policy had happened.

9.Conclusion:

It can be concluded from this study that the designed skin care bundle protocol could be beneficial in improving the knowledge and the practices of the critical care nurses working in critical care unit as well on patient's outcome in relation to prevention of pressure ulcer at the intensive care unit.

10.Recommendations: Based on results of the present study, the following can be recommended:

- The routine use and regular revision of pressure ulcer risk assessment sheet should be encouraged.
- Continued nursing education and in service training programs should be well organized within both Benha University and Benha Teaching Hospital and equipped with the necessary educational facilities and materials necessary .

11.References:

1. **Abd-Allah,S.M.(2000):**Assuring quality care through a managerial in service training program for head nurses working in Assiut University Hospital.DNS Thesis of Nursing Service Administration,Assiut University.
2. **Aljezawi.M.(2011):** Exploring preventive interventions and risk factors of hospital-acquired pressure ulcers: a retrospective matched case-control design,published doctorate thesis, De Montfort University, Leicester, UK
3. **Baldelli, P and Paciella, M.(2008):** Creation and implementation of a pressure ulcer prevention bundle improves patient outcomes. Am J Med Qual. 2008;23(2):136-142
4. **Banjar, H.B., Mahran, S.M and Ali, G.M.(2012):** Effectiveness of prevention and management of pressure ulcers, as" a patient safety issues" among bed ridden Patients at University Hospital in Jeddah, Saudi Arabia. Journal of American Science ; 8(6).
5. **Banks, M., Bauer, J., Graves, N. and Ash, S. (2009):** Malnutrition and pressure ulcer risk in adults in Australian health care facilities. Nutrition, 26(9), pp. 896-901.
6. **Bergstrom,N. and Braden, B.J. (2002):** Predictive validity of the Braden scale among black and white subjects.Journal of nursing research.51(6).398-403.
7. **Black. J. M; Edsberg, L. E; Baharestani, M. M; Langemo. D; Goldberg. M. (2011):** Pressure Ulcers: Avoidable or Unavoidable?Results of the National Pressure Ulcer Advisory Panel Consensus Conference. Ostomy wound Management .FEBRUARY.
8. **Chaiken, N.(2012):** Reduction of Sacral Pressure Ulcers in the Intensive Care Unit Using a Silicone Border Foam Dressing. Journal of Wound, Ostomy & Continence Nursing: 39 (2): PP. 143–145.

9. **De Laat, E. H., Pickkers, P., Schoonhoven, L., Verbeek, A. L., Feuth, T. and van Achterberg, T. (2007):** Guideline implementation results in a decrease of pressure ulcer incidence in critically ill patients. Critical Care Medicine, 35(3), pp. 815-820.
10. **El-Sayed,Z.A, Mohamed,W.Y,& El-Sonbaty,M.A.(2003):**Impact of in-service training program on bed sores identification,prevention,and management among immobilized patients,Assuit University, Bull.Environ.Res.Vol.6.No.1,March2003.pp(141-145).
11. **European Pressure Ulcer Advisory Panel (EPUAP). (2010):** Prevention and Treatment of Pressure Ulcers. A Quick Reference Guide. Available at: http://www.epuap.org/guidelines/Final_Quick_Prevention.pdf (accessed 11 May, 2010).
12. **Fitzgerald, J.(2010):** Keys to Success in Managing Pressure Ulcers and Associated Harm. Division of Healthcare Quality Baystate Medical Center Springfield MA .
13. **Fogerty, M., Abumrad, N., Nanney, L., Arbogast, P., Poulose, B. and Barbul, A.(2008):** Risk factors for pressure ulcers in acute care hospitals. Wound Repair and Regeneration, 16(1), pp. 11-18.
14. **Gibbons.W., Shanks.H.T., Kleinhelter.P., Jones.P.(2006):** Eliminating facility-acquired pressure ulcers at ascension health,Journal on quality and patient safety, Volume 32 Number 9.
15. **Ibrahim,Y.M. (2007):** Skin care intervention for pressure ulcer prevention among cardiac surgical patients, Alexandria scientific nursing journal,volume6 ,number 1,pp:(1-18).
16. **Islam, M.S.(2010):** Nurses knowledge,attitude,and practice regarding pressure ulcer prevention for hospitalized patients at Rajshahi Medical College Hospital in Bangladesh, master thesis in nursing science,Songkla University.
17. **Karadag M,and Gumuskaya N.(2006):** The incidence of pressure ulcers in surgical patients : a sample hospital in turkey.J Clin Nurs;15:413-421.
18. **Kimpton, N. (2011):** Pressure ulcer prevention policy., Peninsula Community Health on www. PeninsulaCommunityHealth.co.uk
19. **Langemo, D., Cuddigan, J., Baharestani, M., Ratliff, C. R., Posthauer, M. E., Black,J., et al. (2008):** Pressure ulcer guidelines: "Minding the gaps" when developing new guidelines. Advanced in Skin and Wound Care, 21, 213-217.
20. **Lindholm, C., Sterner, E., Romanelli, M., Pina, E., Torra y Bou, J., Hietanen, H., et al.(2008):** Hip fracture and pressure ulcer: The Pan-European pressure ulcer study-intrinsic and extrinsic risk factors. International Wound Journal, 5,315-328.
21. **Mohammed, S.S.(2007):** Predicting pressure ulcer risk:Astudy of the predictive validity of the braden scale at El-Kasr El-Aini hospital,Master thesis,faculty of nursing,Cairo University .
22. **Orchard,H. (2010):** Pressure ulcer prevention policy.Torbay care trust.
23. **Paciella, M.E. (2009):** "Bundle" up to prevent pressure ulcers., American Nurse Today Volume 4, Number 4.
24. **Rosenfeld. J (2011):** Pressure sore developed in a nursing home, long-term care facility or hospital. Nursing Homes Abuse Blog www.nursinghomesabuseblog.com/bedso.
25. **Trueman P. and Whitehead S. (2010):** The economics of pressure relieving surfaces: an illustrative case study of the impact of high specification surfaces on hospital finances International Wound Journal 7 48-54.
26. **Vollman K.(2006):** Ventilator- associated pneumonia and pressure ulcer prevention as targets for quality improvement in the ICU.Crit Care Nur Clin North Am,18:453-467.
27. **Zulkowski, K., Ayello, E. A., & Wexler, S. (2007):** Certification and education: Do they affect pressure ulcer knowledge in nursing? Advanced Skin Wound Care, 20, 34-38.