

## Self-Care Practices among Adult Patients with Percutaneous Nephrostomy Tube

Nehad Abdel baset Buttisha <sup>1</sup>, Kawther Gaber Tolba <sup>2</sup>, Gehan Mohamed Desoky <sup>3</sup>, Doaa Amin Ahmed <sup>4</sup>

<sup>1</sup> (Clinical instructor, Faculty of Nursing, Damanhour University, Egypt)

<sup>2</sup> (Professor of Medical-Surgical Nursing, Faculty of Nursing, Alexandria University, Egypt)

<sup>3</sup> (Assistant professor, Medical-Surgical Nursing, Faculty of Nursing, Alexandria University, Egypt)

<sup>4</sup> (Lecturer, Medical-Surgical Nursing, Faculty of Nursing, Damanhour University, Egypt)

Corresponding Author: Doaa Amin Ahmed

---

**Abstract:** Percutaneous nephrostomy (PCN) tube is used to decompress the obstruction in urinary tract and to restore the renal function. Many complications have been associated with PCN tube insertion, the nurse as a health care provider is concerned with preventing these complications through teaching healthy self-care practices.

**Aim:** Assess self-care practices among adult patients with percutaneous nephrostomy tube.

**Design:** A descriptive study design was used for this study.

**Setting:** Outpatient urology clinics at the National Medical Institute of Damanhour, Egypt

**Subjects:** A convenience sample of sixty adult patients who had percutaneous nephrostomy tube for  $\geq 2$  weeks.

**Tools:** One tool was used "Self-Care Practices of Patients with Percutaneous Nephrostomy Tube interview schedule"

**Results:** Fair overall self-care practices was found among (43.3%, 48.3%) of patients in the 1<sup>st</sup> and 2<sup>nd</sup> interview respectively. **Conclusion:** The highest percentage of the patients had poor self-care related to physical activities and daily measuring of intake and output, while elimination-related self-care practices and adherence to the prescribed medications were the highest percentage of good self-care practices.

**Recommendations:** Provide patients' educational programs for self-care practices regarding percutaneous nephrostomy tube that reinforce the importance of daily measurement of intake and output and physical activity with providing safe ways to avoid tube dislodgement

**Key words:** Self-care practices, Adult patients, Percutaneous nephrostomy tube, Urinary tract obstruction.

---

Date of Submission: 21-05-2020

Date of Acceptance: 08-06-2020

---

### I. Introduction

Obstruction of the urinary tract initiates a complex series of reactions at the cellular level, complete urinary obstruction requires urgent procedures to relieve the blockage including; urethral or suprapubic catheterization, stenting the ureter or nephrostomy <sup>(1)</sup>. Placement of percutaneous nephrostomy (PCN) tube is usually done to decompress the obstruction and to restore the renal function <sup>(2)</sup>. The collecting system of the kidney is punctured percutaneously with a needle under fluoroscopic, ultra-sonographic, or computed tomography (CT) guidance <sup>(3)</sup>.

Many complications may result either from insertion procedure or presence of catheter in the body. These complications may include; major complications which are bleeding, sepsis, and even bowel perforation and pneumothorax <sup>(3,4)</sup>, or minor complications which are microscopic hematuria, pain, and urine extravasation <sup>(5,6)</sup>, as well as catheter-related problems which are obstruction, malposition, and dislodgement <sup>(6,7)</sup>. Frequently, challenges associated with teaching and engaging patients and their caregivers in managing their condition result in problems due to a lack of understanding the care required for maintenance of PCN catheters. Patients who do not have the resources or skills to effectively manage their condition are subjected to the resulting PCN complications <sup>(8)</sup>.

The World health organization (WHO) has defined self-care as " the ability of individuals, families and communities to promote health, prevent disease, maintain health, and to cope with illness and disability with or without the support of a health-care provider " <sup>(9)</sup>. According to Dorothea Orem's conceptual framework of nursing, self-care means the practice of activities that individuals initiate and perform on their behalf for maintaining life, health and wellbeing. These self-care practices are performed to meet self-care requisites or needs. The self-care requisites are classified into three groups; universal, health deviation and developmental

requisites<sup>(10)</sup>. To meet the patient's self-care requisites, the nurse can use three systems; the wholly compensatory system, the partially compensatory system, and the supportive educative system<sup>(11)</sup>.

Generally speaking, self-care is beneficial for both the patient and the health care system, as it provides shorter hospital stays and lowers costs also; it provides more effective working relationships between patients and health care providers<sup>(12)</sup>. Empowering self-care can increase the patient's knowledge about their disease, improve compliance with prescribed treatment, reduce anxiety; in addition to improving quality of life, disease outcomes, and perception of one's health condition thus it increases patient satisfaction<sup>(13)</sup>. Since caring for patient's nephrostomy tube is provided in an outpatient setting, proper nephrostomy tube care has been proposed as a key for preventing complications<sup>(14, 15)</sup>. Nursing role in guiding patients with PCN tube is essential; the nurse has to educate patient/care giver how to perform tube care under her supervision before discharge besides that, patient is asked to care for their nephrostomy tube, specially, in an outpatient setting<sup>(16, 17)</sup>.

### **Significance of the study**

Inherent in Orem's theory is the premise that if a self-care need is not met, self-care demand is present, self-care deficits exist when people are unable to meet their self-care demands<sup>(18)</sup>. Nurses are responsible for identification of self-care needs based on the actual practices of the patients in their daily life. In this regard, only one study was encountered concerning PCN post-operative nursing care standard<sup>(19)</sup>, to assess the self-care practices among adult patients with PCN, the present study is conducted.

**I.1.Aim of this study:** The study aims to assess the self-care practices among adult patients with percutaneous nephrostomy tube.

**I.2.Research question:** What are the self-care practices among adult patients with percutaneous nephrostomy tube?

## **II. Materials And Method**

### **II.1.Materials**

**II.1.1.Design:** Descriptive study design was used.

**II.1.2.Setting:** This study was conducted at the National Medical Institute of Damanshour at Beheira Governorate- Egypt.

**II.1.3.Subjects:** A convenience sample of sixty male and female adult patients with percutaneous nephrostomy tube was included in the study. Epi info - 7 program was used to estimate the sample size using the following parameters:

- 1- Population size = 60 over 6 months
- 2- Expected frequency =50%
- 3- Acceptable error = 5%
- 4- Confidence coefficient =99%
- 5- Minimum sample size = 55

**The patient's inclusion criteria were:**

- Patient who would go home with PCN tube for two weeks or more.
- Adults, who were able to communicate verbally.
- Patients who were willing to participate.

**II.1.4. Tool:** One tool was used to collect the data; Self-Care Practices of Patients with PCN Tube interview schedule: it was developed by the researchers, based on reviewing the relevant recent literatures<sup>(19-25)</sup> to assess the self-care practices of patients with PCN tube after procedure. It included three parts as follows:

**Part I: Socio-demographic and clinical data:** This part included data related to:

**a- Socio-demographic data including;** age, sex, level of education, occupation, marital status, and residence area.

**b-Clinical data including;** diagnosis, obstruction cause, surgical history, family history for urinary obstruction, onset of the current complaint, time for seeking medical help, and presence of associated diseases.

**Part II: Universal self-care practices checklist:** - This part included 6 main subscales of universal activities practiced by the patients using the phrase "most of days" as criteria for answer. It consisted of (43) statements under the following subscales:

- i. Nutrition:** It included (11) statements related to number of meals/day, duration between meals, compliance with prescribed therapeutic diet and fluid intake.
- ii. Physical activities:** It included (12) statements related to ability to meet the activities of daily living, in addition to exercises and leisure time activities.

- iii. **Rest and sleep:** It included (4) statements related to rest and sleeping pattern
- iv. **Personal hygiene:** It included (6) statements regarding hand hygiene, oral care, grooming, bathing, and showering, and protecting the catheter and the skin around the insertion site.
- v. **Elimination:** It included (6) statements regarding urination, perineal care, and defecation.
- vi. **Social interaction:** It included (4) statements including time spent with other family members, maintaining role in the family, visits to friends, and participation in social occasions.

**Part III: Percutaneous nephrostomy tube self-care practices check list:** This part is consisted of (49) statements under 6 main activities (subscales) practiced by patients to care for PCN tube as follows:

- i. **Care of the tube:** It included (6) statements regarding daily observation of PCN tube and checking on site and patency.
- ii. **Care of the urinary bag:** It included (10) statements regarding level of the bag, when to empty and change the bag.
- iii. **Percutaneous nephrostomy wound care:** It included (14) statements related to steps for wound management and skin care around the tube.
- iv. **Adherence to the prescribed medication:** It included (3) statements related to compliance with the prescribed medications, and avoiding over the counter medications.
- v. **Daily measurement of intake and output:** It included (6) statements related to intake and output chart, urine observation, and the way of urine specimen collection from nephrostomy tube.
- vi. **Preventing potential percutaneous nephrostomy tube complications:** these questions included patients' practices to prevent potential complications: -
  - a) **Preventing infection:** It included (4) statements related to practices to avoid infection and monitor signs of infection.
  - b) **Preventing percutaneous nephrostomy tube dislodgment and displacement:** It included (4) statements related to practices to empty urinary bag and securing nephrostomy tube connection to the drainage bag.
  - c) **Preventing percutaneous nephrostomy tube obstruction:** It included (2) statements related to practices to prevent and monitor obstruction signs.

**All Questions in part II and part III were dichotomous with yes or no answers.**

**Scoring system:** Both of part II and III questions were scored according to the following scoring system for self-care practices:

Participant's answer about self-care practice for each question was scored as giving one point for the self-care practice that was answered by yes, and zero for that was answered by no. A total score for every participant's answers was summed up and converted into percentage. The total score of each subscale was calculated and transferred to percentage and was classified as the following:

- Scoring of more than 64% was considered as good.
- Scoring of 50% to 64% was considered as fair.
- Scoring less than 50% was considered as poor.

The total score of either universal or PCN tube self-care practices was the sum of all subscale scores in each of them, and the total score for self-care practices was the sum-up of total scores of both, the total percent scores were calculated and the appropriate statistical analysis was used. The total score for self-care practices ranged from 0-93 if the participant had renal stones, or it ranged from 0-90 if the participant hadn't.

**II.2.Method:** This study was carried out using the following steps:

- An official written approval was obtained from the responsible authorities at the previously mentioned research settings to obtain their permission to conduct the study after explanation of the study aim.
- The tool was developed by the researchers after reviewing the relevant recent literatures <sup>(19-25)</sup>.
- A jury from five experts in the Medical-Surgical nursing field at the Faculty of Nursing, Alexandria University examined the content validity of the tool for comprehensiveness and clarity of the items. Every jury member was informed about the aim, question and method of the study. Modifications in wording and sequence of few statements were carried out accordingly as recommended.
- Both of part II, III reliability was tested by using Alpha Cronbach's test. The Cronbach's coefficient alpha score for patient's self-care practices was 0.74.
- A pilot study was carried out for testing the clarity, feasibility, and applicability of the tool on 6 patients (10%) with PCN tube out of the sample number.
- Data collection was carried out over a period of six months; from December 2017 to May 2018 by the researcher.

- Structured interview schedule was done with every participant alone twice after percutaneous nephrostomy tube insertion to assess his/her self-care practices. The first interview was done after one week of PCN tube insertion at the urology clinic in outpatient department (at the waiting area of the clinic). The second one was done after two weeks from the first interview at the same setting. Every patient was interviewed from twenty to thirty minutes for each time.

**Ethical considerations:**

- A written informed consent was obtained from each participant before data collection and after explanation of the study aim.
- Privacy of the participants and confidentiality of the collected data were assured.
- Anonymity of the study participants was maintained.
- Right to withdraw from the study was confirmed.

**Statistical Analysis of data:**

Data were coded and transferred into specially designed format for computer feeding. Following data entry, checking and verification process was carried. Statistical analysis was performed using IBM SPSS software package version 20.0. Qualitative data were described using number and percent. Quantitative data were described using mean, standard deviation, minimum and maximum.

**a- Mean value**  $(\bar{X}) = \frac{\sum X}{n}$ . Where X = the sum of all observations. n = the number of observations.

**b- The standard deviation S.D.**  $= \sqrt{\frac{\sum (X - \bar{X})^2}{n - 1}}$

Where  $\sum (X_i - \bar{X})^2 =$  the sum of squares of differences of observations from the mean.

Statistical analysis was conducted by using the following tests:

**1 - McNemar and Marginal Homogeneity Test:** analyze the significance between the different stages.

**2 - Paired t-test:** For normally distributed quantitative variables, to compare between two periods.

### III. Results

**Table (1): Frequency and percent distribution of the studied patients according to socio-demographic characteristics.** It was noticed that the largest proportion were in the age group from 40 to <50 years, males, illiterate, not working, married and lived in rural areas (43.3%, 61.7%, 41.6%, 35%, 71.7%, and 58.3% respectively).

**Table (2) : Frequency and percent distribution of the studied patients according to clinical data.** It was obvious that a fairly high percent had unilateral urinary obstruction, renal calculi obstruction, negative surgical history, and negative family history for urinary obstruction, complaining since 1 to < 6 months, requested medical advice at the onset of symptoms, and had associated diseases (60%, 71.6%, 51.7%, 90%, 41.7%, 58.3%, and 51.7% respectively).

**Table (3) Patients' universal self-care practices mean scores in both interviews. The results revealed that** statistical significant difference was found between the mean percent scores of the first and second interview in physical activities (p<0.001), rest and sleep (p=0.038), personal hygiene (p<0.001), social interactions (p<0.001), and total scores of universal self-care practices (p<0.001).

**Table (4): Patients' mean percent scores of percutaneous nephrostomy tube and overall self-care practices in both interviews. The results illustrated** statistical significant differences between the mean percent scores of the first and second interview regarding the overall mean scores and all subscales except practices of both adherence to the prescribed medication, and prevention of PCN tube complications

**Table (5): Percent distribution of the studied patients according to self-care practice classes in both interviews. The results showed** statistical significant differences between the first and second interview regarding physical activities and social interaction classes (p<0.001), personal hygiene (p=0.001), accordingly total scores of universal self-care practices (p<0.001). Also, it can be noticed that there were statistically significant differences regarding PCN tube self-care practice classes that concern wound care, daily intake and output measurement, prevention of obstruction, total scores PCN tube self-care practices, with p values (<0.001, 0.029, 0.018 and, 0.034) and accordingly the overall self-care practices score.

**Table (6): Relation between classes of self-care practice and patients' socio-demographic data in both interviews. It can be noticed that** statistical significant differences were found between age and patient's total self-care practice classes in both interviews (p=0.011, p<0.001 respectively). Also, there were statistical

significant differences between educational level and patients' total self-care practices score in both interviews (p=0.001, p<0.001 respectively).

**In addition**, statistical significant differences were found between occupation and patients' total self-care practice classes in both interviews (p=0.001, p=0.045 respectively). The results also revealed statistical significant differences between residence and patients' total scores of self-care practices in both interviews (p<0.001, p=0.020 respectively).

**Table (7) Relation between the total self-care practices scores and patients' clinical data in both interviews.** The results showed that the only statistical significant difference was found between patient's total self-care practices score and the cause of obstruction and (p=0.001) in the first interview.

**Table (1): Frequency and percent distribution of the studied patients according to socio-demographic data.**

Socio-demographic data	Studied patient (n = 60)	
	No.	%
Age (Years)		
20 –	4	6.7
30 –	9	15.0
40 –	26	43.3
50 – 60	21	35.0
Mean ± SD.	53.78 ± 16.48	
Sex		
Male	37	61.7
Female	23	38.3
Level education		
Illiterate	25	41.6
Read and write	10	16.7
Basic education	7	11.7
secondary education	15	25.0
University education	3	5.0
Occupation		
Employee	8	13.3
Manual work	12	20.0
House wife	16	26.7
Retired	3	5.0
Not working	21	35.0
Marital status		
Married	43	71.7
Single	4	6.7
Widowed	12	20.0
Divorced	1	1.7
Residence area		
Rural	35	58.3
Urban	25	41.7

**Table (2): Frequency and percent distribution of the studied patients according to clinical data.**

Clinical data	Studied patient (n = 60)	
	No.	%
<b>Diagnosis:</b>		
Bilateral urinary obstruction	24	40.0
Unilateral urinary obstruction	36	60.0
<b>Obstruction cause:</b>		
Renal calculi	43	71.6
Ureteral tumor	1	1.7
Ureteral stricture	1	1.7
Pelvic malignancies	6	10.0
Enlarged prostate	9	15.0
<b>Surgical history:</b>		
Renal surgeries	26	43.3
Other surgeries	3	5
No surgeries	31	51.7
<b>Family history for urinary obstruction:</b>		
Positive	6	10.0
Negative	54	90.0
<b>Onset of the current complaint:</b>		
< 1month	16	26.7
1-< 6 months	25	41.7
6- < 12months	5	8.3
≥ 1year	14	23.3

<b>Seeking medical help:</b>		
At the onset of symptoms	35	58.3
When symptoms became intolerable	25	41.7
<b>Associated diseases:</b>		
Yes	31	51.7
No	29	48.3

**Table (3): Patients’ universal self-care practices mean scores in both interviews.**

Universal self-care activities	First Interview (n = 60)	Second Interview (n = 60)	p
<b>Nutrition:</b>			
Min. – Max.	1.0 – 11.0	0.0 – 11.0	0.248
Mean ± SD.	5.78 ± 2.09	6.23 ± 2.24	
<b>Physical activities:</b>			
Min. – Max.	0.0 – 11.0	0.0 – 11.0	<0.001*
Mean ± SD.	4.77 ± 3.77	6.68 ± 3.49	
<b>Rest and sleep:</b>			
Min. – Max.	0.0 – 4.0	1.0 – 4.0	0.038*
Mean ± SD.	2.23 ± 0.95	2.53 ± 0.89	
<b>Personal hygiene:</b>			
Min. – Max.	1.0 – 9.0	2.0 – 9.0	<0.001*
Mean ± SD.	5.52 ± 1.95	6.58 ± 1.79	
<b>Elimination:</b>			
Min. – Max.	0.0 – 1.0	0.0 – 1.0	0.083
Mean ± SD.	0.87 ± 0.34	0.92 ± 0.28	
<b>Social interaction:</b>			
Min. – Max.	0.0 – 4.0	0.0 – 4.0	<0.001*
Mean ± SD.	1.83 ± 1.14	2.45 ± 1.19	
<b>Total score of universal self-care practices</b>			
Min. – Max.	6.0 – 33.0	7.0 – 35.0	<0.001*
Mean ± SD.	21.0 ± 6.91	25.40 ± 6.67	

p: p value for **Paired t-test** for comparing between first and second interview

\*: Statistically significant at  $p \leq 0.05$

**Table (4): Patients’ mean percent scores of percutaneous nephrostomy tube and overall self-care practices in both interviews.**

Percutaneous nephrostomy tube care self-care practices.	First Interview (n = 60)	Second Interview(n = 60)	P
<b>Percutaneous nephrostomy tube care</b>			
Min. – Max.	2.0 – 6.0	2.0 – 6.0	0.005*
Mean ± SD.	4.03 ± 1.12	4.43 ± 1.21	
<b>Care of percutaneous nephrostomy tube bag</b>			
Min. – Max.	3.0 – 10.0	4.0 – 10.0	0.038*
Mean ± SD.	5.45 ± 1.36	5.78 ± 1.46	
<b>Percutaneous nephrostomy wound care</b>			
Min. – Max.	0.0 – 16.0	0.0 – 17.0	<0.001*
Mean ± SD.	5.92 ± 6.37	9.18 ± 5.92	
<b>Adherence to the prescribed medication</b>			
Min. – Max.	1.0 – 4.0	1.0 – 4.0	0.659
Mean ± SD.	3.73 ± 0.71	3.73 ± 0.69	
<b>Daily measurement of intake &amp; output</b>			
Min. – Max.	0.0 – 8.0	0.0 – 8.0	0.008*
Mean ± SD.	2.60 ± 1.98	2.12 ± 1.79	
<b>Prevention of percutaneous nephrostomy tube complications</b>			
<b>Infection prevention:</b>			
Min. – Max.	1.0 – 7.0	1.0 – 7.0	0.070
Mean ± SD.	3.70 ± 1.53	3.93 ± 1.61	
<b>Prevention of PCN tube dislodgement&amp; displacement</b>			
Min. – Max.	0.0 – 4.0	0.0 – 4.0	0.389
Mean ± SD.	2.42 ± 1.03	2.50 ± 1.05	

<b>Prevention of PCN tube obstruction:</b>			
Min. – Max.	1.0 – 5.0	1.0 – 5.0	0.086
Mean ± SD.	2.68 ± 1.14	2.85 ± 1.22	
<b>Overall percutaneous nephrostomy tube self-care practices</b>			
Min. – Max.	17.0 – 53.0	17.0 – 51.0	0.038*
Mean ± SD.	30.53 ± 9.36	34.53 ± 9.25	

p: p value for **Paired t-test** for comparing between first and second interview  
 \*: Statistically significant at  $p \leq 0.05$

**Table (5): Percent distribution of the studied patients according to self-care practice classes in both interviews (n = 60).**

Self-care practices subscales	First interview						Second interview						p
	Poor		Fair		Good		Poor		Fair		Good		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
<b>Universal self-care practices subscales</b>													
Nutrition	23	38.3	19	31.7	18	30.0	17	28.3	18	30.0	25	41.7	MH <sub>p</sub> =0.154
Physical activities	33	55.0	8	13.3	19	31.7	18	30.0	9	15.0	33	55.0	MH <sub>p</sub> <0.001*
Rest and sleep	15	25.0	16	26.7	29	48.3	9	15.0	17	28.3	34	56.7	MH <sub>p</sub> =0.078
Personal hygiene	20	33.3	5	8.3	35	58.3	7	11.7	9	15.0	44	73.3	MH <sub>p</sub> =0.001*
Elimination	8	13.3	0	0.0	52	86.7	5	8.3	0	0.0	55	91.7	McN <sub>p</sub> =0.250
Social interaction	25	41.7	18	30.0	17	28.3	12	20.0	19	31.7	29	48.3	MH <sub>p</sub> <0.001*
<b>Total scores of universal self-care practices</b>	<b>26</b>	<b>43.3</b>	<b>18</b>	<b>30.0</b>	<b>16</b>	<b>26.7</b>	<b>13</b>	<b>21.7</b>	<b>18</b>	<b>30.0</b>	<b>29</b>	<b>48.3</b>	MH <sub>p</sub> <0.001*
<b>PCN tube self-care practices subscales</b>													
Care of the tube	1	1.7	22	36.7	37	61.7	2	3.3	13	21.7	45	75.0	MH <sub>p</sub> =0.127
Care of the urinary bag	16	26.7	33	55.0	11	18.3	14	23.3	30	50.0	16	26.7	MH <sub>p</sub> =0.108
PCN wound care	37	61.7	2	3.3	21	35.0	21	35.0	4	6.7	35	58.3	MH <sub>p</sub> <0.001*
Adherence to the prescribed medication	3	5.0	4	6.7	53	88.3	1	1.7	7	11.7	52	86.7	MH <sub>p</sub> =0.819
Daily measuring intake and output	41	68.3	14	23.3	5	8.3	48	80.0	9	15.0	3	5.0	MH <sub>p</sub> =0.029*
Preventing infection	34	56.7	8	13.3	18	30.0	30	50.0	7	11.7	23	38.3	MH <sub>p</sub> =0.072
Preventing PCN dislodgment	30	50.0	22	36.7	8	13.3	27	45.0	23	38.3	10	16.7	MH <sub>p</sub> =0.179
Preventing PCN obstruction	34	56.7	13	21.7	13	21.7	29	48.3	13	21.7	18	30.0	MH <sub>p</sub> =0.018*
<b>Total scores PCN tube self-care practices</b>	<b>20</b>	<b>33.3</b>	<b>25</b>	<b>41.7</b>	<b>15</b>	<b>25.0</b>	<b>12</b>	<b>20.0</b>	<b>29</b>	<b>48.3</b>	<b>19</b>	<b>31.7</b>	<b>0.034*</b>
<b>Overall self-care practices score</b>	<b>22</b>	<b>36.7</b>	<b>26</b>	<b>43.3</b>	<b>12</b>	<b>20.0</b>	<b>10</b>	<b>16.7</b>	<b>29</b>	<b>48.3</b>	<b>21</b>	<b>35.0</b>	<b>&lt;0.001*</b>

MH: Marginal Homogeneity Test, McN: McNemar test,  
 p: p value for comparing between first and second interview,  
 \*: Statistically significant at  $p \leq 0.05$

**Table (6): Relation between classes of self-care practice and patients' socio-demographic data in both interviews**

Socio-demographic data	Self-care practice classes First interview						$\chi^2$	P	Self-care practice classes Second interview						$\chi^2$	P
	Poor <50% n = 22		Fair 50%-64% n = 26		Good >64% n = 12				Poor <50% n = 12		Fair 50%-64% n = 27		Good >64% n = 21			
	No.	%	No.	%	No.	%			No.	%	No.	%	No.	%		
<b>Age (Years)</b>																
20 –	1	4.5	3	11.5	0	0.0	14.648*	MC p=0.011*	0	0.0	2	6.9	2	9.5	23.617*	MC p=<0.001*
30 –	2	9.1	4	15.4	3	25.0			0	0.0	1	3.4	8	38.1		
40 –	5	22.7	13	50.0	8	66.7			1	10.0	17	58.6	8	38.1		
50 – 60	14	63.6	6	23.1	1	8.3			9	90.0	9	31.0	3	14.3		
<b>Sex</b>																
Male	14	63.6	18	69.2	5	41.7	2.696	0.260	7	70.0	17	58.6	13	61.9	0.408	0.815
Female	8	36.4	8	30.8	7	58.3			3	30.0	12	41.4	8	38.1		
<b>Level education</b>																
Illiterate	13	59.1	12	46.2	0	0.0	23.257*	MC p=0.001*	8	80.0	15	51.7	2	9.5	28.189*	MC p=<0.001*
Read and write	4	18.2	5	19.2	1	8.3			1	10.0	6	20.7	3	14.3		
Basic education	3	13.6	3	11.5	1	8.3			1	10.0	5	17.2	1	4.8		
secondary education	2	9.1	6	23.1	7	58.3			0	0.0	3	10.3	12	57.1		
University education	0	0.0	0	0.0	3	25.0			0	0.0	0	0.0	3	14.3		
<b>Occupation</b>																
Employee	3	13.6	4	15.4	1	8.3	23.113*	MC p=0.001*	0	0.0	2	7.4	6	28.6	14.130*	MC p=0.045*
Manual work	0	0.0	9	34.6	3	25.0			2	16.6	5	18.5	5	23.8		
House wife	3	13.6	6	23.1	7	58.3			2	16.6	9	33.3	5	23.8		
Retired	2	9.1	1	3.8	0	0.0			0	0.0	1	3.7	2	9.5		
Not working	14	63.6	6	23.1	1	8.3			8	66.8	10	37.1	3	14.3		
<b>Marital status</b>																
Married	12	54.5	21	80.8	10	83.3	6.399	MC p=0.526	5	50.0	21	72.4	17	81.0	7.998	MC p=0.160
Single	2	9.1	2	7.7	0	0.0			0	0.0	2	6.9	2	9.5		
Widowed	7	31.8	3	11.5	2	16.7			4	40.0	6	20.7	2	9.5		
Divorced	1	4.5	0	0.0	0	0.0			1	10.0	0	0.0	0	0.0		
<b>Residence area</b>																
Rural	20	90.9	13	50.0	2	16.7	18.919*	<0.001*	9	90.0	18	62.1	8	38.1	7.831*	0.020*
Urban	2	9.1	13	50.0	10	83.3			1	10.0	11	37.9	13	61.9		

$\chi^2$ : Chi square test      MC: Monte Carlo      \*: Statistically significant at p ≤ 0.05

**Table (7): Relation between classes of self-care practice and patients' clinical data in both interviews.**

Clinical data	Self-care practice classes First interview						$\chi^2$	P	Self-care practice classes Second interview						$\chi^2$	P
	Poor <50 N = 22		Fair 50 - 64 N = 26		Good >64 N = 12				Poor <50 N = 10		Fair 50 - 64 N = 29		Good >64 N = 21			
	No.	%	No.	%	No.	%			No.	%	No.	%	No.	%		
<b>Diagnosis</b>																
Bilateral urinary obstruction	11	50.0	8	30.8	5	41.7	1.854	0.396	5	50.0	11	37.9	8	38.1	0.500	0.779
Unilateral urinary obstruction	11	50.0	18	69.2	7	58.3			5	50.0	18	62.1	13	61.9		
<b>Obstruction cause</b>																
Renal calculi	9	40.9	22	84.6	12	100.0	20.190*	MC p=0.001*	4	40.0	23	79.3	16	76.2	11.414	MC p=0.099
Ureter tumor	1	4.5	0	0.0	0	0.0			0	0.0	0	0.0	1	4.8		
Ureter stricture	0	0.0	1	3.8	0	0.0			0	0.0	0	0.0	1	4.8		
Pelvic malignancies	6	27.3	0	0.0	0	0.0			3	30.0	2	6.9	1	4.8		
Enlarged prostate	6	27.3	3	11.5	0	0.0			3	30.0	4	13.8	2	9.5		
<b>Surgical history</b>																
Renal surgeries	5	22.7	15	57.7	6	50.0	7.338	MC p=0.072	3	30.0	14	48.3	9	42.9	1.990	MC p=0.785
Other surgeries	1	4.5	1	3.8	1	8.3			0	0.0	2	6.9	1	4.8		
No surgeries	16	72.7	10	38.5	5	41.7			7	70.0	13	44.8	11	52.4		
<b>Family history for urinary obstruction</b>																
Positive	1	4.5	2	7.7	3	25.0	3.321	MC p=0.186	0	0.0	5	17.2	1	4.8	2.519	MC p=0.504
Negative	21	95.5	24	92.3	9	75.0			10	100.0	24	82.8	20	95.2		
<b>Onset of the Current complaint</b>																
< 1month	7	31.8	7	26.9	2	16.7	5.742	MC p=0.441	2	20.0	7	24.1	7	33.3	6.663	MC p=0.532
1- < 6 months	11	50.0	8	30.8	6	50.0			6	60.0	12	41.4	7	33.3		
6- < 12months	2	9.1	2	7.7	1	8.3			2	20.0	2	6.9	1	4.8		
≥ year	2	9.1	9	34.6	3	25.0			0	0.0	8	27.6	6	28.6		
<b>Seeking medical help</b>																
At the onset of symptoms	11	50.0	18	69.2	6	50.0	2.242	0.326	6	60.0	16	55.2	13	61.9	0.241	0.887
When symptoms became intolerable	11	50.0	8	30.8	6	50.0			4	40.0	13	44.8	8	38.1		
<b>Associated diseases</b>																
Yes	15	68.2	12	46.2	4	33.3	4.334	0.114	7	70.0	17	58.6	7	33.3	4.734	0.094
No	7	31.8	14	53.8	8	66.7			3	30.0	12	41.4	14	66.7		

$\chi^2$ : Chi square test MC: Monte Carlo  
\*: Statistically significant at p ≤ 0.05

#### IV. Discussion

Patients with PCN may develop many complications including major complications as; bleeding and sepsis and minor complications as urinary tract infection, local inflammatory skin reaction, in addition to catheter-related problems such as displacement, dislodgement or obstruction<sup>(26)</sup>. Recent clinical evidences have suggested patient/ care giver engagement in performing self-care practices and routine maintenance of the drainage catheter to reduce the risk of PCN associated complications and improve their quality of life<sup>(16, 27)</sup>. Based on this fact, the aim of the present study was to assess the self-care practices done by patients with PCN tube to meet their self-care requisites.

The main findings denoted poor universal self-care practices among the highest percent of participants, especially in the first interview, while fair practices were noticed among the highest percent of them as regards the PCN, and the overall self-care practices in both interviews. More elaboration, in the light of the recent relevant studies, can be discussed regarding the participants' characteristics and their practices as follows:



The socio-demographic characteristics showed that a high percentage of participants were in the middle adulthood, this is in agreement with Eltigani et al., (2013)<sup>(28)</sup> and Masaki (2015)<sup>(29)</sup>. Also males represented a higher percentage which was interpreted by Cutie & Mcdougal (2008)<sup>(30)</sup> as the possibility of benign prostatic hypertrophy, carcinoma, and the higher incidence of urinary out flow obstruction & urinary stones especially in men older than 50 years. In addition, high percent of illiteracy, no work status among participants may interpret their seeking for medical help from free governmental hospital (study setting) as they didn't have health insurance and the higher percent of them lived in rural areas, where there are no tertiary health care settings. Furthermore, the high percent of those not working may be explained by retirement in this age group, and presence of fatigue, renal colic and urinary manifestations. Also, the study revealed a majority of married participant which was congruent with the results of Reda (2017)<sup>(25)</sup>, which might suggest possibility of having care giver.

Regarding clinical data, the highest percentage of participants had unilateral urinary obstruction, which contradicts Van Aardt et al., (2017)<sup>(31)</sup> who reported that the majority of patients had bilateral urinary obstruction. Moreover, the cause of obstruction for the majority of participants in the present study is renal calculi which was cited by Frokiaer (2016)<sup>(32)</sup> as the most common cause of obstruction, this result is congruent with Eltigani et al., (2013)<sup>(28)</sup>.

As regards the universal self-care practices, nutritional self-care practices showed a high percent who didn't have the recommended daily fluid intake, this result comes in line with Sharifabad et al., (2015)<sup>(33)</sup>. Also, the majority of participants who had renal stones didn't avoid stone forming food, this was the same with El-Sheikha (2018)<sup>(34)</sup>. This was interpreted by Sharifabad et al., (2015)<sup>(33)</sup> as lacking knowledge about their stone forming food, in addition to high percentage of illiteracy among the current study participants and lacking of health care services in rural areas. In this context, Stokes et al., (2014)<sup>(27)</sup> emphasized instructing patients to remain well hydrated.

Unfortunately, more than half of participants reported poor physical activity in the first interview. This may be due to presence of pain, anxiety from having external tube, or poor knowledge about how to ambulate safely with the tube especially outdoors. This result is in line with El-Sheikha (2018)<sup>(34)</sup>, while it contradicts with that of Abd El-Fattah (2015)<sup>(19)</sup> who found that the majority of patients reported good physical activity practices. In the second interview, the high percent was to those reported good physical activities. This may be due to improvement of participants' general condition and that they became more familiar with tube due to lesser pain severity. Concerning exercise, the majority of participants didn't perform any exercises in both interviews. This may be due to presence of pain that may limit their ability to perform any exercises post-operatively. In that context, El-Sheikha (2018)<sup>(34)</sup> reported poor health-related knowledge about post-operative exercises. Also, this was similar to the results of Sharifabad et al., (2015)<sup>(33)</sup> who reported that the majority didn't practice any preventive behavior such as walking or exercises. On the contrary, the majority of participants reported good self-care practices in both interviews regarding elimination which can be explained by that they had no post obstructive diuresis (POD) symptoms as the highest percentage of participants had unilateral urinary obstruction which was supported by Zhu et al., (2015)<sup>(35)</sup> who reported that POD occurs more commonly after bilateral urinary obstruction, not in unilateral urinary obstruction.

As for PCN tube self-care practices, the majority of participants had poor self-care practices in both interviews regarding daily measurement of intake and output, this may be rationalized by lacking of awareness and instructions about the importance of measuring fluid intake and output and the right way to measure them. This result is in harmony with Reda (2017)<sup>(25)</sup> who reported that patients didn't measure or record urine output. In this context, two recent studies: Leslie et al., (2019)<sup>(36)</sup> and Harrison et al., (2018)<sup>(37)</sup> concluded that pathological POD puts the patient at risk for hypovolemia and hemodynamic instability as well as acid-base disturbances and electrolyte imbalances, they suggested that careful monitoring of fluid status is necessary for early diagnosis and treatment of pathologic POD. On the other hand, the majority of participants reported good self-care practices regarding adherence to the prescribed medications in both interviews. This may be related to their fear from recurrence of symptoms, and instructions emphasized by physician about the impact of un-prescribed medication and non-compliance with the therapeutic regimen on renal function. This result contradicts with El-Sheikha (2018)<sup>(34)</sup> who found poor compliance to therapeutic regimen among the majority of patients.

The current study revealed that a high percent of participants didn't change the bag weekly which might refer to limited financial resources as the highest percent of them were not working, and they were reluctant to change it at home due to fear of malfunctioning after manipulation. Concerning PCN wound care, poor wound care self-care practices in the first interview was found due to lack of supplies, lack of guidance and instructions given by the health team members about the way to change dressing at home. In that context, Abd El-Fattah (2015)<sup>(19)</sup> reported that nurses didn't perform PCN wound care accurately nor give instructions regarding home wound care, as they believed that it is the responsibility of the physician. Regarding prevention of complications, the current study showed that the majority of participants didn't monitor signs of infection,

this could be explained by lack of adequate instructions from nurses before patients' discharge, this was supported by the finding of Abd El-Fattah (2015) <sup>(19)</sup> who reported high rate of post-operative infection due to lack of nurses' instructions. Besides, the current study participants didn't secure the drainage bag as they didn't anticipate PCN dislodgement shortly after weeks of insertion. As regards monitoring signs of tube obstruction, a high percent didn't monitor them; this might be due to negative surgical history hence it was their first experience with wound and external tube. This poor self-care practices concerning prevention of PCN tube complications was consistent with the results of El-Sheikha (2018) <sup>(34)</sup> who found poor health-related knowledge about preventing post-operative complications.

For better understanding of the results, the relation between socio-demographic data and patient's self-care practices was explored; where older patients (50- 60) years had the poorest self-care practices. This could be due to decline in physical ability, while patients of age group from 40 to <50 years had the highest self-care practices. This result is not consistent with the results of El-Sheikha (2018) <sup>(34)</sup> who reported that younger age was related to poor health-related behaviors. Also, the results showed that illiterate patients had the poorest self-care practices; this may be due to the role of education in raising health awareness. This result is in agreement with El-Sheikha (2018) <sup>(34)</sup> who concluded that patients with higher educational level showed better understanding toward their disease management. In addition, participants who were not working had the poorest level of self-care practices; this may be due to lack of financial resources. Also, patients who lived in rural areas had the poorest practices in both interviews, this may be due to lack of health awareness in rural areas beside low education and lack of health care facilities, this was not the finding of Monteiro et al. (2013) <sup>(38)</sup> who stated that rural and urban patients are similar in their knowledge and attitude toward their illness. On the other hand, participants' sex showed no significant relation with self-care practice scores. This might be interpreted by the finding of Doan et al., (2014) <sup>(39)</sup> who reported no significant relation between patient's knowledge and sex. In addition, clinical data were not related to self-care practices except those with upper renal obstruction, especially, in the first interview.

In light of the previous findings, participants in this study showed improved self-care practices in the second interview. This can be interpreted by the finding of Van Aardt et al., (2017) <sup>(31)</sup> who reported improvement of patient's general condition after PCN tube insertion. Thus, practices that needed physical capabilities showed significantly higher mean scores in the second interview; either universal or PCN-related practices. In the same context, those who performed good practices increased significantly in the second interview. On the other hand, practices that depend on participants' knowledge showed no significant increase neither in mean scores nor in percent of those who performed good practices. Poor self-care practice was found among those who were older, illiterate, not working and living in rural areas, and only those who had renal calculi.

In conclusion, the present study has contributed to increase the body of knowledge for nurses working in health care settings about self-care practices done by the patients with PCN tube in order to meet the self-care deficits classified as poor practices.

## **V. Conclusion**

**Based on the current findings, it can be concluded that:**

Poor universal self-care practices were reported by a high percent of participants, especially in the first interview, while fair PCN tube care and overall self-care practices were reported among the highest percent of them. The highest percent of the participants had poor self-care related to physical activities and daily measuring of intake and output in both interviews, while elimination and adherence to the prescribed medications were the highest percentage of good self-care practices.

## **VI. Recommendations**

**The following recommendations are suggested:**

1. Develop educational programs for self-care practices regarding PCN tube for patients, reinforce the importance of daily measurement of intake and output and physical activity with providing safe ways to avoid tube dislodgement.
2. Improve nurse's practices through encouraging them to participate in educational programs, attending seminars, workshops and lectures related to care of PCN tube.
3. Study the effect of a health- education program on improving patients' knowledge and self-care practice of patients with PCN tube.

## **Acknowledgements**

The researchers are grateful to the responsible authorities and staff of the National Medical Institute of Damanhour, Egypt. Also, they are thankful to patients who participated in this research.

**REFERENCES**

- [1]. Preminger G. Obstructive uropathy: Urinary tract obstruction. Retrieved from: <https://www.msmanuals.com/professional/genitourinary-disorders/obstructive-uropathy/obstructive-uropathy>. [Retrieved on 11 May 2019]
- [2]. Fauci A, Braunwald E, Kasper D, Hauser S, Longo D, Jameson J, Loscalzo J. Harrison's principles of internal medicine, 17<sup>th</sup> ed. New York: Mc Graw-Hill companies, 2008.
- [3]. Hautmann S. Nephrostomy. Retrieved from: <https://emedicine.medscape.com/article/445893-overview#a8>. [Retrieved on 11 May 2019].
- [4]. Bayne D, Taylor ER, Hampson L, Chi T, Stoller ML. Determinants of nephrostomy tube dislodgment after percutaneous nephrolithotomy. *J Endourol*. 2015;29(3):289-292. doi: 10.1089/end.2014.0387.
- [5]. Gallagher KM, Hughes J. Urinary tract obstruction. In: Johnson R, Feehally J, Floege J, Tonelli M.( Eds). *Comprehensive clinical nephrology*. 6<sup>th</sup>ed. Philadelphia: Saunders Elsevier, 2019;p. 704-709.
- [6]. Lipkin M, Shah O. Complications of percutaneous renal surgery. In: Taneja S.( Eds). *Complications of urologic surgery, prevention and management*. 4<sup>th</sup> ed. Philadelphia: Saunders Elsevier, 2010; p. 317-329.
- [7]. Al-Qahtani S, Traxer O. Bowel and other organ injury during percutaneous renal surgery. In: Smith A, Badlani G, Preminger G, Kavoussi L. (Eds). *Smith's Textbook of Endourology volume I&II*. 3<sup>rd</sup> ed. Oxford: Wiley-Blackwell, 2012;p. 349-353.
- [8]. Ganter Ritz V, Speroni KG, Walbridge D. Reducing Complications and Hospitalizations Through an Innovative Catheter Care Clinic for Percutaneous Nephrostomy Catheter Patients. *J Radiol Nurs*. 2016; 35(4): 275-280.
- [9]. World Health Organization, Regional Office for South-East Asia. Self care for health. World Health Organization (WHO). *Self-care for health: A Handbook for community health workers and volunteers*. WHO Regional Office for South-East Asia. 2014
- [10]. Fawcett J. *Analysis and evaluation of conceptual models of nursing*, 3<sup>rd</sup> ed. Philadelphia: FA Davis Company. 1995
- [11]. Masters K. *Nursing theories: A framework for professional practice*, 2<sup>nd</sup> ed. Burlington: Jones & Bartlett learning. 2015
- [12]. Lorig KR, Sobel DS, Ritter PL, Laurent, D, Hobbs M. Effect of a self-management program on patients with chronic disease. *Eff Clin Pract*. 2001; 4(6):256-262.
- [13]. Shaheen S. Self-care practices of patients with lumbar disc prolapse in relation to their post treatment disability levels. Unpublished Master Thesis, Faculty of Nursing: Alexandria University, Egypt, 2013.
- [14]. Allen DJ, Longhorn SE, Philp T, Smith RD, Choong S. Percutaneous urinary drainage and ureteric stenting in malignant disease. *Clin Oncol (R Coll Radiol)*. 2010; 22(9): 733-739.doi: 10.1016/j.clon.2010.07.004.
- [15]. Siddiq DM, Darouiche RO. Infectious complications associated with percutaneous nephrostomy catheters: Do we know enough?. *Int J Artif Organs*. 2012; 35(10):898-907. doi: 10.5301/ijao.5000146.
- [16]. Canadian Agency for Drugs and Technologies in Health (CADTH). *Nephrostomy and Biliary Tube Management: A Review of the Clinical Evidence and Guidelines*. Ottawa: CADTH, 2014.
- [17]. Agency for Clinical Innovation (ACI). *Management of patients with nephrostomy tubes: Clinical guideline and patient information*. Chatswood NSW: ACI, 2010.
- [18]. Lowenstein AJ, Bradshaw M J, Fuszard B. *Fuszard's innovative teaching strategies in nursing*. Sudbury, MA: Jones & Bartlett Learning, 2004.
- [19]. Abd El-fattah K. Developing post-operative nursing care standards for patients undergoing percutaneous nephrostomy tube. Unpublished Master Thesis, Faculty of Nursing: Assuit University, Egypt, 2015.
- [20]. Norfolk and Norwich university hospitals. Guidelines for caring for a nephrostomy at home district nurses. Retrieved from <http://www.nnuh.nhs.uk/publication/download/caring-for-a-nephrostomy-at-home-guidelines-for-district-nurses-41-0-45/>. [Retrieved on 7 March 2018.]
- [21]. University of Washington Medical Center. *Percutaneous nephrostomy Tube: What to expect*. USA: University of Washington Medical Center.2014.
- [22]. Berbiglia V. Orem's self-care deficit theory in nursing practice. In: Alligood MR( Eds). *Nursing Theorists and Their Work*. 5<sup>th</sup> ed. St Louis: Elsevier Health Sciences, 2017; p. 222-242.
- [23]. Zeidel M. Obstructive uropathy. In: Goldman L, Schafer AI. (Eds). *Goldman-Cecil Medicine*. 25<sup>th</sup> ed. Philadelphia: Elsevier Health Sciences, 2016; p. 799-803.
- [24]. Taylor S. Self-care deficit theory of nursing. In : Marriner Tomey A, Alligood M(Eds.). *Nursing theorists and their work*. 6<sup>th</sup> ed . St Louis: Mosby, 2006; p. 267-296.
- [25]. Reda J. Self-management for patients with percutaneous nephrostomy tube. *IOSR-JNHS*. 2017; 6 ( 6 ): 48-52. doi: 10.9790/1959-0606024852
- [26]. Turo R, Horsu S, Broome J, Das S, Gulur D, Pettersson B, Doyle G, Awsare N. Complications of percutaneous nephrostomy in a district general hospital. *Turk J Urol*. 2018; 44(6): 478-483. doi: 10.5152/tud.2018.37336
- [27]. Stokes L, Meranze S. Percutaneous nephrostomy, cystostomy, and nephroureteral stenting. In: Mauro M, Murphy K, Thomson K, Venbrux A, Morgan R. (Eds). *Image guided interventions*, 2<sup>nd</sup> ed. Philadelphia: Saunders Elsevier, 2014; p. 1076-1080.
- [28]. Eltigani HM, Hassan T, Abbo A, Hussein A. The commonest indication and complications following percutaneous nephrostomy placement at Al-Ribat university hospital. *Sudan Med J*. 2013; 49(2): 77-79.
- [29]. Masaki M. The role of percutaneous nephrostomy in the management of obstructive uropathy secondary to pelvic malignancies at Kenyatta national hospital. Published Master Thesis, Faculty of Medicine: Nairobi University, 2015.
- [30]. Cutie C, McDougal W. Obstructive uropathy. In: E Akalin.(Ed). *Therapy in nephrology & hypertension*. 3<sup>rd</sup> ed. Philadelphia: Saunders Elsevier, 2008; p. 469-475.
- [31]. Van Aardt MC, Van Aardt J, Mouton A. Impact of percutaneous nephrostomy in South African women with advanced cervical cancer and obstructive uropathy. *South Afr j gynaecol oncol*. 2017; 9(1):6-10.
- [32]. Frokiaer J. Urinary tract obstruction. In: Shorecki K, Chertow G, Marsden P, Taal M, Yu A. Brenner M.(Eds). *Brenner and rector's. The kidney*. 10<sup>th</sup> ed. Philadelphia: Saunders Elsevier, 2016; p. 1257- 1282.
- [33]. Sharifabad M, Pirouzeh R., Hemayati R, Askarshahi M.. Preventive behaviors in recurrent kidney stone and barriers to perform these behaviors. *JRH*. 2015; 5(2):p 230-239.
- [34]. El-Sheikha M. Assessment of health related behaviors among patients post percutaneous nephrolithotomy. Unpublished Master Thesis, Faculty of Nursing: Alexandria University, Egypt. 2018.
- [35]. Zhu GG, Rais-Bahrami S. Diagnosis and Management of Obstructive Uropathy in the Setting of Advanced Pelvic Malignancies. *J Nephrol Res*. 2015; 1(3):p 90-96.
- [36]. Leslie SW, Sajjad H, Sharma S.. Postobstructive diuresis. Retrieved from : <https://www.ncbi.nlm.nih.gov/books/NBK459387/>. [Retrieved on 4may 2019.]

- [37]. Harrison S, Lasri A, Jabbour Y, Slaoui A, Djamal J, Karmouni T, El Khader K, Abdelatif K, Andaloussi A. Post-obstructive diuresis: Physiopathology, diagnosis and management after urological treatment of obstructive renal failure. *Open J Urol.* 2018; 8(09): 267-274. doi: 10.4236/oju.2018.89030.
- [38]. Monteiro N, Balogun S. Urban and rural perception of illness in Ethiopia. *IOSR-JHSS.* 2013;8 (3):p 43-51.
- [39]. Doan QA, Preechawong, S. Factors related to dietary behaviors in vietnamese persons with recurrent kidney stone post-operation. *J Health Res.*2014; 28(6):p 413-418.

Doaa Amin Ahmed, et. al. "Self-Care Practices among Adult Patients with percutaneous Nephrostomy Tube." *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*, 9(3), 2020, pp. 41-52.