



EFFECT OF DESIGNATED NURSING GUIDELINES ON THE INCIDENCE OF COMPLICATIONS FOR PATIENTS UNDERGOING PERCUTANEOUS NEPHROSTOMY TUBE

Zeinab Hussien Ali¹, Shaimaa Mohamed Mohamed², Mohamed
Mahmoud Sayed Ahmed³

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Abstract

Nephrostomy tube is inserted directly into the kidney's collecting system to allow permanent or temporary urinary drainage. Many complications may result either from insertion procedure or presence of catheter in the body.

Aim of the study: To evaluate the effect of designated nursing guidelines on the incidence of complications for patients undergoing percutaneous nephrostomy tube.

Research design: A quasi experimental design.

Setting: Urology surgery department and urology outpatient clinic in Fayoum University Hospital.

Methods: A purposive sample of 60 adult patients, recruited randomly into two equal groups (30 patients in each).

Tools: Included, Structured Interview questionnaire, patients knowledge assessment questionnaire, patients practice observational checklist, percutaneous nephrostomy tube complications observational checklist.

Results: There was a statistical significant difference between both groups as regarding knowledge, self-care practices (P-value <0.001), incidence of complications post implementation of nursing guidelines with higher percentage of complications among control group.

Conclusion: Application of the guidelines had a positive effect on the outcomes of patients undergoing percutaneous nephrostomy tube.

Recommendations: Nurses should apply the educational instrument that would help patients improve their self-care practices to reach positive outcomes.

Keywords: Complications, Nephrostomy tube, guidelines

¹Professor of Medical Surgical Nursing, Faculty of Nursing Helwan University, Egypt.

²Assistant Lecturer of Medical Surgical Nursing, Faculty of Nursing Fayoum University, Egypt.

³Lecturer of Urology, Faculty of Medicine Fayoum University, Egypt.

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1. INTRODUCTION

Urinary obstruction is a structural or functional obstruction of normal urine flow: congenital or acquired, complete or partial, temporary or permanent. Urinary obstruction is one of the most common conditions affecting the urinary system and a significant cause of hydronephrosis and about 9.2% of chronic kidney disease. Urolithiasis, benign prostatic hypertrophy, advanced malignancies and congenital malformations constitute the main causes (Peteinaris et al., 2020). The 0.9% of the annual

discharges of the US hospitals has the diagnosis of obstructive uropathy.

The goal of an initial treatment of urinary tract obstruction is to resolve the obstruction, later to treat the cause that led to the obstruction. The National Institute of Clinical Excellence (NICE) and European Association of Urology (EAU) guidelines, 2019 (Level 1b evidence) considers either retrograde ureteric stent or percutaneous nephrostomy is an acceptable intervention to treat an obstructed renal system and the decision lies with the attending urologist.

A percutaneous nephrostomy tube (PCN) is a narrow-gauge pigtail drain inserted into the renal pelvis to divert urine away from the ureter and bladder into an external drainage bag. percutaneous nephrostomy tube is often temporary and removed when the obstruction has resolved or can be bypassed with an internalized ureteric stent, or when the therapeutic intervention is complete. However, in rare cases (e.g., advanced cancer or retroperitoneal fibrosis) a nephrostomy tube may be permanent or semi-permanent (**Martin & Baker, 2019**).

Patients who do not have the resources or skills to effectively manage their condition may subject to complications, which include, but not limited to, obstructed urine flow, inflammation of the skin, local infection, catheter dislodgment, and in severe cases, sepsis (**Buttisha, et al., 2020**).

The prevention of these complications can be accomplished through the use of appropriate care. However, with the support of an interdisciplinary team and effective education, the catheter can be successfully managed. These actions belong to the nurse and to the patient, who must be instructed in self-care about preparation and management of his/her nephrostomy. Canadian Agency for Drugs and Technologies in Health (CADTH), 2014, 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.

Patient knowledge regarding disease and self-care practices are found to be important for patients to achieve the desired treatment targets and contribute meaningfully in the management of their disease (Niguse, et al., 2019). Hence, health professionals must dynamically and carefully intervene in improving patients' self-care ability through well-designed and effective caring systems (Riegel, et al., 2021).

• **Significance of Study:**

Percutaneous nephrostomy tube (PCN) placement is a procedure performed on daily basis in the urological department. The vast majority of nephrostomy tubes are placed to address urinary obstruction representing 85- 90% of patients (Ocampo, 2022). Approximately 55% of PCN cases performed in the interventional radiology department are for long-term use that is defined as PCN placement required for more than 2 weeks in duration (**Carley, 2020**).

Although PCN is a common procedure there are no extents from complications. In adults, the rate of acute complications related directly to tube placement, such as pleural injury and bleeding, range from 0.3% to 4.7%, while subacute to chronic

complications including infection, dislodgement, and kinking are reported as high as 45%. In children, published rates of complications range from 0.2% to 17% (**Yoo, et al., 2021**). approximately 4 to 8% of PCNs, complications arise necessitate specialized care or lengthy hospitalization (**Mohamed, et al., 2022**).

• **Aim of the Study**

The present study aimed to evaluate the effect of designated nursing guidelines on the incidence of complications for patients undergoing percutaneous nephrostomy tube through the following objectives :

- Assess needs of patients undergoing percutaneous nephrostomy tube.
- Design nursing guidelines for patients with percutaneous nephrostomy tube based on reviewing relevant literatures.
- Implement nursing guidelines for patients with percutaneous nephrostomy tube.
- Evaluate the effect of implementing designated nursing guidelines on the incidence of complications for patients with nephrostomy tube.

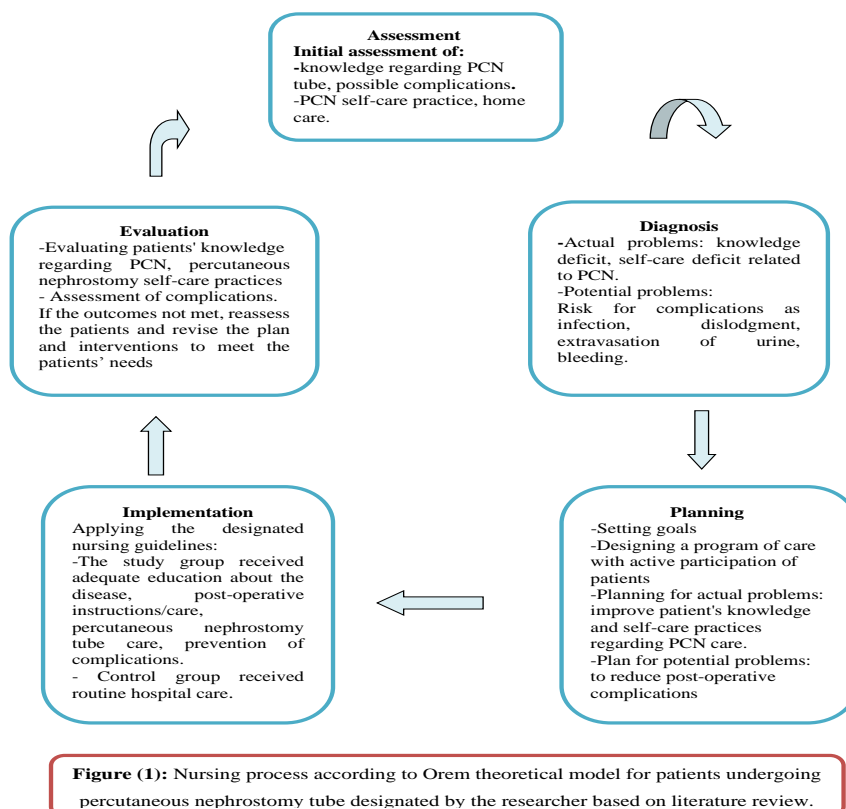
• **Research Hypothesis:**

At the end of the study patients undergoing percutaneous nephrostomy tube placement who will receive the designated nursing guidelines will have no or less complications following percutaneous nephrostomy tube insertion compared with those patients who will receive routine hospital care as measured by tool IV.

• **Theoretical Framework**

The present study employed Orem's Self-care Deficit Nursing Theory (SCDNT) as a theoretical framework of reference in implementing the self-care management program. the theory includes the theoretical constructs of Self-Care, Self-Care Deficits and Nursing Systems (**Marques, et al., 2022**). According to the theory, nursing is required in situations of self-care deficits, which occurs when an individual is unable to fulfill self-care activities. It can encompass limitations in knowledge, the ability to perform actions, or making decisions, and nurses play an essential role in fulfilling the self-care need activities using the theory of the nursing system (**Aguirre, 2022**).

Orem comprises the nursing process as a method of determining self-care deficiencies that allows the definition of the roles of nurses and the self-care agent, so as to satisfy the self-care requisites. which is configured in the action of the nurse to intervene on the needs of self-care, as well as to assess continuously the effects of this action (**Gonzalo, 2021**).



2. SUBJECT AND METHODS

Research Design:

A Quasi-experimental design was utilized to conduct the study.

Setting:

This study was conducted in Urology Outpatient Clinic and Urology Surgery department in Fayoum University Hospital.

Subject:

A purposive sample of 60 adult patients from both genders undergoing percutaneous nephrostomy tube, allocated randomly into two equal groups study, control (30 patients for each group), according to the following criteria:

Inclusion criteria:

- Adult Patients from both gender agree to participate in the study.
- Patient undergoing percutaneous nephrostomy tube insertion.
- Patient able to communicate verbally.

Exclusion criteria:

- Pregnant patient.
- Marked obesity (BMI >40 kg/m²).
- Patient with active urinary tract infection.

Tools of Data Collection:

Four tools were used to collect the data according to the following:

Tool I: Structured Interview questionnaire

It developed by the researcher based on relevant, current national and international literature (Amirhosseini, et al., 2020), consists of three parts that were fulfilled by the researcher and its includes: socio-demographic characteristics (age, gender, marital status, occupation, residence and BMI). Health related data and Post-operative data which include: side of nephrostomy tube and duration of hospital stay.

Tool II: patients knowledge assessment questionnaire.

This tool developed by the researcher based on relevant, current literature (Abdel Fattah, et al., 2015) to assess patient's knowledge regarding percutaneous nephrostomy tube items and including two parts:(1) Patients' knowledge regarding anatomy and physiology of urinary system, percutaneous nephrostomy tube and it's possible complications, it consists of 10 multiple choice questions (MCQ), (2): Patients' knowledge regarding care of percutaneous nephrostomy tube and home care (11 multiple choice question(MCQ)).

Scoring system: the questionnaire consisting of 21 questions, the correct answer was scored 1 point and incorrect answer was scored 0 point, and satisfactory level was detected based on statistical analysis as following:

Satisfactory knowledge level $\geq 70\%$

Unsatisfactory knowledge level $\leq 70\%$

Tool (III): patient's practice observational checklist.

This tool developed by the researcher based on relevant, current literature (Abdel Fattah, et al., 2015) (Buttisha, et al., 2019), to assess self-care practices of patients with percutaneous nephrostomy tube after procedure. Consists of 5 main parts as the following:

Part I: to assess patient's practice regarding nephrostomy tube care (4 items).

Part II: to assess patient's practice regarding care of the urinary bag (8 items).

Part III: to assess patient's practice regarding percutaneous nephrostomy wound care (8 items).

Part IV: to assess patient's practice regarding prevention of infection (7 items).

Part V: to assess patient's practice regarding daily measurement of intake and output (4 items. (

Scoring system: the total items were (31), each step has 2 levels of answers (not done and done completely). These were respectively scored (0 and 1). The score of the items were summed up and the total divided by the number of items, giving a mean score. These scores were converted in a percent score, and means and standard deviations were computed. Satisfactory level was detected based on statistical analysis as following:

Satisfactory practice level $\geq 70\%$

Unsatisfactory practice level $\leq 70\%$

Tool IV: Percutaneous nephrostomy tube complications observational checklist.

This tool developed by the researcher based on relevant, current national and international literature (Elbatanouny, et al., 2020) (Turo, et al., 2018) to assess expected complications, including minor and major complications. Minor complications including: transient hematuria, urinary tract infection, tube related complications like: kinking of the tube, obstruction, dislodgment, and extravasation of urine, vasovagal symptoms and inflammation of the skin. Major complications including Hemorrhage: macroscopic hematuria require blood transfusion, wound Infection, pleural complications, and bowel transgression.

Scoring system: Complications assessed as present or not present, respectively scored as 1, and 0 point for each problem.

Ethical consideration:

An ethical approval to conduct the proposed study was obtained from the Scientific Research, Ethical Committee of the faculty of Nursing, Helwan University. An official permission was obtained from the administrative authority of the selected setting for the current study.

The researcher obtained consent from the studied patients, explaining the purpose and nature of the study, stating the possibility to withdraw at any time, confidentiality of data assured by the researcher by using codes to identify participants instead of names or any other personal identifiers.

Pilot study:

A Pilot study was carried out with 10% (not less than 10 patients) of the sample under study. Patients who shared in pilot study excluded from the study sample.

Field Work:

Study was conducted within eight months from August 2021 to the end of March 2022 and carried out through five phases: assessment, planning, implementing and evaluation.

Assessment Phase:

- The researcher collect data regarding to participants' sociodemographic and health history. Data collection was held through structured interviews and medical record chart.

- each patient was assessed individually during preoperative period, and data collection was filled by the researcher, by using tools(I), tool (II), tool (III) for both study and control groups.

II- Second phase (diagnosis phase)

According to Orem's theory diagnosis provides the basis for selection of nursing interventions to achieve outcomes for which the nurse is accountable, actual problems includes: knowledge deficit, self-care deficit regarding to PCN tube, Potential problem: risk for complications as infection, dislodgment, extravasation of urine, bleeding.

III- Planning and design phase:

-The researcher plan intervention, design the educational section's content according to the patient's needs. Detected needs, requirements and deficiencies were translated into the aim and objectives of the educational program sections in the form of guidelines booklet.

- The educational training program was written in simple Arabic language easy to be understood from patients.

III- Implementation phase:

- Self-care program was developed by the researcher and implemented immediately after the pre-test. No intervention was performed for the control group during the study.

- implementing the designated nursing guidelines for the study group (30) patient, in term of post-operative care, educational sessions, discharge instructions and follow up. the program was divided into 6 sessions (2 theoretical, and 4 practical sessions) each session was implemented in one day. The duration of each session varied, according to its contents as well as the clients' response.

- Each participant obtains a copy of the nursing guidelines booklet. The researcher used pictures for illustration, and video to educate the patient.

IV- Evaluation phase:

Evaluation was done by using the posttest questionnaire which was the same format of pre-test, using assessment tools (II, III) post 15 days of intervention, as well both groups were observed for the incidence of complications during hospitalization,

after 2 weeks, and after 4 weeks of discharge, using tool (IV).

3. RESULTS

Table (1): Frequency and percentage distribution of sociodemographic characteristics for both Study and control groups (N: 60).

Variables	Study group (n=30)		Control group (n=30)		Test	p-value
Age					t-test	
Mean ±SD	43.7±10.2		45.2±10.6		-0.56	0.6
Gender	No.	%	No.	%	X² test	
Male	19	63.3%	22	73.3%	0.69	0.6
Female	11	36.7%	8	26.7%		
Marital status						
Single	5	16.7%	6	20%	0.11	0.9
Married	25	83.3%	24	80%		
Education level						
Illiterate	6	20%	9	30%	3.3	0.5
Read and write	3	10%	2	6.7%		
Basic education	7	23.3%	4	13.3%		
Secondary	9	30%	10	33.3%		
University	5	16.7%	5	16.7%		
Occupation						
Not working	12	40%	14	46.7%	3.7	0.3
Literal Work	10	33.3%	11	36.7%		
Retired	3	10%	0	0%		
Employee	5	16.7%	5	16.7%		
Residence						
Rural	24	80%	25	83.3%	0.11	0.9
Urban	6	20%	5	16.7%		
Body Mass Index (kg/m²)						
Low	3	10%	1	3.3%	1.3	0.7
Normal	14	46.7%	17	56.7%		
Over weight	11	36.7%	10	33.3%		
Obese	2	6.7%	2	6.7%		

Table (1) illustrates that there was no statistical significant difference between study and control groups with p-value >0.05, as regarding socio-demographic characteristics like; age, gender,

marital status, educational level, occupation, residence and BMI, which indicated proper matching between groups in these variables.

Table (2): Frequency and percentage distribution of health related data for both study and control groups (N:60).

Variables	Study group (n=30)		Control group (n=30)		X ²	p-value
Diagnosis	No.	%	No.	%	X² test	
Renal calculi	21	70%	18	60%	3.3	0.7
Ureteric stricture	1	3.3%	0	0%		
Prostatic hypertrophy	4	13.3%	6	20%		
Radical cystectomy	2	6.6%	1	3.3%		
Hemorrhagic cystitis	1	3.3%	3	10%		
Ureteric obstruction	1	3.3%	2	6.7%		
Co morbidity						
No	17	56.7%	22	73.3%	4.2	0.4

Diabetes Mellitus	5	16.7%	4	13.3%		
Hypertension	4	13.3%	1	3.3%		
Chronic lung disease	0	0%	1	3.3%		
Others	4	13.3%	2	6.7%		
Surgical history						
No surgeries	11	36.7%	17	56.7%	4.6	0.1
Urological surgeries	9	30%	5	16.7%		
Others	10	33.3%	8	26.7%		
Time of consultation in the current problem						
At the onset of symptoms	23	76.7%	24	80%	0	1
When symptoms are not tolerated	7	23.3%	6	20%		
Post-operative data						
Side of Percutaneous nephrostomy tube						
Unilateral	30	100%	30	100%	0	1
Duration of hospitalization.					T –test	
Mean /SD (days)	7.9 / 3.5		10.2 / 4.7		-2.1	0.03*

*statistical significant difference with p-value ≤ 0.05

Table (2) illustrated that there was no statistical significant difference with p-value >0.05 between study and control groups as regarding health related data like diagnosis, comorbidities, surgical history, time of consultation, side of Percutaneous nephrostomy tube, with high percentage of renal

calculi diagnosis among both study and control groups.

On the other hand; there was statistical significant difference between study and control groups as regarding duration of hospital stay with p-value (0.03).

Table (3): Frequency and percentage distribution of patients' knowledge levels before and after implementation of designated nursing guidelines for study and control groups (N:60).

Variables	Study group (n=30)		Control group (n=30)		X ²	p-value
	No.	%	No.	%		
Knowledge before						
Unsatisfactory	30	100%	30	100%	----	----
Satisfactory	0	0%	0	0%		
Knowledge after						
Unsatisfactory	4	13.3%	27	90%	35.3	<0.001*
Satisfactory	26	86.7%	3	10%		
X ²	45.8		3.2			
p-value	<0.001*		0.07			

Table (3) showed that; there was no statistical significant difference between study and control groups as regarding knowledge level before the implementation of designated nursing guidelines with p-value >0.05 .

On the other hands, there was a statistical significant higher percentage of satisfactory level of knowledge 86.7% in study group after implementation of designated nursing guidelines with p-value <0.001 compared with control group.

Figure (1): Total knowledge and practice score before, after implementation of designated nursing guidelines for study group (No. 30).

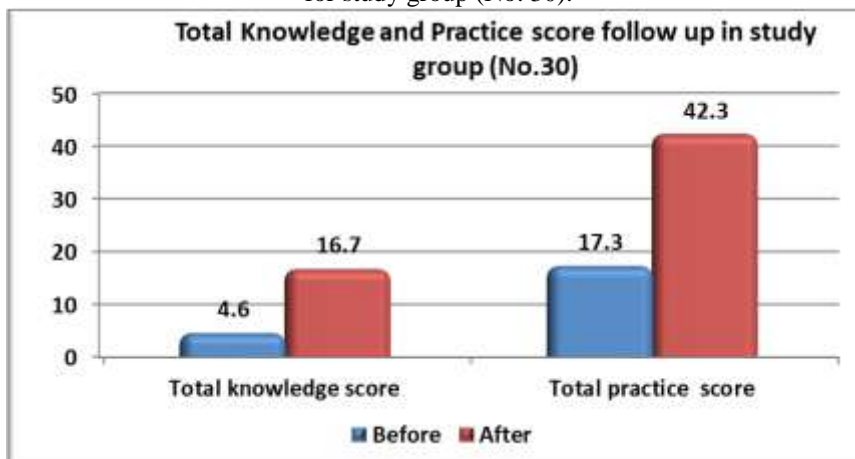


Fig. (1) illustrated that among study group there was a statistical significant improvement in knowledge and practice total scores as regarding percutaneous nephrostomy tube care after implementation of designated nursing guidelines.

Table (4): Frequency and percentage distribution of Minor and Major Complications during hospitalization in both study and control groups (N:60).

Variables	Study group (n=30)		Control group (n=30)		X ²	p-value
	No.	%	No.	%		
Minor complications					X² test	
Transient hematuria	6	20%	10	33.3%	1.4	0.4
Tube related complications:						
Kinking	0	0%	1	3.3%	1.01	0.9
Obstruction of the tube	0	0%	0	0%	--	---
Dilodgement of the tube	0	0%	0	0%	--	---
Extravasation of urine not requiring intervention	0	0%	2	6.7%	2.1	0.5
Urinary tract infection	0	0%	0	0%	--	---
Vasovagal symptoms	8	26.7%	15	50%	3.5	0.1
Inflammation of the skin around tube	2	6.7%	3	10%	0.22	0.9
Major complications						
Hemorrhage	0	0%	1	3.3%	1.01	0.9
Infection of the wound	0	0%	0	0%	--	---
Pleural complications	0	0%	0	0%	--	---
Bowel transgression	0	0%	0	0%	--	---

Table (4): illustrated that there was no statistical significant difference with p-value >0.05 between study and control groups as regards incidence of minor and major complication during

hospitalization period, which indicated that both groups show same incidence of complications, with higher percentage of transient hematuria and vasovagal symptoms.

Table (5): Frequency and percentage distribution of minor and major complication after 2 weeks in both study and control groups (N:60).

Variables	Study group (n=30)		Control group (n=30)		X ²	p-value
	No.	%	No.	%		
Minor complications					X² test	
Transient hematuria	3	10%	4	13.3%	0.16	0.9
Tube related complications:						
Kinking	0	0%	0	0%	--	---
Obstruction of the tube	0	0%	0	0%	--	---

Dilodgement of the tube	0	0%	0	0%	--	---
Extravasation of urine not requiring intervention	1	3.3%	2	6.7%	0.35	0.9
Urinary tract infection	0	0%	7	23.3%	7.9	0.01*
Vasovagal symptoms	2	6.7%	5	16.7%	1.5	0.4
Inflammation of the skin around tube	0	0%	1	3.3%	1.01	0.9
Major complications						
Hemorrhage	0	0%	1	3.3%	1.01	0.9
Infection of the wound	2	6.7%	3	10%	0.22	0.9
Pleural complications	0	0%	0	0%	--	---
Bowel transgression	0	0%	0	0%	--	---

Table (5): illustrated that there was a statistical significant higher percentage with p-value (0.01) between study and control groups as regarding the incidence of Urinary tract infection complication after 2 weeks follow up with higher percentage 26.7% among control group versus 3.3% cases in

study group. on the other hands, there was no statistical significant difference with p-value >0.05 between study and control groups as regarding the incidence of minor and major complications after 2 weeks follow up.

Table (6): Frequency and percentage distribution of minor and major complication after 4 weeks follow up, for study and control groups (N:60).

Variables	Study group (n=30)		Control group (n=30)		X ²	p-value
	No.	%	No.	%		
Minor complications					X² test	
Transient hematuria	0	0%	3	10%	3.2	0.2
Tubelated complications						
Kinking	0	0%	0	0%	--	---
Obstruction of the tube	0	0%	0	0%	--	---
Dilodgement of the tube	0	0%	7	23.3%	1.01	0.01*
Extra-vasation of urine not requiring intervention	0	0%	1	3.3%	7.9	0.9
Urinary tract infection	1	3.3%	8	26.7%	6.4	0.02*
Vasovagal symptoms	2	6.7%	9	30%	5.5	0.04*
Inflammation of the skin around tube	6	20%	10	33.3%	1.4	0.4
Major complications						
Hemorrhage	0	0%	0	0%	--	---
Infection of the wound	1	3.3%	5	16.7%	2.9	0.2
Pleural complications	0	0%	0	0%	--	---
Bowel transgression	0	0%	0	0%	--	---

*statistical significant difference with p-value <0.05

Table (6): illustrated that there was a statistical significant higher percentage with p-value 0.01 between study and control groups as regarding the incidence of tube dislodgment complication and urinary tract infection after 4 weeks follow up with

higher percentage 23.3% among control group versus one case in study group. also a significant higher percentage of vasovagal symptoms in control group 30% versus no cases in study group.

Table (7): Relation of Knowledge score before and after implementation of designated nursing guidelines and different educational level among study group (N:30).

Education level	Knowledge score before		Knowledge score after	
	Mean	SD	Mean	SD
Illiterate	2.8	1.7	11.2	5.7

Read and write	3.4	1.8	11.4	5.1
Basic education	4.2	2.5	14.1	4.9
Secondary	5.9	2.9	13.5	4.7
University	7.7	4.2	13.7	4.3
F test	5.1		0.82	
p-value	0.002*		0.5	

*statistical significant difference with p-value <0.05

Table (8) illustrated that there was a statistical significant difference high score of knowledge before implementation of nursing guidelines among patients with university level of education (p-value 0.002). On the other hand there was no statistical

significant difference in knowledge score after implementation of designated nursing guidelines among study group as regards different education levels of patients with p-value >0.05.

Table (9): Relation of immediate minor complications with different sociodemographic characteristics for study and control groups (N: 60).

Variables	No minor complication		Minor complications		Test	p-value
Age					t-test	
Mean ± SD	40.2±7.8		48.7±10.8		-3.5	0.001*
Gender	No.	%	No.	%	X² test	
Male	24	80%	17	56.7%	3.8	0.09
Female	6	20%	13	43.3%		
BMI						
Low	3	10%	1	3.3%	5.1	0.2
Normal	16	53.3%	15	50%		
Over weight	11	36.7%	10	33.3%		
Obese	0	0%	4	13.3%		
Co morbidity						
No	21	70%	18	60%	6.4	0.2
Diabetes Mellitus	2	6.7%	7	23.3%		
Hypertension	1	3.3%	0	0%		
Chronic lung disease	4	13.3%	1	3.3%		
Others	2	6.7%	4	13.3%		

Table (9): illustrated that, there are a statistical significant relation of older age among cases with

minor complications with no difference in BMI, gender or co- morbidities.

Table (10): Correlation between knowledge score and practice score after implementation of designated nursing guidelines with study variables among study group(No:30).

Variables	Knowledge score before		Knowledge score After		Practice score After	
	R	P-value	R	P-value	R	P-value
Age (years)	-0.22	0.2	-0.11	0.6	-0.16	0.4
Knowledge after	0.15	0.4	----	----	-0.07	0.7
Practice before	0.58	0.001*	0.21	0.3	0.22	0.2
Practice after	0.38	0.03*	-0.07	0.7	----	----

Table (10) illustrated that there was a statistical significant positive correlation between knowledge score before nursing guidelines implementation and both practice score before and after nursing

guidelines implementation with p-value 0.001, 0.03 respectively, which indicated that an increase in knowledge level will associated with an increase in practice level.

4. DISCUSSION

The socio-demographic and medical characteristics of subjects in both study and control groups, were not significantly different; this means that the participants were selected from identical population of patients undergoing percutaneous nephrostomy tube with good random allocation obtained. This findings supported with Batagello, et al. (2022) who conducted a study carried out in Sao Paulo, Brazil, reported that the baseline prognostic factors were well balanced and as most patients randomly assigned were followed, there was little potential for bias.

As regarding diagnosis; study findings revealed that there was a high percentage of renal calculi diagnosis among both study and control groups. This findings may be explained as renal calculi is an increasing urological disorder of high prevalence and recurrence rates that can occur at any age and can result in urinary tract obstruction. This explanation was supported by Byers & Rochon (2018) who demonstrated that, obstructive hydronephrosis have varying etiology based on the patient's age. In adults, the most common cause is urolithiasis. In addition, this finding agree with Elbatanouny, et al. (2020) who reported that , Egypt was identified as one of stone-forming belt countries.

Pertaining to time of consultation; study findings revealed that majority of the studied patients seek medical consultation at the onset of symptoms. This might be related to pain or anuria that may accompany the obstruction and being as sever to be tolerated. This explanation was supported by Jung, et al., (2019) who reported that, according to a report, over 70% of patients with ureter stones experienced severe pain (visual analog scale 7 or more). However, urinary diversion, such as percutaneous nephrostomy (PCN) or ureteral stenting, may be required in patients with ureter stones complaining of intractable pain despite treatment with analgesics.

The findings of the present study illustrated that, there was no statistical significant difference between study and control groups as regarding knowledge scores before designated nursing guidelines implementation, as the studied patients allocated randomly from the same population. This findings are in line with Jihad & Reda, (2018) who stated that the results demonstrate that two groups in light of studied main domains, they have same level of education and knowledge concerning management of nephrostomy tube and that mean the two groups had chosen from same population in pre period.

The findings of the present study showed that, there was no significant difference between study and control groups as regarding level knowledge and PCN tube self-care practice pre-intervention, on the other hand, there was a statistical significant difference between the two groups post intervention,

which indicated the effectiveness of the provided educational intervention.

In that context, Chen, et al.(2020) who stated that, Patients' knowledge may influence both self-care and self-efficacy, as poor knowledge regarding the condition may result in difficulty recognizing and evaluating symptoms, leading to poorer confidence (self-efficacy) in acting upon symptoms and less self-care.

Similarly this findings in the same line with Mohamed & Fashafsheh (2019), who demonstrated that, there are no statistical significant difference between two groups pre implementation. While, there are highly statistically significant improvement of knowledge and self-care performance in study group at the immediately and follow-up tests after implementation of program compared by control group with routine care.

As regarding PCN related complications, the findings of the present study revealed that there was no statistical significant difference between study and control groups as regards incidence of minor and major complication, with higher incidence of minor complications than major complications, as the incidence of minor complications are more common than major complications, as well major complications are associated with intraoperative tube installation failure.

This findings in line with Kumar, et al.(2020) who pretend that they have observed 4.2% major complication and 27.2% minor complications (SIR threshold 4% and 15% respectively). Higher minor complication observed in our study is due to longer follow up (1 month) and inclusion of UTI and tube dislodgement in minor complication. As well this findings supported by Ho Won, et al. (2022) who demonstrated that, there was no mortality associated with the PCN technique itself in the study. The rate of a minor complication (transient gross hematuria through the PCN catheter) was 31.5% (17/54).

The findings of the present study illustrated that pre nursing guidelines implementation there was no statistical significant difference between study and control groups as regards incidence of complications, compared with post nursing guidelines implementation, there was a statistical significant difference between both groups with higher percentage among control group. As study group received designated nursing guidelines to improve their knowledge and self-care activities to reduce the incidence of nephrostomy tube related complications. This result agree with the findings of Ritz, et al. (2016) who show that, pre-CCC implementation, 15 of the 32 (46.9%) adult patients with PCNs experienced complications requiring hospitalization, compared with post-CCC implementation, 2 of the 47 (4.3%) PCN catheter patients experienced complications requiring hospitalization. And concluded that the innovation of a CCC resulted in

improved outcomes for patients with PCNs as measured by fewer ED and inpatient hospitalizations and cost savings realized through decreased hospital charges.

The study findings showed that there was a statistical significant difference with high score of knowledge among patients with university level of education, this may be due to the role of education in raising health awareness. This findings in agreement with Abdel Wahed, et al. (2020) who reported that, the knowledge mean scores were significantly related to the level of education. Participants with university or higher education had significantly higher knowledge mean scores compared to those with lower levels of education.

The present study findings illustrated that, there are a statistical significant relation of older age among cases with complications with no difference in BMI, gender or co morbidities. As older age patients may exhibit limited socioeconomic resources and comorbid conditions that significantly affect self-management. This finding in line with Degirmenci, et al., (2013) who demonstrated that, patient age, nondilated system, preoperative creatinine levels, and mean hemoglobin levels were the significant parameters for the development of complications on univariate analysis

The present study findings indicated that, there was a statistical significant positive correlation between knowledge score before nursing guidelines implementation and both practice score before and after implementation of nursing guidelines, which indicated that an increase in knowledge level will associated with an increase in practice level.

The findings was supported by Tsai & Wang, (2021) who stated that, accurate disease knowledge is a key factor in self-care, and this might improve clinical outcomes. Added that Self-care behavior was positively and significantly correlated with disease knowledge and Poor disease knowledge contributes to inadequate self-care behavior.

5. CONCLUSION

Based on the findings of the study, it can be concluded that, designated nursing guidelines had a positive effect on the outcomes of patients as regarding self-care practices, knowledge, incidence of complications and duration of hospital stay.

6. RECOMMENDATION.

- Apply the designated nursing guidelines to patients undergoing percutaneous nephrostomy tube insertion
- Nursing staff should apply the educational instrument that would help patients be more familiar with self-care, embrace it, and reach positive outcomes.

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