Original Research

DETERMINATION OF THE BENEFITS AND COMPLICATIONS OF CLEAN INTERMITTENT CATHETERIZATION TO SPINAL CORD INJURED PATIENTS

Raheem Atyia Badir

Adult nursing department, College of Nursing, Al-Bayan University

Corresponding author: **raheem.atyia@Albayan.edu.iq*

ABSTRACT

Introduction: Intermittent catheterization (IC) is the best method for bladder emptying in patients with spinal cord lesions who are suffering from neurogenic bladder dysfunction. The aim of the study was to **d**etermine the benefits of using clean intermittent catheters for patients with spinal cord injury at regular intervals daily to empty the bladder and identify the complications from its use. **Methods:** A quantitative descriptive design study was done at Ibn Al-Kuff hospital for spinal cord injuries in Baghdad city, including (60) male spinal cord injured patients from the 14th of February 2021 to the 20th of April 2022. A non-probability (purposive) sample of (60) male spinal cord-injured (SCI) patients with paraplegia and tetraplegia were selected. A questionnaire format was used, which consisted of three major parts with a total (of 26) items. **Results:** The present study included (60) male paraplegic and tetraplegic patients, half of them in the age group between (18-27) years old, and 33 (55%) of them were single. The majority24 (40%) of the study sample were primary school graduates. Furthermore, 24 (40%) were employees before they were injured. Concerning the clinical characteristics of patients, the study indicates that (48 (80%) of the sample were paraplegic patients, 41(68.3%) were complete paralysis and 55(91.7%) of them the cause of injury was Traumatic SCI. Furthermore, 51(85%) of them use self-clean intermittent catheterization; concerning the number of daily catheterizations, 33(55%) of them used it from 7- and more daily, while 34(56.7%) of them, the time between the catheter and the next was each two hours. Concerning the urinary complication occurs during the last 3 months associated with intermittent catheterization, 22(36.7%) of the sample had (UTIs). **Conclusion:** The current study has demonstrated that the practices of spinal cord injury patients about clean intermittent catheters were acceptable and regular, and it was beneficial to them, as it reduced complications, especially urinary tract infections, noting the need to increase the time between each interval of catheterization to (4-6) hours for each period.

Keywords: Determination, Benefit, Complications, Intermittent Catheterization, Clean Intermittent Catheterization, Spinal Cord Injured Patients.

Introduction

A neurogenic bladder (NB) is any bladder dysfunction related to abnormal or absent bladder innervation and causes urine incontinence (Myers et al., 2019), (Priscilla, L., Karen, B., & Gerene, 2017), (Lewis et al., 2000). To maintain the vital capacity of the neurogenic bladder, clamping is started regularly, gradually over time, until it reaches two hours of clamping (Grundy & Swain, 2002). Previously, specialists used to treat (NB) using an intermittent catheter and supra pubic, but a sudden change to using clean intermittent catheterization with great benefits was observed in reducing many urinary tract complications related to (NB), such as UTIs, nephritis, pyelonephritis, urethritis, bladder and urethral erosion(Dinh et al, 2019) (Kessler, Ryu & Burkhard, 2009).

Measuring fluid intake, output, residual urine volume, urine examination and assessing sensory awareness of bladder fullness and motor control are all part of NB evaluation (Bader, 2021) (Hinkle & Cheever, 2017). Intermittent catheterization (IC) is the preferred method of bladder emptying for many persons with voiding difficulties as a result of spinal cord injury (SCI) (Wyndaele, 2007). In recent years, there has been a technological development in the manufacture of intermittent catheters(hydrophilic catheter) making them easier to insert and more resistant to preventing urinary tract infections (Beiko et al, 2004).

Using intermittent catheterization is a safe and effective method to treat neurogenic bladder dysfunction due to a spinal cord lesion. The use of hydrophilic-coated intermittent catheters may reduce the urethral complication rate. The most important factors for the success of IC include good education for SCI patients, good adherence and the application of a good catheterization technique (Wyndaele, 2002). Despite such benefits of (IC), repeated catheterization by using uncoated catheters can lead to a group of complications; such as urinary tract infections (UTIs), which can be recurrent and constant, urethral mucosa irritation over urethral lesions, strictures and false passages may occur (Wyndaele & Maes, 1990) (Perrouin-Verbe et al., 1995).

A survey study done in Canada in 2008 included (912) SCI patients and found a significant relationship between the number of catheterizations per day and UTI rate, with the infection rate reducing as the number of catheterizations per day increased (Woodbury et al., 2008). This is consistent with previous suggestions that the frequency of catheterization influences the occurrence of symptomatic bacteriuria by increasing the time that colonized urine resides in the bladder (in case of infrequent catheterization) or by increasing the risk of urethral damage when too frequent catheterization occurs (De Ridder et al., 2005). The data also confirm with previous reports, which mentioned that when caregivers perform, IC increases the risk of infection (Bakke & Vollset, 1993). The involvement of others is usually borne out of necessity in the case of patients with tetraplegia and compromised upper limb function. Neurological level of injury and severity of injury (complete or incomplete), and hence the degree of independence, have individually been identified as risk factors for UTI (Esclarin, Garcia & Herruzo, 2000).

Urinary tract infection in SCI patients most commonly results from ascending transurethral invasion of the bladder by pathogenic organisms normally present in the intestines (Kennelly et al., 2019) (Moloney et al., 1981). Neurological lower urinary tract dysfunction (NLUTD) always results in high post-voided residual (PVR) volume, so it needs catheterization for complete bladder emptying regularly. Clean intermittent catheterization (CIC) is the first technique of option. It needs sterile gloves and antiseptics and can be used by patients themselves or caregivers in the home environment (McKibben et al., 2015) (Vahr et al., 2013). Furthermore, the CIC procedure was first reported by Lapides et al. in 1972, who mentioned that urinary tract infection (UTI) in NLUTD is caused by PVR and bladder distention, not as a necessary result by asepsis of the technique, thus proving to be more important to keep a regularity of emptying than an aseptic technique (Lapides et al,. 1972). The steps to be followed include; hygiene of the genital area, hand washing and lubrication, and administering the CIC. The independence in performing the procedure may not be accomplished by patients with high injuries (Santos et al., 2015).

Methods

A quantitative descriptive design study was done at Ibn Al-Kuff hospital for spinal cord injuries in Baghdad city, which has five spinal units with a total of (120) beds; the study included (60) male spinal cord injured patients because it is difficult to observe female patients with them. The study started from the period (the 14th of February 2021 to the 20th of April 2022). A non-probability (purposive) sample of (60) male spinal cord injured (SCI) patients with paraplegia and tetraplegia were selected from different ages and educational levels and admitted to the hospital for rehabilitation. For this study, a questionnaire format was used for data collection, which consisted of three major parts with a total (of 26) items; the first part is concerned with patients' socio-demographic characteristics, which include (4) items; (age and level of education, marital status, and occupation before injury), the second part is dealing with the clinical characteristics of SCI patients and the complication that occurs as a result of patients using clean intermittent catheters, which consist of (7) items, and the third part consist observational checklists to evaluate patients' practices concerning Intermittent clean catheterization (CIC) include (15) items.

The items of patients' practices were rated on three level Likert scale; always, sometimes, and never, and scored as 3, 2, and 1, respectively.

Patients were observed performing clean intermittent catheters concerning the neurogenic bladder. For CIC practices, data were collected through concealed observation techniques. A total of (3) events were observed for each respondent's practices as a means of data collection. (3) correct practices out of (3) episodes were rated as always, (2) correct practices out of (3) episodes were rated as sometimes, and (1) or less correct practices of (3) episodes were rated as never (25).

The mean score was done to assess patients' practices concerning CIC. The mean score, which was equal to (1.5-2.5), was considered significant, while greater than (2.5) was considered highly significant and less than (1.5) was considered non-significant.

On the other hand, the content validity is estimated through a panel of experts. At the same time, the reliability of the questionnaire was estimated using Alpha Cronbach for the test-retest approach.
Data analysis was performed by applying descriptive statistics (frequency, percentage, Cumulative Percent, and mean of the score (MS).

Ethical considerations:

This research is funded by the researcher and is considered a single independent research project. The patients themselves must consent to the data collection. patient's names were left off the questionnaire out of respect for their privacy. Al-Bayan University approved the study's completion to complete the data collection from hospitals.

Results:

Table (1): Distribution of Spinal Cord Injured Patients by Socio-Demographic Characteristics (n= 60)

SDCVs.	Group	N	%	Cum. %
1. Age Groups (year)	18 - 27	30	50	50
	28- 37	21	35	85
	38 - and more	9	15	100
	Total	60	100	
2. Level of education	Read and write	9	15	15
	Primary school graduate	24	40	55
	Intermediate school graduate	15	25	80
	Secondary school graduate	9	15	95
	Institute or College graduate	3	5	100
	Total	60	100	
3. Marital status	Single	33	55	55
	Married	27	45	100
	Total	60	100	
4. Occupation before the injury	Student	9	15	15
	Employee	24	40	55
	Free Business	15	25	80
	Unemployed	12	20	100
	Total	100	100	

SDCVs = Socio-Demographic Variables

Table (1) indicated that the present study included (60) male paraplegic and tetraplegic patients, half of them in the age group between (18-27) years old, and 33 (55%) of them were single. Regarding the level of education, the majority24 (40%) of the study sample were primary school graduates. Furthermore, 24 (40%) of them were employees before they were injured.

Table (2): Clinical Characteristics of (60) SCI patients

Variables	N	(%)	Cum. %
1.Type of paralysis			
Tetraplegia	6	10	10
Paraplegia	54	90	100
Total	60	100	
2. Complete or incomplete lesion			
Complete	41	68.3	68.3
Incomplete	19	31.7	100
Total	60	100	
3. Cause of SCI			
Traumatic SCI	55	91.7	91.7
Non-traumatic SCI	5	8.3	100
Total	60	100	
4. Intermittent catheterization			
Self	54	90	90
Others	6	10	100
Total	60	100	
5. Number of daily catheterizations			
2-3	6	10	10
4-6	21	35	45
7-and more	33	55	100
Total	60	100	
6. Time between the catheter and the next(hour)			
Each two hours	34	56.7	56.7
3-4 hours	20	33.3	90
5-6 hours	6	10	100
Total	60	100	
7. Urinary complication occurs during the last 3 months			
Urinary tract infection	22	36.7	36.7
Bladder stone formation	3	5	41.7
Urethral structure	3	5	46.7
Upper tract stone	2	3.3	50
Free from UTI	30	50	100
Total	60	100	

F=Frequency; %= Percentage

Table (2) shows the clinical characteristics of SCI patients in the present study, indicating that 54 (90%) of the sample were paraplegic patients, 41(68.3%) were complete paralysis, and 55(91.7%) of them the cause of injury was Traumatic SCI.

Furthermore, 54(90%) of them use self-clean intermittent catheterization; concerning the number of daily catheterizations, 33(55%) of them used it from 7- and more daily, while 34(56.7%) of them, the time between the catheter and the next was each two hours. Concerning the urinary complication occurs during the last 3 months associated with intermittent catheterization, 30(50%) of the sample were free from UTIs during the last 3 months, while 22(36.7%) of the sample had urinary tract infections (UTIs).

Table (3): Assessment of patients' practices regarding clean intermittent catheterization

No	Standard items	N =60				
		Always	Sometimes	Never	M. S	Assessment
		N	N	N		
1	Preparing equipment (prepare CIC, sterile gloves, lidocaine ointment, and urine bag).	44	8	8	2.60	H
2	Good Hand washing is standard.	33	15	12	2.35	M
3	Good genital washing (penis, perineum and urine opening).	25	17	18	2.12	M
4	Wearing sterile gloves as standard.	22	13	25	1.95	M
5	Choose the right catheter size.	48	8	4	2.70	H
6	Choose the appropriate position for the insertion of the catheter.	51	4	5	2.77	H
7	Use Lidocaine gel to lubricate the catheter	52	4	4	2.80	H
8	The penis is held in an upright position and extended slightly upward.	41	10	9	2.53	H
9	Insert the catheter into the urethra until the urine begins to exit, and then push the catheter for another 2cm.	43	11	6	2.61	H
10	The catheter is slowly drawn to allow the urine to drain from the bottom of the bladder after the urine flow has stopped.	39	13	8	2.52	H
11	Pull the catheter out gently after finishing, and clean your hands after the gloves are removed.	32	12	16	2.27	M
12	Clean the catheter well with soap and water immediately after use.	12	4	44	1.47	L
13	Rinse the catheter well and let it dry.	23	13	24	1.98	M
14	Store the catheter dry and clean inside the clean towel.	19	16	25	1.90	M
15	He discards a catheter that has become cracked or brittle, accumulated sediment, or lost its shape.	28	17	15	2.22	M
	Total items	512	165	223	2.32	M

MS= Mean of the score, L=Low = Less than (1.5), M= Moderate= (1.5-2.5), and H=High = (greater than 2.5).

Table (3) shows the assessment of patients' practices regarding clean intermittent catheterization, which depicted that there is a moderate practice for SCI patients regarding clean intermittent catheterization, where (7) items had highly significant and (7) items get moderate significance, concerning the total mean of scores (MS) which was moderate (2.32).

Discussion:

Discussion of Socio-Demographic Characteristics and Clinical Characteristics of the study sample.

The present study, as it has been shown in table (1) that the present study included (60) male paraplegia and tetraplegia patients admitted to Ibn Al-Kuff spinal cord injuries hospital for rehabilitation, half of them the age group between (18-27) years old, and 33 (55%) of them were single. From the researcher's point of you, this result shows that most of the patients are young people in the prime of life; most of them have been exposed to a traumatic injury, either by gunshot, road traffic accident, falling from a high place, or driving a motorcycle without wearing safety equipment, and the accident of heavy work.

We can say that this result is consistent with a study conducted in Canada that included 912 SCI patients to elicit information on clinical and demographic data, techniques and use of IC, genital care, the occurrence of UTI, and consequences of UTI. Fifty-five percent (55%) of all respondents use IC regularly. Those who used IC were significantly younger than those who did not use it (Woodbury, 2008).

Concerning the level of education, the majority, 24 (40%) of the study sample, were primary school graduates, while 15(25%) were Intermediate school graduates. Furthermore, 24 (40%) of the study sample were employees before they were injured. Concerning the clinical characteristics of the study sample, table(2) shows the clinical characteristics of SCI patients in the present study, indicating that 54 (90%) of the sample were paraplegic patients, 41(68.3%) were complete paralysis, and 55(91.7%) of them the cause of injury was Traumatic SCI. Also, this result is consistent with a survey study done in Canada, which included 912 SCI patients; they found that (86%) of respondents were traumatic SCI, while this study did not agree with the type of paralysis and the lesion of injury (complete or incomplete), where (62%) ;(55%) of them were paraplegic patients and complete lesion respectively (Woodbury, 2008).

Furthermore, the present study indicated that 54(90%) of them use self-clean intermittent catheterization; concerning the number of daily catheterizations, 33(55%) of them used it from 7- and more daily, while 34(56.7%) of them, the time between the catheter and the next was each two hours, and only 20(33.3%) of them the time between the catheter and the next was each (3-4) hours. This result is inconsistent with the study conducted in Canada, whereby (in 69.8%) of respondents, the number of daily catheterizations was (4-6) per day (Woodbury, 2008).

To find an explanation for this result, the SCI patients need more bladder rehabilitation to increase the time of each bladder interval voiding by using CIC from (4-6) times per day. Concerning the urinary complication occurs during the last 3 months associated with intermittent catheterization, 30(50%) of the sample were free from urinary tract infections (UTIs), while 22(36.7%) of the sample had UTIs. These infections may be attributed to poor technique or catheter misuse.

This result agrees with a survey study done in Canada (2008) that included 912 SCI patients find that (23%) of respondents reported no infections in the past 12 months. The most frequent infection rate was one to two infections per year (35%); 20% of respondents reported the occurrence of more than four UTIs in the past year (Woodbury, 2008). This result is consistent with a study that found that the frequency of catheterization influences the occurrence of symptomatic bacteriuria by increasing the time that colonized urine resides in the bladder or by increasing the risk of urethral damage when too frequent catheterization occurs per day (De Ridder et al., 2005).

Also, this result is consistent with the study found that most of the (75) patients had neuropathic bladder dysfunction, and 92% were continent. Bilateral hydronephrosis was relieved in 14/19 patients following CIC. Chronic or recurrent UTIs were present in 42% of patients using CIC. Patients with positive urine cultures were not necessarily symptomatic. In general, symptomatic infections were found to be related to poor technique or catheter misuse. Complications occurred in 15/75 (20%) of patients, with a urethral pathological condition (urethral stricture, false passage, mastitis, meatal stricture) being the most frequent complication in male patients during follow-up (Wyndaele & Maes, 1990).

The result of the present study is consistent with another study included (159) patients. The analysis showed a rate of symptomatic lower urinary tract infection (UTI) of 28%. Asymptomatic cytobacteriological infection was seen in 60% of patients, while men had significantly more symptomatic and asymptomatic infections than happened to women (Perrouin-Verbe et al., 1995).

This result of the present study agrees with another study which found that SCI patients who are using intermittent catheterization are less likely to experience urological complications compared to the other bladder management methods investigated (Weld et al., 2000).

Conclusion: The current study has demonstrated that the practices of spinal cord injury patients about clean intermittent catheters were acceptable and regular, and it was beneficial to them, as it reduced complications, especially urinary tract infections, noting the need to increase the time between each interval of catheterization to (4-6) hours for each period.

Conflicts of Interest

The author declares no conflicts of interest.

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