

ORIGINAL ARTICLE

Knowledge and practices of nurses working in urology clinics on fluid–electrolyte monitoring and management

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Abstract

The aim of the study was to examine the knowledge and practices of nurses working in urology clinics on fluid–electrolyte monitoring and management. The study sample for this descriptive cross-sectional research comprised 79 nurses employed in clinics providing care to urology patients from June 2023 to June 2024. These nurses had internet access and consented to participate in the study on a voluntary basis. The data were obtained through the ‘Google Form’, which uses a descriptive characteristics form, a fluid–electrolyte monitoring and management knowledge form, and a practice form for fluid–electrolyte monitoring and management. The mean score of the nurses on the fluid–electrolyte monitoring and management knowledge form was 7.48 ± 1.74 . The most common practice related to fluid–electrolyte monitoring and management was “I monitor and record additional fluid losses related to vomiting, diarrhoea, fever and drains”. When the mean scores of the fluid–electrolyte monitoring and management knowledge form were compared according to the individual characteristics of the nurses, no statistically significant difference was found between the mean scores of the knowledge form according to the characteristics of the nurses ($p > 0.05$). In this study, the mean knowledge scores of the nurses were above average. When the practices of the nurses for the prevention of fluid–electrolyte imbalances were examined, most of them stated that they monitored additional fluid losses related to vomiting, diarrhoea, fever and drains. The characteristics of the nurses (clinical experience, age, years of working in the profession and educational status) did not affect their knowledge scores.

KEYWORDS

fluid and electrolyte balance, knowledge, nursing, practice, urology

What is known about this topic

- Urological surgery includes a wide variety of surgical methods such as laparoscopic, cystoscopic/resectoscopic, open abdomen, open flank/thoracic, vascular and extracorporeal shock wave lithotripsy.

- Fluid balance, electrolyte imbalance and acid–base status abnormalities are very common in surgical patients.
- Although the incidence of electrolyte imbalances has decreased significantly in urological surgery, it is reported that importance should be given to postoperative fluid–electrolyte imbalances in major urological surgery.
- Nurses' knowledge and practices on fluid monitoring and electrolyte administration are necessary to provide quality patient care, and nurses have important responsibilities in closely monitoring all parameters of patients.

What this paper adds

- The study showed that the average knowledge score of nurses was above the average.
- It was determined that nurses mostly monitored patients' additional fluid losses related to vomiting, diarrhoea, fever and drains in order to prevent fluid–electrolyte imbalances.
- It is thought that determining the knowledge and practice status of nurses on fluid electrolytes is important in terms of providing quality care to urology patients and reducing morbidity and mortality rates.

1 | BACKGROUND

1.1 | Problem

Surgical interventions have become one of the most preferred treatment methods as a result of rapid developments in surgical techniques, new technological medical devices, advances in anaesthesia and improvements in pre- and postoperative patient care. Despite these developments, there is always a risk of complications after surgical interventions. Urological surgery includes a wide variety of surgical modalities. Patients undergoing urological intervention cover a wide range of ages and comorbidities. Postoperative nursing care is planned and implemented to maintain cardiovascular function, maintain respiratory system function, provide adequate nutrition and elimination, maintain fluid–electrolyte balance, maintain adequate renal function, ensure rest and safety as well as early movement and mobilization, ensure wound healing, provide psychological support and prevent complications.^{1,2}

Surgical patients frequently experience disturbances in fluid balance, electrolyte levels and acid–base status. These critical and potentially life-threatening imbalances require meticulous management. A systematic evaluation of these factors should be a standard practice in surgical care. Managing fluid, electrolyte and acid–base imbalances for each patient is an integral aspect of personalized nursing care.³ Although recent studies considering electrolyte imbalance in urological surgery have shown that advances in surgical techniques have significantly reduced the incidence of complications, the incidence and risk factors for hyponatraemia, especially postoperative hyponatraemia, require further investigation.⁴ Electrolytes are crucial for various physiological processes, including enzymatic and biochemical reactions, maintaining cell membrane potentials, bone structure, hormone regulation, energy metabolism, nerve signal transmission, muscle function, cardiovascular health, fluid balance, acid–base homeostasis and neurotransmission. Variations in fluid volume and electrolyte levels can occur before, during, and after surgery. After surgery, patients are

especially susceptible to shifts in electrolytes due to blood and fluid loss, the stress of the surgical procedure, preoperative fasting, anaesthesia and surgical trauma.⁵

During the perioperative period, ongoing assessment and maintenance of body fluid balance are crucial for preserving patient hemodynamic. Fluid balance pertains to the equilibrium between the intake and loss of body fluids, which is essential for normal metabolic processes. Accurate daily documentation of fluid intake and output is a key component of the patient's medical record. Monitoring fluid intake includes tracking oral fluids, intravenous solutions or medications, nasogastric tube feeds and total parenteral nutrition. Fluid output encompasses all fluids expelled from the body through urine, faeces, vomiting, nasogastric tube drainage, insensible losses, surgical wound drainage and chest tubes. A balanced state between fluid intake and output indicates proper fluid equilibrium.³ Assessment and documentation of a patient's fluid balance is highly important for understanding and managing clinical conditions, especially in patients being treated for diseases that cause accumulation of body fluid, such as hypertension, peripheral oedema and respiratory failure.^{6,7} Fluid overload has been associated with inaccurate monitoring and recording of fluid balance, adverse outcomes and increased mortality rates. Fluid balance recording is often inadequate or inaccurate due to insufficient numbers of health professionals, a lack of training or ineffective time management by nurses.⁸ Nurses' knowledge of and practices related to fluid monitoring and electrolyte administration are essential for providing high-quality patient care, and nurses have important responsibilities in the process of closely monitoring all the parameters of patients.^{9,10}

2 | RESEARCH QUESTION/AIM

Nurses' knowledge and practices related to fluid monitoring and electrolyte therapy in urology patients are important in terms of providing quality care and reducing morbidity and mortality rates.¹¹ However,

evidence-based practices can also be used in treatment and care if nurses have the knowledge and practices to provide quality care to patients. In hospitals, there is a need to investigate the knowledge and practices of nurses working in urology clinics about fluid and electrolyte monitoring and application, where fluid–electrolyte monitoring is very important because of the inability to allocate sufficient time for patient care due to the high number of patients and low number of nurses. The aim of this study was to examine the knowledge and practices of nurses working in urology wards about fluid–electrolyte monitoring and management. In this regard, the study questions are as follows.

2.1 | Research questions

- What are the knowledge scores of nurses working in urology services about fluid–electrolyte monitoring and management?
- What are the practices of nurses working in urology wards regarding fluid–electrolyte monitoring and management?

3 | METHODOLOGY

3.1 | Study design

We performed as a descriptive cross-sectional study.

3.2 | Study population sample

The study's population comprised nurses employed in urology departments across Turkey from June 2023 to June 2024. The sample included 79 nurses who were involved in the care of urology patients during the study period, had internet access, and willingly consented to participate. Data were collected using a 'Google Form'. To facilitate this, an email detailing the study's purpose and including the link was distributed to the nurses via social media and the Urology Nurses Association. A follow-up reminder was sent to the nurses 4 weeks after the initial email to enhance response rates. The online data collection forms were backed up daily by the researchers.

3.3 | Data collection tools

Data were gathered using a form detailing descriptive characteristics, a knowledge assessment form on fluid and electrolyte monitoring and management, and a practice form for fluid and electrolyte monitoring and management.

3.3.1 | Descriptive characteristics form

This form consists of a total of eight questions, including the age, gender, marital status, and so forth, of the nurses.

3.3.2 | Fluid–electrolyte monitoring and management knowledge form

The form was prepared by the researchers and consisted of 10 multiple-choice questions to measure the level of knowledge of nurses about fluid–electrolyte imbalances.^{11,12} While evaluating the form, correct answers were accepted as 1 point and incorrect answers as 0 points. The total score is evaluated over 10 points.

3.3.3 | Fluid–electrolyte monitoring and management practice form

This form, which was prepared by the researcher in line with the literature, consists of 21 questions, including whether nurses perform practices related to fluid–electrolyte monitoring and management.^{13,14}

After the relevant forms were prepared, expert opinions were obtained from two urology nurses and three faculty members with scientific studies in the field of urology to evaluate the forms in terms of suitability and clarity. The forms were finalized in line with expert opinions. A pilot study was conducted on 10% of the sample to test the applicability, visibility and clarity of the forms and to estimate the time required for each page. The nurses included in the pilot study were excluded from the study.

3.4 | Data collection

The study data were collected electronically via 'Google Forms' between June 2023 and June 2024. The link of the form was sent to the urology nurses known to the researchers first by using social media tools and then to other urology nurses via the snowball sampling method. The informed consent form included explanations about the purpose of the study, that participation in the study was voluntary, that all personal data would be kept confidential, and statements declaring that they agreed to participate in the study. The participants who agreed to participate in the study completed the questionnaire by completing the descriptive characteristics form, the fluid–electrolyte monitoring and management knowledge form and the practice form for fluid–electrolyte management and monitoring. It took approximately 15–20 min to complete the questionnaire electronically.

3.5 | Data analysis

Data were analysed using SPSS 22 statistical software for Windows (SPSS, Chicago, IL, USA). 'Mean, standard deviation, median minimum, maximum, frequency counting and percentage ratio values' were used in descriptive statistics of the data. The distribution of variables was measured via the Kolmogorov–Smirnov test. Independent sample *t* tests, one-way ANOVA tests and chi-square tests were used to analyse quantitative independent data. The Pearson correlation test was

used for correlation analysis. The statistical significance level was accepted as $p < 0.05$.

3.6 | Ethical approach

Ethics committee approval was obtained before starting the study (12.05.2023/E-74555795-050.01.04-685 894). Informed consent was obtained electronically from the nurses who participated in the study. Research and publication ethics were followed in the article. The study was conducted in accordance with the principles of the Declaration of Helsinki.

4 | RESULTS

4.1 | Characteristics of nurses

In this study, the mean age of the nurses was 30.85 ± 6.87 years, 78.5% ($n = 62$) were female, 53.2% ($n = 42$) were married, 75.9% ($n = 60$) had an undergraduate degree, 63.3% ($n = 50$) worked in a hospital affiliated with the Ministry of Health, 79.8% worked in day and night shifts, and 54.4% ($n = 43$) received training on fluid-electrolyte monitoring and management. The mean duration of working in the profession of the nurses was 8.88 ± 7.16 years, and the mean duration of working in the urology clinic was 4.38 ± 4.64 years (Table 1).

TABLE 1 Characteristics of Nurses ($N = 79$).

Characteristics	Mean	SD	Minimum	Maximum	<i>n</i>	%
Age	30.85	6.87	22	50		
Gender						
Female					62	78.5
Male					17	21.5
Marital Status						
Married					42	53.2
Single					37	46.8
Education Status						
Pre licence					7	8.9
Undergraduate					60	75.9
Postgraduate					12	15.2
Organization						
University Hospital					21	26.6
Ministry of Health Hospital					50	63.3
Private Hospital					8	10.1
Working method						
Night					1	1.3
Day					15	19
Day and Night					63	79.8
Receiving training on fluid-electrolyte monitoring and management						
Yes					43	54.4
No					36	45.6
Working years in profession	8.88	7.16	1	31		
Working year in urology clinic	4.38	4.64	1	25		

4.2 | Knowledge scores of nurses working in urology services about fluid-electrolyte monitoring and management

The mean score of the nurses on the fluid-electrolyte monitoring and management knowledge form was 7.48 ± 1.74 (Table 2).

4.3 | Practices of nurses working in urology wards regarding fluid-electrolyte monitoring and management

As shown in Table 3, the most frequently applied practices related to fluid-electrolyte monitoring and management by nurses were, 'I monitor and record additional fluid losses related to vomiting, diarrhoea, fever and drains', 'I measure vital signs and respiratory sounds', 'I evaluate the patient's state of consciousness', 'I perform and record the extraction process correctly', 'I take precautions against injuries that may develop due to changes in the patient's mental state', 'I administer the fluids requested at the appropriate dose and flow rate', 'I monitor the patient in terms of side effects of diuretic treatment', 'I administer potassium in a controlled manner in line with the physician's order'.

When the mean scores of the fluid-electrolyte monitoring and management knowledge form were compared according to the individual characteristics of the nurses included in the study, no statistically significant difference was found between the mean scores of the

TABLE 2 Distribution of nurses' fluid-electrolyte monitoring and management knowledge form scores (N = 79).

Fluid-Electrolyte Monitoring and Management Knowledge Level				
Level	Mean	SD	Min	Max
Fluid-electrolyte monitoring and management knowledge form	7.48	1.74	1	10

Abbreviations: Max, maximum; Min, minimum; SD, standard deviation.

TABLE 3 Distribution of nurses' fluid-electrolyte monitoring and management knowledge scores (N = 79).

No	Practices	Done n (%)	Not done n (%)	Have no opportunity n (%)
1.	I monitor the patient for signs and symptoms of fluid-electrolyte deficiency/excess	73 (92.4)	2 (2.5)	4 (5.1)
2.	I measure the patient's vital signs, respiratory sounds	75 (94.9)	2 (2.5)	2 (2.5)
3.	I monitor the patient's heart rate and changes in ECG	73 (92.4)	3 (3.8)	3 (3.8)
4.	I assess the patient's state of consciousness	75 (94.9)	2 (2.5)	2 (2.5)
5.	I perform and record the received-extracted trace correctly	75 (94.9)	1 (1.3)	3 (3.8)
6.	I monitor and record additional fluid losses related to vomiting, diarrhoea, fever and drains	76 (96.2)	1 (1.3)	2 (2.5)
7.	I do daily weight monitoring	47 (59.5)	20 (25.3)	12 (15.2)
8.	I monitor laboratory tests (blood urea creatinine (BUN), creatinine, electrolyte levels, etc.) and report changes to the physician	68 (86.1)	8 (10.1)	3 (3.8)
9.	I assess skin turgor, colour and moistness of the mucous membrane	71 (89.9)	3 (3.8)	5 (6.3)
10.	In a sodium disorder, I assess for muscle tone, strength, cramping and twitching	56 (70.9)	16 (20.3)	7 (8.9)
11.	I assess hypoactive or hyperactive reflexes and muscle strength	50 (63.3)	24 (30.4)	5 (6.3)
12.	I check peripheral perfusion	54 (68.4)	20 (25.3)	5 (6.3)
13.	If the patient has a CVP, I assess it periodically	50 (63.3)	15 (19)	14 (17.7)
14.	I take precautions against injuries that may develop due to changes in the patient's mental state	75 (94.9)	3 (3.8)	1 (1.3)
15.	I administer the fluids requested at the appropriate dose and flow rate	75 (94.9)	3 (3.8)	1 (1.3)
16.	I monitor the patient in terms of side effects of diuretic treatment	75 (94.9)	3 (3.8)	1 (1.3)
17.	I inform patients taking lithium not to take diuretics	38 (48.1)	29 (36.7)	12 (15.2)
18.	I consider water intake in tube-fed patients	66 (83.5)	10 (12.7)	3 (3.8)
19.	I administer potassium in a controlled manner in line with the physician's order	75 (94.9)	3 (3.8)	1 (1.3)
20.	I inform the patient about his diet	74 (93.7)	4 (5.1)	1 (1.3)
21.	I monitor digital patients for digital toxicity	41 (51.9)	23 (29.1)	15 (19)

knowledge form according to the characteristics of the nurses ($p > 0.05$) (Tables 4 and 5).

5 | DISCUSSION

Fluid-electrolyte balance monitoring is one of the most important nursing interventions. Therefore, nurses working in urological services where fluid-electrolyte imbalances are common are responsible for accurate monitoring and recording of fluid balance and planning and implementing appropriate interventions. Managing fluid balance after urological surgery is as important as performing other patient care activities.⁷

Fluid and electrolyte balance is critical for sustaining life and homeostasis.¹⁵ Studies investigating the knowledge and practices of nurses regarding the maintenance of fluid electrolyte balance have revealed that the mean age of nurses is 28 ± 6.9 years, 34% of them are between the ages of 25–30 years,¹⁵ the majority of them are between the ages of 23–35 years⁵ and 25–30 years,¹⁰ and two-thirds of the sample is between the ages of 23–35 years.¹⁶ In this study, which investigated the knowledge and practices of nurses working in urology services to maintain fluid electrolyte balance, the mean age was 30.85 years, which overlapped with the studies in the literature.

Fluid and electrolyte imbalances are very common in patients after surgical intervention. After urological surgery, fluid-electrolyte imbalances may occur due to surgical stress, blood loss, renal function,

TABLE 4 Distribution of the mean fluid-electrolyte monitoring and management knowledge form score according to the individual characteristics of the nurses ($N = 79$).

Characteristic		Fluid-Electrolyte Monitoring and Management Knowledge Form Mean $\pm$ SD	Statistical analysis
Gender	Female	7.55 $\pm$ 1.78	t ; p 0.625;0.514
	Male	7.24 $\pm$ 1.60	
Marital status	Married	7.38 $\pm$ 1.87	t ; p 0.543;0.589
	Single	7.59 $\pm$ 1.59	
Education status	Pre licence	6.57 $\pm$ 1.40	f ; p 1.513;0.227
	Undergraduate	7.48 $\pm$ 1.82	
	Postgraduate	8.00 $\pm$ 1.35	
Organization	University Hospital	7.48 $\pm$ 1.54	f ; p 2.58;0.135
	Ministry of Health Hospital	7.30 $\pm$ 1.84	
	Private Hospital	8.63 $\pm$ 1.19	
Working method	Night	7.13 $\pm$ 1.81	f ; p 0.714;0.493
	Day	9.00 $\pm$ 00	
	Day and Night	7.55 $\pm$ 1.74	
Receiving training on fluid-electrolyte monitoring and management	Yes	7.51 $\pm$ 1.96	t ; p 0.170;0.865
	No	7.44 $\pm$ 1.46	

Note: f , One-way ANOVA test; t , independent sample t test.

TABLE 5 Relationships between the characteristics of the nurses and the mean scores of the fluid-electrolyte monitoring and management knowledge form ($N = 79$).

Characteristics	Fluid-Electrolyte Monitoring and Management Knowledge Form	
	p	R
Age	0.890	0.016
Working years in profession	0.938	0.009
Working year in urology clinic	0.701	0.044

Note: R , Pearson correlation.

urinary tract obstruction and damage, postoperative medications (diuretics), gastrointestinal fluid loss and bladder irrigation.^{17,18} It is very important for nurses to have a good level of knowledge about fluid electrolyte imbalances and to transfer their knowledge to practice to diagnose postoperative fluid electrolyte imbalances early, treat them and prevent possible complications.⁵ When the literature is reviewed, the knowledge and practice results of nurses regarding the prevention of fluid electrolyte imbalances differ. Vijanaya reported that 50% of nurses had above-average knowledge about fluid and electrolyte administration after cardiac surgery, and in terms of practices, it was stated that the most common practice was to control the amount and type of fluid according to the physician's order.¹¹ Soltatania et al. reported that only half of nurses had sufficient knowledge about fluid electrolyte imbalances after macrofacial surgery.⁵ In the study of Hassan and Mohamed, the knowledge and practice levels of

nurses regarding fluid and electrolyte imbalance were insufficient.⁷ El Sayed & El Sayed stated that nurses have moderately sufficient knowledge about monitoring fluid balance and that there are inadequate practices.¹⁵ Varghese et al. reported that the majority of nurses have good knowledge about fluid-electrolyte imbalances, but improvements should be made in practice to prevent electrolyte imbalances.¹⁹ Aslam et al. reported that nurses' knowledge and practices regarding fluid-electrolyte imbalance were poor.³ In this study, the mean knowledge scores of nurses were above average. When their practices for the prevention of fluid-electrolyte imbalances were examined, it was determined that they performed most of the practices and most frequently monitored additional fluid losses related to vomiting, diarrhoea, fever and drains. This result is important in terms of determining the knowledge and practice deficiencies of nurses regarding fluid-electrolyte imbalances and establishing in-service training programmes to update them with the latest guidelines and ensure periodic implementation.

Professional experience and education level of nurses may affect their knowledge and practices in the treatment process of patients. It is stated that the education level and experience of nurses are effective in professional behaviours and attitudes.²⁰ In the study of Aslam et al. (2018), it was determined that clinical experience affects the knowledge levels of nurses. In the study, contrary to the literature, it was observed that sociodemographic characteristics of nurses (such as clinical experience, age, years of working in the profession and educational status) did not affect their knowledge scores. This suggests that this may be due to the fact that the majority of nurses are undergraduate graduates.

5.1 | Limitations of the Study

The study is limited to nurses who use social networks and agree to participate in the study. Another limitation of the study is that the findings of the study were obtained from the answers given to the data collection forms used, and the study was conducted within a certain time interval.

6 | CONCLUSION

In this study, the mean knowledge scores of the nurses were above the middle level. When the practices performed by the nurses for the prevention of fluid-electrolyte imbalances were examined, it was determined that they performed many practices and most frequently monitored additional fluid losses related to vomiting, diarrhoea, fever and drains. The characteristics of the nurses (clinical experience, age, years of working in the profession and educational status) did not affect their knowledge scores.

In line with these results, it is recommended to determine the knowledge and practice deficiencies of nurses in urological surgery regarding fluid electrolyte imbalances, establish in-service training programmes to update their knowledge according to the latest guidelines, ensure that the quality of care is increased by periodically organizing them, and develop a standardized measurement tool for periodic evaluation of nurses' knowledge and practices regarding fluid electrolyte imbalances.

AUTHOR CONTRIBUTIONS

The listed authors meet the criteria for authorship and agree with the content of the manuscript. *Study design:* E.S.A., Y.C., E.E., A.O. *Data collection:* E.S.A., Y.C., E.E., Y.C. *Data analysis:* E.S.A., Y.C., E. E. *Manuscript writing:* E.S.A., Y.C., E.E., A.O. All authors supervised critically reviewed the manuscript and checked spelling and grammar. All the authors read and approved the final manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The datasets generated and/or analysed during the current study are not publicly available due to privacy and confidentiality concerns but are available from the corresponding author on reasonable request.

ETHICS STATEMENT

The study was conducted according to the guidelines of the Declaration of Helsinki and Ethics approval (12.05.2023/E-

74555795-050.01.04-685 894) was obtained from the Ethics Committee. Informed consent was obtained from all study participants.

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