



Nurses' Performance and Factors Affecting Hydration Status for Critical Cardiac Patients

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Abstract

Background: Hydration status is a critical component in the management of patients with cardiac conditions, particularly those in critical care settings. **Aim:** The aim of this study was to evaluate nurses' performance and factors affecting hydration status for critical cardiac patients. **Research design:** A descriptive research design was used. **Setting:** This study was conducted in three cardiac care units, at Zagazig university hospitals, Sharqia govenorate , Egypt. **Subjects:** A convenient sample of available nurses (48) and purposive sample of (165) patients were selected from the mentioned setting. **Tools:** Four tools were utilized for data collection, pertinent as follows: self-administered questionnaire for nurses, observational checklist for nurses, patient's hydration status physical assessment tool and factors affecting hydration status with critical cardiac patients assessment tool. **Results:** Revealed that, more than three fifth (60.4%) of the studied nurses had unsatisfactory knowledge regarding hydration status for critical cardiac patients. More than two thirds (70.0%) of the studied nurses had unsatisfactory practice related to hydration status for critical cardiac patients with Mean $\pm$ SD=53.77 $\pm$ 7.99. About three fifths of critical cardiac patients under the study were affected by factors that disturb hydration status. Meanwhile, More than two fifths of the studied patient not affected with Mean $\pm$ SD=39.72 $\pm$ 3.41 **Conclusion:** The majority of studied patient hydration status in four days of admission had negative balance with mean $\pm$ SD -1617.1 $\pm$ 1692.0. Additionally, There was a highly statistically significant positive correlation between nurses' knowledge and their practice. **Recommendations:** Further studies are recommended to evaluate the effectiveness of educational and training programs on improving nurses' performance and patient outcomes related to hydration status.

Keywords: Critical Cardiac Patients, Factors Affecting Hydration, Hydration Status and Nurses' Performance.



Introduction

Hydration status is defined by the balance between water outputs and water inputs. Physiological homeostasis is disrupted when inputs exceed outputs or vice versa. Both over hydration and dehydration are non-physiological states of the body that can have negative implications for human health. Therefore, clinicians must pay special attention to maintaining optimal hydration in all patients (**Wittczak & Bielecka-Dabrowa, 2023**).

Fluids and electrolytes and acid base balance are fundamental to the process of life. They are necessary to maintain health and function of all body system. Fluids are vital to all forms of life, they help maintain body temperature and cell shape, and they help transport nutrients, gases, and wastes. Electrolytes play a vital role in maintaining homeostasis within the body. Help to regulate myocardial and neurological function, fluid balance, oxygen delivery, and acid base balance (**Mahmoud et al., 2023**).

A healthy adult requires a balance between water intake and loss; water deprivation arises when this balance is disrupted, leading to a state of dehydration .A complicated state that results in a decrease in total body water is one definition of dehydration .Dehydration is commonly characterized by dry mouth and tongue, decreased skin turgor, thirst, headache, lethargy and elevated blood concentrations of osmolality and serum sodium (**Labieb et al., 2024**).

The disturbances in fluid and electrolyte balance may manifest in several clinical forms that such as hyponatremia or hypernatremia potassium imbalances, whether hypokalemia or hyperkalemia, calcium and magnesium abnormalities may lead to muscle cramps, tetany, hypotension, or prolonged QT interval on the electrocardiogram. Fluid overload can result in pulmonary edema, dyspnea, and decreased oxygen saturation, while fluid deficit may cause hypotension, tachycardia, poor urine output, and impaired tissue perfusion (**Mohamed, et al., 2024**).

Fluid overload can be defined as an abnormal buildup of both water and dissolved electrolytes in the body that exceeds physiological levels. Typically, this surplus of fluid collects in the distensible spaces between cells, leading to interstitial edema, and may also result in macroscopic fluid accumulation in the chest (pleural effusions) or abdomen (ascites). Congestion in heart failure is defined as fluid accumulation in the intravascular compartment and the interstitial space, resulting from increased cardiac filling pressures caused

by maladaptive sodium and water retention by the kidneys (**Wittczak & Bielecka-Dabrowa, 2023**).

There are many factors affecting altered hydration status in critical cardiac patients such as comorbidities disease (cardiovascular disease, renal disease, cerebrovascular stroke, diabetes mellitus, deterioration in the level of consciousness, excessive gastrointestinal fluid loss, impaired skin integrity such as pressure ulcer, burn, trauma and sepsis). Critical patients are at risk for increased sensible and insensible loss via many mechanisms as infection, and fever (**Samir et al., 2022**).

Nursing management depends upon the clinical status of the patient and the correction of the underlying cause. Critical care nurses are responsible for delivering prescribed nutrition, fluids, and medication safely and effectively to CHF (Congestive Heart Failure) patients. Nursing interventions include assessment, monitoring of vital signs, skin temperature and peripheral pulses, results of tests, and oxygen saturation, implementing strategies to treat fluid and electrolyte imbalances, and instructing a patient to get adequate bed rest and sleep (**Hamam, 2024**).

Significance of the study:

Heart disease is the world's leading cause of death, claiming the lives of about 17.9 million people every year. Heart disease is a group of disorders that affect the heart and the blood vessels (**World Health Organization, 2023**). Monitoring fluid status closely is especially important for patients with heart failure, as they are more likely to experience fluid overload or dehydration as a result of medication and medical interventions. The fluid status of cardiac patients can have a major impact on their health. Heart disease, including heart failure, can cause fluid overload, edema and other serious health issues (**Roberts, 2023**).

Monitoring fluid balance is part of the scope of practice of nurses. Because the fluid balance was not correctly calculated, all patient management decisions were affected by inaccurate fluid balance data. This is why nurses working in ICUs are responsible and accountable for accurately record and calculate fluid balance when treating critically ill patients (**Elsayed & Saad, 2022**). Therefore this research will be carried out to assess nurses' performance and factors affecting hydration status for critical cardiac patients.



Operational Definition

1. Critical cardiac patients:

Critical cardiac patients are individuals who suffer from severe or life-threatening heart conditions that require intensive medical care and continuous monitoring. These patients may experience conditions such as heart failure, myocardial infarction (heart attack), arrhythmias, cardiogenic shock, or severe hypertension. They are usually admitted to intensive care units (ICUs) or cardiac care units (CCUs) to receive specialized treatment aimed at stabilizing heart function, preventing complications, and improving survival outcomes.

2. Factors affecting hydration status:

Hydration status refers to the balance of fluids in the body. It is affected by several factors that influence fluid intake and fluid loss. These factors include age, physical activity, environmental temperature, diet, health conditions, and medications. Increased sweating, vomiting, diarrhea, or inadequate water intake can lead to dehydration, while excessive fluid intake may cause overhydration. Maintaining proper hydration is important for normal body functions, temperature regulation, and overall health.

3. Nurses' Performance:

Nurses' performance refers to the effectiveness and efficiency with which nurses carry out their professional duties and responsibilities in delivering patient care. It encompasses their clinical skills, decision-making abilities, communication, adherence to ethical standards, and the application of knowledge in practice to promote health, prevent illness, and care for patients.

Aim of the study:

The aim of this study was to evaluate nurses' performance and factors affecting hydration status for critical cardiac patients.

This aim was achieved through the following objectives:

- 1-Assess the level of nurses' knowledge regarding hydration status for critical cardiac patients.
- 2-Assess the level of nurses' practice regarding hydration status for critical cardiac patients.
- 3-Determine factors affecting hydration status for critical cardiac patients.

Research Questions:

- 1- What is the level of nurses' knowledge regarding hydration status for critical cardiac patients?
- 2- What is the level of nurses' practice regarding hydration status for critical cardiac patients?
- 3- What are factors affecting hydration status for critical cardiac patients?

3- What are factors affecting hydration status for critical cardiac patients?

Subjects and Methods:

Research design:

This study used a descriptive design was utilized to accomplish the aim of this study and to answer the research questions

Setting:

This study was conducted in three cardiac care units, at Zagazig university hospitals, Sharqia govenorate , Egypt. One of the cardiac care units is located on the first floor of Medical hospital and the other are located on third and fourth floor of Heart and thoracic hospital. The cardiac care units contain men and women patients, which include about 31 beds for patients. In which comprehensive care will provided to the patient.

Subjects:

The study involved convenient sample of available nurses (48) working in cardiac care units at Zagazig University hospital and purposive sample of 165 patients who fulfilling the inclusion criteria.

Tools of data collection:

Four tools were used to collect necessary data.

Tool I: Self-Administered Questionnaire for nurses included two parts as follows:

First part: Nurses' demographic characteristics: This part covered the demographic characteristics of the nurses contained five ended questions included (Age, gender, level of education, years of experience, and attendance of training programs).

Second part: Nurses' knowledge Assessment Questionnaire: This part concerned with assess nurse's knowledge regarding fluid and electrolyte balance the questionnaire contained 85 questions, divided into 3 subscales (20 question in the form of true and false questions about nurses 'basic knowledge regarding fluid and electrolyte management (monitoring, preparation, administration, and recording), 24 question in the form of MCQ questions about knowledge regarding fluid balance for critical cardiac patients and 41 question in the form of MCQ questions about knowledge regarding definition , causes, correction and care for dehydration and over hydration with critical cardiac patients (Hosny, et al., 2022).

The scoring system for Nurse's knowledge regarding Hydration status: The questionnaire using a two-point scale that ranges from one "correct answer", zero "incorrect answer". The total score is 85 grades. these



scores were summed and converted into a percent score. It was classified into two categories: satisfactory if score $\geq 80\%$. (68-85 grades) and unsatisfactory if score from $<80\%$. (Zero-67 grades). Based on statistical analysis.

Tool II: Observational Checklist for Nurses:

It was used to assess nurses' practice regarding Hydration status for critical cardiac patients. The scale contained 74 steps in the form of done or not done questions, divided into four subscales fluid and electrolyte balance management which contain 29 steps (4 steps in preparation, 6 steps in monitoring, 6 steps in administration and 13 steps in documentation), Arterial puncture procedure which contain 14 steps, central venous pressure measurement which involve 19 steps, Body mass index procedure which contain 12 steps (Hosny et al., 2022; Hamzaoui & Teboul, 2022; Khanna et al., 2022; Rowling et al., 2022).

Scoring system for Nurse's practice regarding Hydration status for critical cardiac patients:

The scale using a two-point scale that ranges from one "done", zero "not done". The total score is 74 grades. These scores were summed and converted into a percent score. It was classified into two categories: adequate if score $\geq 80\%$. (59-74 grades) and Inadequate if score from $<80\%$ (0-58 grades). Based on statistical analysis.

Tool III: Patient's hydration status physical assessment tool: it was developed by the researchers based on the recent literature. It included the following three parts:

Part I. This part was concerned about demographic characteristics of patients under the study, It was include nine questions about gender age, marital status, educational level, occupation, date of CCU admission, weight, height, and body mass index.

Part II. This part was included 12 items regarding patient's clinical data, it composed of eight items about present comorbid condition, three items about past history, and one items about family history.

Part III. This part was divided into sections as follow; Five items assessment of vital signs, assessment level of consciousness by using Glasgow coma scale three domain (Eye opening four response, verbal response five response, motor response six response and total score two response) assessment of oxygenation and ventilation status (Method of oxygen therapy three

items and patient on mechanical ventilator one items), physical examination of body systems covered 18 items included (cardiovascular system peripheral pulse five items, Capillary refill time two items, Respiratory system pattern four items, Respiratory sound four items, Skin color five items, Skin moisture three items, Mucous membrane two items, Lips color three items, Skin turgor three items, Edema two items, Type of edema two items, Site of edema two items, Edema grade four items, Gastrointestinal system five items, Nutritional status four items, Urinary system urine amount four items, Urine color three items and general signs of altered hydration status five items), Fluid balance chart 11 items and laboratory investigations 14 items (Samir et al., 2022; Amirtharaj et al., 2022).

Tool IV: Factors affecting hydration status with critical cardiac patients assessment tool .: This tool developed by the investigator in English language. It was used to assess factors affecting hydration status with critical cardiac patients. which patient related factors (Health problems 25 items, Sepsis and infection three items, Current medication 13 items, Patient habits and life style four items, Body mass index four items), Environmental related factors six items, Nurses related factors seven items, Physician related factors six items (Samir et al., 2022).

Scoring System

The total score of the factors was 68 grades (100%). The responds to these statements were on two scales as follows: One point for affected and zero point for not affected. These scores were converted into percentage scores. The patient hydration status affected with this factor when the total score equal or above 60% and not affected when the total score below 60% based on statistical analysis.

Tools validity & Reliability:

It was used to modify the tools to determine whether the tools covered the aim or not. It ascertained by three jury of expertise from (three assistant professors in medical surgical nursing) who were reviewed the tools for clarity, relevance, comprehensiveness, applicability, and understanding. According to the expertise's modifications and the results of the pilot study, some modifications were applied in the form of rephrasing or rewording, and sometimes changing of some questions. The final form had been drawn.

The reliability of tools was tested by the internal consistency method. Cronbach's alpha reliability coefficient was found to be 0.859 and 0.836



respectively for nurses' knowledge and practice. Cronbach's alpha reliability coefficient was found to be 0.712 and 0.703 respectively for Patient's hydration Status Physical assessment tool and factors affecting hydration Status for Critical Cardiac Patients. Reliability testing was conducted before data collection began.

Field work:

A letter was delivered by the dean of the faculty of nursing to the head of the cardiac care units, requesting the required agreement to carry out the current study. Once permission to continue the study was obtained, the researcher began data collection. Initially the patients were interviewed by the researcher to initiate a line of communication. Data collection was carried out over a period of ten months, from April 2024 to the end of September 2024. Each patient was interviewed individually during the study period from Day of Admission to 3rd day after Admission in two shifts at morning and afternoon shift.

Each nurse was met individually, got a full explanation about the aim of the study and was invited to participate. The nurse who gave his/her verbal informed consent to participate was handed the self-administered questionnaire and was instructed during the filling. The data were collected from Day of Admission to 3rd day after Admission in the morning and afternoon shifts, the time used for finishing the self-administered questionnaire ranged between 20-30 minutes for each nurse according to nurses' physical and mental readiness and for nurses practice, also the researcher was observing nurses' practical skills about studied procedures.

Pilot study:

A pilot study was carried out on four patients and four nurses (10%) of the total study sample to test whether the tools are clear, understandable, feasible, applicable, and time consuming. Necessary modifications were made according to the pilot study results. Pilot subjects were later excluded from the main study sample.

Administrative and ethical consideration:

The necessary approvals were obtained from the dean of the Faculty of Nursing and submitted to general director of Zagazig University Hospitals. Then Permission to carry out the study was obtained from the head of mentioned setting after explaining the purpose of the study.

At the initial interview, each potential subject was informed about the nature, purpose, benefits of the

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study, and informed that his/her participation is voluntary. Confidentiality and anonymity of the subjects were also assured through coding of all data. The researcher assured that the data collected, and information will be confidential and would be used only to improve their health and for the purpose of the study and there was no risk for study subject during application of the research.

In addition, an informed consent was obtained from each participant prior to inclusion into the study and after a full explanation of its aim and procedures. They were informed about their rights to refuse or withdraw from the study at any time with no reason to be given or consequences. **Ethical code:** M.D.Zu.R/182/13 /6/2022.

Statistical analysis:

The statistical analysis of data was done by using the computer software of Microsoft Excel Program and Statistical Package for Social Science (SPSS) version 25. Data were presented using descriptive statistics in the form of frequencies and percentage for categorical data, the mean (X) and standard deviation (SD) for quantitative data. Qualitative variables were compared using chi square test (X^2), P-value to test association between two variables and Pearson correlation test (R-test) to the correlation between the study variables. A significant level value was considered when $p < 0.05$ and a highly significant level value was considered when $p < 0.01$. Not significant level value was considered when $p \geq 0.05$.

Results:

Table1: Shows that, three quarters (75.0%) of the studied nurses their ages ≤ 30 years, while one quarter of them their ages more than 30 years with Mean $\pm$ SD = 27.91 ± 5.20 . Concerning nursing qualifications; 14.6% of the studied nurses had diploma degree, 47.9% had technical institute, while 33.3% had bachelor degree of nursing and only 4.2% had post graduate level of education.

The same table reveals that, 68.8% of the studied nurses had total experience years less than 10 years, with Mean $\pm$ SD = 7.22 ± 6.06 . This table also shows that, 54.2% of the studied nurses didn't had any training course related to fluids balance in critical cardiac patient care. While, 45.8% had attended training course related to hydration status for critical cardiac patients.

Table 2: Shows that, 85.4% of the studied nurses had satisfactory knowledge about body fluids and



electrolytes with Mean $\pm$ SD=16.81 $\pm$ 2.84, while about half of the studied nurses (47.9%) had satisfactory knowledge about fluid balance with Mean $\pm$ SD=17.43 $\pm$ 1.68. On the other hand, more than half (54.2%) of the studied nurses had satisfactory knowledge about electrolyte balance with Mean $\pm$ SD=28.12 $\pm$ 8.30. Also, this table shows that, 39.6% of the studied nurses had satisfactory knowledge regarding fluid balance for critical cardiac patients. On the other hand, more than three fifth (60.4%) of studied nurses had unsatisfactory knowledge regarding hydration status for critical cardiac patients.

Table3: Shows that, 52.1% of the studied nurses had attained satisfactory practice regarding fluid and electrolyte balance management for critical cardiac patients with Mean $\pm$ SD = 21.52 $\pm$ 4.16. While (100.0%) of studied nurses had unsatisfactory practice about arterial blood gases with Mean $\pm$ SD =10.56 $\pm$ 1.71. On the other hand 66.6% of the studied nurses had attained satisfactory practice regarding Central venous pressure measurement with Mean $\pm$ SD =15.56 $\pm$ 2.96. this table reveals that the majority of the studied nurses (83.3%) of studied nurses had reported unsatisfactory practice related to measure body mass index with Mean $\pm$ SD = 6.12 $\pm$ 2.03. Also, this table indicates that, more than two thirds (70.0%) of the studied nurses had unsatisfactory practice related to hydration status for critical cardiac patients with Mean $\pm$ SD=53.77 $\pm$ 7.99.

Table 4: Reveals that, (83.0%) of studied patients' age were $\geq$ 50 years with the mean age = (54.70 $\pm$ 6.38) and 62.4% were females. Also, the most of studied patients (95.7%) were married, (53.9%) of them were educated and living with their families. Moreover, (87.3%) of patients were not working. Finally, Body mass index of studied patients were as follow (26.1% of them were normal, 30.0% of them were overweight and 43.0% of them were obese).

Table 5: Shows that, The majority (84.2) of studied patient hydration status in four days of admission had negative balance with mean $\pm$ SD -1617.1 $\pm$ 1692.0. There was a statistically significant relation between patients' hydration status and their 4 days of follow-up ($p < 0.01$).

Table 6: Shows that, About three fifths (58.2 %) of critical cardiac patients under the study were affected by factors that disturb hydration status. Meanwhile, More than two fifths (41.8%) of the studied patient not affected with Mean $\pm$ SD=39.72 $\pm$ 3.41 and Median (range) =13.0 (30.0-46.0)

Table 7: Shows that, there was a highly statistically significant relation between nurses' knowledge and their practice ($p < 0.001$).

Table (8): shows that, there was a highly statistically significant positive correlation between nurses' knowledge and their practice with ($r = 0.874$. at $P = 0.001$), there was a statistically significant negative correlation between nurses' knowledge and factors score with ($r = -0.225$. at $P = 0.04$). Also the same table illustrates that, there was a highly statistically significant positive correlation between nurses' experience and their Practice with ($r = 0.373$ at $P = 0.009$).

Discussion:

Regarding to demographic characteristics of the studied nurses, the present study revealed tha, three quarters of the studied nurses their ages ≤ 30 years, while one quarter of them their ages more than 30 years with Mean $\pm$ SD =27.91 $\pm$ 5.20. The finding of the present study in the same context with **Hosny et al. (2022)**, in the study entitled "Assessment of Nurses' knowledge and Performance Regarding Fluid and Electrolyte Management for Cardiac Surgery Patients", stated that, about half of studied nurses aged 26- 30 years and more than one third aged 20-25 years with mean age was 29.6 years.

Regarding gender, the present study revealed that, three quarters of the studied nurses were females while one quarter of them were male. The finding of the present study in contrast with **Aslam et al. (2017)**, in the study entitled "The assessment of nurses' knowledge and practices about fluid and electrolytes monitoring and administration among cardiac surgery patients", stated that, all of the studied nurses were females.

Regarding educational level, the present study revealed that, less than half of the studied nurses had technical institute, while one third of the studied nurses had bachelor degree of nursing. The finding of the present study in the same context with **Eldsouky et al. (2016)**, in the study entitled "Nurses' knowledge and practice concerning fluid and electrolyte balance among patients with congestive heart failure", stated that, One third of the studied nurses had a bachelor degree.

Concerning experience, more than two third of the studied nurses had total experience years less than 10 years, with Mean $\pm$ SD= 7.22 $\pm$ 6.06. The finding of the present study in the same context with **Eldsouky et al. (2016)**, who revealed that, less than two thirds of the studied nurses had less than 10 experience years.



Regarding total knowledge of the studied nurses, the present study revealed that more than three fifths of studied nurses had unsatisfactory total knowledge scores regarding hydration status for critical cardiac patients. This finding is agreement with **Hamam et al. (2024)**, in the study entitled “Nurses’ Performance Regarding Fluids and Electrolytes Management for the Patient Undergoing Cardiac Surgerie”, stated that, more than half of the studied nurses had unsatisfactory level of knowledge while more than two fifth of them had satisfactory level of knowledge regarding fluids and electrolytes management for the patient undergoing cardiac surgeries.

Regarding nurses' knowledge about fluid Balance, the present study revealed that more than half of studied nurses had unsatisfactory knowledge scores regarding to fluid Balance. This finding is supported by **Hosny et al. (2022)**, who revealed that, about two thirds of studied nurses have poor knowledge level including basic knowledge, fluid and electrolyte balance with total mean score 45.24, 40.94, and 32.34 respectively.

Regarding to total practice regarding hydration status management, the present study revealed that, More than two thirds of the studied nurses had unsatisfactory practice regarding hydration status for critical cardiac patients. This finding is agreement with **Hamam et al. (2024)**, Who revealed that, more than half of the studied nurses had an incompetent level of practice while more than one third of them had a competent level of practice regarding fluids and electrolytes management for the patient undergoing cardiac surgeries.

Regarding nurses' practice about taking arterial blood gases Sample, the present study revealed that all of studied nurses had unsatisfactory practice about arterial blood gases with Mean $\pm$ SD = 10.56 $\pm$ 1.71. This finding is agreement with **Ragab & Mohamed (2022)**. In the study entitled “Effect of Self-Learning Package on Nurses' Knowledge and Practice Regarding Arterial Blood Gases Analysis for Critically Ill Patients” revealed that majority of studied nurses had total unsatisfactory level of practice regarding ABG analysis.

Regarding to demographic characteristics of the studied patients, the present study revealed that, majority of studied patients' age were ≥ 50 years with the mean age = (54.70 $\pm$ 6.38) The finding of the present study in the same context with **Othman et al. (2024)**, in the study about “Relation between hydration status and cognitive function among critically ill patients”

showed that, more than half of the studied patients were >50 years with a mean age of 48.95 $\pm$ 4.75 years.

Related to Gender, the results of the present study showed that more than half of the studied patients were female. In disagreement with **Elsayed et al. (2017)**, who reported in the study entitled “Factors Associated with Altered Hydration Status among Critically Ill Adult Patients” that, Male patients represented the majority of the studied sample.

Related to marital status, the results of the present study showed that most of the studied patients were married. In agreement with **Eldsouky et al. (2016)**, who reported that, the majority of the studied patients were married.

Related to education level, the results of the present study showed that more than half of the studied patients were educated and living with their families. In agreement with **Samir Afifi et al. (2022)**, who reported in the study entitled “Factors affecting hydration status among critically ill patients” that, two fifth of the studied patients were highly educated.

Regarding BMI, results of the present study revealed that, the body mass index of studied patients were as follow (more than one quarter of them were normal, about one third of them were overweight and more than two fifth of them were obese). The finding of the present study in contrast with **Samir Afifi et al. (2022)**, who reported that, two fifth of the studied patients were normal, more than one third of them were overweight and one fifth of them were obese.

Regarding Hydration status of studied patients throughout 4 Days of Follow-up, the present study revealed that there was a statistically significant relation between patients' fluid balance and their 4 days of follow-up ($p < 0.01$). Also, there was a highly statistically significant relation mean $\pm$ SD of patients' fluid balance and their 4 days of follow-up. The present finding unsupported by **Othman et al. (2024)**, who reported that, that 64.0%, 67.4%, 70.9%, and 74.4% of the studied patients had normal fluid intake in 24 hrs. On the day of admission, the first day, the second day, and the third day after admission, respectively. Also, 58.1%, 60.5%, 64.0%, and 66.3% had normal total output in 24 hrs. on the day of admission, the first day, the second day, and the third day after admission, respectively.

Regarding factors affecting hydration status of patients, the present study revealed that, about three fifths of critical cardiac patients under the study were affected by factors that disturb hydration status. This



finding is supported by **Samir Afifi et al. (2022)**, who reported that, the most common factors affecting hydration status of patients was antibiotic, antacid, calcium channel blockers, beta blockers medications, deterioration in level of consciousness, respiratory infection, smoking, overweight, diuretic medications, vomiting, fever, and impaired skin integrity (89.0%, 61.0%, 55.0%, 52%, 51.0% 43.0%, 41.0%, 38%, 37%, 35%, 34.0%, 34%) respectively.

Owing to relations between total level of knowledge and total level of practice among studied nurses regarding Hydration status management, the current study findings showed that, there was a highly statistically significant relation between nurses' knowledge and their practice ($p < 0.001$). In the same context with **Hamam (2024)**. Who reported that, that there was a statistically significant positive relation between the total level of practices and total level of knowledge among the studied nurses at P - value=0.016.

The current study reveals that, there was a highly statistically significant positive correlation between nurses' experience and their Practice with ($r = 0.373$. at $P = 0.009$). In the same context with **Hosny et al. (2022)**, who reported that, there was highly statistically significant correlations appear between nurses' clinical competency scores and their years of experience.

Conclusion:

On the light of the present study results, can concluded that, More than three fifths of studied nurses had unsatisfactory total knowledge scores regarding hydration status for critical cardiac patients. More than

two thirds of the studied nurses had unsatisfactory practice related to hydration status for critical cardiac patients with Mean $\pm$ SD=53.77 $\pm$ 7.99. The majority of studied patient hydration status in four days of admission had negative balance with mean $\pm$ SD - 1617.1 $\pm$ 1692.0. About three fifths of critical cardiac patients under the study were affected by factors that disturb hydration status. Meanwhile, More than two fifths of the studied patient not affected with Mean $\pm$ SD=39.72 $\pm$ 3.41 and Median (range) =13.0 (30.0-46.0). Additionally, There was a highly statistically significant positive correlation between nurses' knowledge and their practice.

Recommendations:

In line with the findings of the study, the following recommendations were derived and suggested:

- Develop and implement continuous educational and training programs to improve nurses' knowledge regarding hydration status assessment and management for critically ill cardiac patients.
- Provide regular practical training sessions to enhance nurses' performance in assessing and monitoring hydration status using evidence-based guidelines.
- Increase nurses' awareness of the factors affecting hydration status in critically ill cardiac patients to promote early detection and appropriate intervention.

Table 1: Frequency and Percentage Distribution of Demographic Characteristics of Studied Nurses (n=48).

Demographic characteristics of nurses	No	%
Age ≤30 years >30 years Mean ±SD Median(range)	36 12	75.0 25.0
	27.91±5.20 29.0 (21.0-42.0)	
Sex Male Female	12 36	25.0 75.0
Education Diploma Technical institute Bachelor of Nursing Post graduate	7 23 16 2	14.6 47.9 33.3 4.2
Years of experience ≤10 years >10 years Mean ±SD Median(range)	33 15	68.8 31.2
	7.22±6.06 21.0(1.0-22.0)	
Training course Yes No	22 26	45.8 54.2

SD= Standard deviation.

Table 2: Frequency, Percentage of Total Knowledge among Studied Nurses regarding Hydration Status for Critical Cardiac Patients (n = 48).

Total nurses’ knowledge	Satisfactory ≥75		Unsatisfactory < 75	
	No	%	No	%
Body Fluids and Electrolytes	41	85.4	7	14.6
Mean ± SD Median (range)	16.81±2.84 13.0 (7.0-20.0)			
Fluid Balance	25	47.9	23	52.1
Mean ± SD Median (range)	17.43±1.68 6.0 (14.0-20.0)			
Electrolyte Balance	26	54.2	22	45.8
Mean ± SD Median (range)	28.12±8.30 32.0 (5.0-37.0)			
Total nurses’ knowledge	19	39.6	29	60.4
Mean ± SD Median (range)	62.37±9.52 34.0 (40.0-74.0)			

SD= Standard deviation.



Table3: Mean and Frequency Distribution of Nurses Practice regarding hydration status for critical cardiac patients (n = 48).

Total Nurses' Practice	Satisfactory ≥ 75		Unsatisfactory < 75	
	No	%	No	%
Fluid and Electrolyte Balance Management	25	52.1	23	45.8
Mean $\pm$ SD	21.52 $\pm$ 4.16			
Median (range)	16.0 (12.0-28.0)			
Arterial Blood Gases	0	0.0	48	100.0
Mean $\pm$ SD	10.56 $\pm$ 1.71			
Median (range)	5.0 (8.0-13.0)			
Central venous pressure Measurement	32	66.6	16	33.3
Mean $\pm$ SD	15.56 $\pm$ 2.96			
Median (range)	12.0 (7.0-19.0)			
Measure Body Mass Index	8	16.7	40	83.3
Mean $\pm$ SD	6.12 $\pm$ 2.03			
Median (range)	8.0 (3.0-11.0)			
Total nurses' practice	14	29.2	34	70.8
Mean $\pm$ SD	53.77 $\pm$ 7.99			
Median (range)	26.0 (40.0-66.0)			

SD= Standard deviation.

Table 4: Frequency and Percentage Distribution of Demographic characteristics of studied patients (n=165).

Demographic characteristics for patients	No	%
Age		
<50 years	28	17.0
≥ 50 years	137	83.0
Mean $\pm$ SD	54.70 $\pm$ 6.38	
Median(range)	25.0(35.0-60.0)	
Gender		
Male	62	37.6
Female	103	62.4
Marital status		
Married	165	95.7
Single	7	4.2
Education level		
Educated	89	53.9
Not educated	76	46.1
Occupation		
Work	21	12.7
Not work	144	87.3
Body mass index		
Underweight below 18.5	0	0.0
Normal 18.5-24.9	43	26.1
Overweight 25-29.9	51	30.9
Obese 30 and above	71	43.0
Mean $\pm$ SD	30.34 $\pm$ 9.43	
Median(range)	33.0(19.0-50.0)	

SD= Standard deviation.



Table 5: Mean and Frequency Distribution of studied patients Hydration Status throughout 4 Days of Follow-up (n=165).

	1 st day		2 nd day		3 rd day		4 th day		χ^2	p-value
	No	%	No	%	No	%	No	%		
Neutral	9	5.5	2	1.2	0	0.0	0	0.0	20.571	0.002**
Negative	139	84.2	144	87.3	148	89.7	145	87.9		
Positive	17	10.3	19	11.5	17	10.3	20	12.1		
Mean±SD	-1617.1±1692.0		-1435.1±1639.7		-1593.3±1728.4		-1145.8±1593.7		F=2.804	0.039*

 χ^2 =Chi square test

(F) one way ANOVA

(*) p<0.05 significant

Table 6: Frequency, Percentage and Mean Distribution of Total Factors affecting Hydration status for Critical Cardiac Patients (n=156).

Total Factors	≥60 Affected		< 60 Not affected	
	No	%	No	%
Patient related factors	30	18.2	135	81.8
Mean ± SD	21.88±4.33			
Median (range)	13.0 (14.0-28.0)			
Environmental related factors	152	92.1	13	7.9
Mean ± SD	4.84±1.05			
Median (range)	2.0 (3.0-6.0)			
Nurses related factors	156	100.0	0	0.0
Mean ± SD	6.96 ±0.18			
Median (range)	1.0 (6.0-7.0)			
Physician's related factors	156	100.0	0	0.0
Mean ± SD	5.95±0.21			
Median (range)	1.0 (5.0-6.0)			
Total Factors	96	58.2	69	41.8
Mean ± SD	39.72±3.41			
Median (range)	13.0 (30.0-46.0)			

Table 7: Relation between total level of knowledge, Total Level of Practice and Total Factors Affecting Hydration among Studied Nurses' (n=48).

Total Nurses' knowledge	Total Nurses' practice				χ 2	p-value
	Satisfactory		Unsatisfactory			
	No.	%	No.	%		
Satisfactory	11	22.9	8	16.7	12.563	0.001*
Unsatisfactory	3	6.3	26	54.2		
Factors affecting hydration						
Affected	9	18.8	19	39.6	0.288	0.750
Not affected	5	10.4	15	31.2		

 χ^2 =Chi square test

(*) p<0.05 significant



Table 8: Correlation matrix between, total nurses' knowledge score, total nurses' practices score and demographic characteristics (n=48)

Parameters	Nurses' knowledge score		Nurses' practice score	
	R	P	r	P
Practice score	0.874**	<0.001	-	-
Factors score	-0.225	0.04*	-0.193	0.0190
Age	0.436**	0.002	-0.087	0.557
Experience	0.373**	0.009	-0.161	0.275

(r) correlation coefficient

**p<0.05= significant

References

- 1- Amirtharaj, A. D., Lazarus, E. R., & Alzaabi, O. (2022). Assessing validity and reliability of Glasgow Coma Scale and Full Outline of Un Responsiveness score: A systematic review. *International Journal of Health Sciences*, 6(S2), 12293–12306.
- 2- Aslam, S., Afzal, M., Kousar, R., Waqas, A., & Gilani, S. A. (2017). The assessment of nurses' knowledge and practices about fluid and electrolytes monitoring and administration among cardiac surgery patients: A case of Punjab Institute of Cardiology. *International Journal of Applied Sciences and Biotechnology*, 5(2), 208–215.
- 3- Elsayed, E. E., & Saad, N. S. E. D. (2022). Effect of hybrid educational program on nurses' performance regarding caring of patients with fluid and electrolytes imbalance in critical care units. *International Egyptian Journal of Nursing Sciences and Research*, 2(2), 253–268.
- 4- Elsayed, S. M., El-Hamid, A., Hassan, M., & Reda, N. A. (2017). Factors associated with altered hydration status among critically ill adult patients. *Alexandria Scientific Nursing Journal*, 19(1), 177–192.
- 5- Eldsouky, S. E., Taha, N. M., & Saleh, M. D. (2016). Nurses' knowledge and practice concerning fluid and electrolyte balance among patients with congestive heart failure. *Zagazig Nursing Journal*, 12(1), 114–128.
- 6- Hamam, D. O., Mahmoud, F. H., & Elauoty, R. M. (2024). Nurses' performance regarding fluids and electrolytes management for the patient undergoing cardiac surgeries. *Helwan International Journal for Nursing Research and Practice*, 4(11), 201–218.
- 7- Hamzaoui, O., & Teboul, J. L. (2022). Central venous pressure (CVP). *Intensive Care Medicine*, 48(10), 1498–1500.
- 8- Hosny, A., Sherief, W., & Mohamed, M. (2022). Assessment of nurses' knowledge and performance regarding fluid and electrolyte management for cardiac surgery patients. *Mansoura Nursing Journal*, 9(1), 31–40.
- 9- Khanna, D., Peltzer, C., Kahar, P., & Parmar, M. S. (2022). Body mass index (BMI): A screening tool analysis. *Cureus*, 14(2).
- 10- Labieb, M. M., Ghayth, E. I., Aly, S. E., & Khalaf, S. A. (2024). Nursing educational program for improving older persons' hydration status. *Tanta Scientific Nursing Journal*, 32(1), 188–203.
- 11- Mahmoud, F. H., Ammar, S. A., & Mohamed, A. S. M. (2023). Nurse's knowledge and practice regarding care of fluids and electrolytes imbalance among critically ill patients. *Journal of Survey in Fisheries Sciences*, 10, 4257–4266.
- 12- Mohamed Gamal Ahmed, E., Gaber Mohamed, H., Sobhy Mohamed, E., & Tolba Fathy, A. (2024). Assessment of nurses' knowledge and practice regarding monitoring fluid and electrolyte among cardiac surgery patients in the intensive care. *Journal of Nursing Science Benha University*, 7(1), 414–426.
- 13- Othman, A., Mohammad, S., & Abubakr, E. (2024). Relation between hydration status and cognitive function among critically ill patients. *Evidence-Based Nursing Research*, 7(1), 28–40.
- 14- Ragab Bayomi, R., & Mohamed Taha, N. (2022). Effect of self-learning package on nurses' knowledge and practice regarding arterial blood gases analysis for critically ill patients. *Egyptian Journal of Health Care*, 13(1), 57–69.
- 15- Roberts, B. (2023). Improving unlicensed staff and nurses' knowledge, attitudes, and practices associated with fluid status monitoring by the utilization of a fluid status monitoring protocol. *South Dakota State University*.
- 16- Rowling, S. C., Fløjstrup, M., Henriksen, D. P., Viberg, B., Hallenberg, C., Lindholt, J. S., ... & Brabrand, M. (2022). Arterial blood gas analysis: As safe as we think? A multicentre historical cohort study. *ERJ Open Research*, 8(1), 00535–2021.
- 17- Samir Afifi, S., Abd Elaty Ahmed, O., Abd Elrahman Abd Elrahman, A., & Nabil Abd Elsalam, S. (2022). Factors affecting hydration status among critically ill patients. *Egyptian Journal of Health Care*, 13(2), 1213–1225.
- 18- Wittczak, A., Ślot, M., & Bielecka-Dabrowa, A. (2023). The importance of optimal hydration in patients with heart failure—Not always too much fluid. *Biomedicine*, 11(10), 2684.
- 19- World Health Organization. (2023). Cardiovascular diseases. *World Health Organization*