Knowledge And Self-Care Practices And Skills Regarding Congestive Heart Failure And Fluid And Electrolytes Balance Among Patients Suffering From It

Section A-Research Paper

KNOWLEDGE AND SELF-CARE PRACTICES AND SKILLS REGARDING CONGESTIVE HEART FAILURE AND FLUID AND ELECTROLYTES BALANCE AMONG PATIENTS SUFFERING FROM IT

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Abstract

Fluid and electrolyte imbalance in the patient with cardiovascular dysfunction is a common complication of cardiac disease. Cardiovascular diseases remain the number one cause of death i today. Recovery from these diseases requires careful attention to the factors that influence heart status. Fluid and electrolyte imbalance in the cardiac patient often is both life-threatening and preventable. Maintaining a homeostatic environment in terms of fluid and electrolyte balance is critical to achieving optimal cardiac function in all heart patients. ***Aim of study:*** to evaluate the effect of nursing intervention program on maintaining fluid and electrolyte balance among patients with congestive heart failure. ***Subjects and Methods***: This quasi-experimental study was conducted in the outpatient clinics of the cardiology department at Zagazig University Hospitals on 60 patients suffering from CHF. The tools used in data collection were an interview questionnaire form for knowledge and observation checklists for practice, in addition to an input/output sheet. The researcher prepared the educational health promotion program, implemented it, and measured its immediate and 3-month follow-up effects. ***Results***: Patients' age ranged between 33 and 85 years, with 55.0% males. Patients' knowledge improved from 3.3% pre-intervention to 81.7% post-intervention phase, and 75.0% at the follow-up (p<0.001). Their practices improved from 1.7% pre-intervention to 81.7% post-intervention, and 75.0% at follow-up (p<0.001). The prevalence of edema decreased from 73.3% pre-intervention to 26.7% at follow-up (p<0.001). In multivariate analysis, the study intervention was the main positive predictor of the knowledge and practice scores.

Keywords: Fluid and Electrolyte Balance, Congestive Heart Failure, Educational Program, Self- Care, Cardiovascular Dysfunction.

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INTRODUCTION

Congestive heart failure (CHF) is a complex clinical syndrome in which the heart cannot pump enough blood to supply oxygen and nutrients to the body. In CHF is dyspnea, fatigue and fluid retention that can limit tolerance to exercise and functional capacity (**Tinoco et al., 2021**). It is an increasing global public health problem associated with higher expenditure rate and increased hospital admission as well as mortality (**Qiu et al., 2021; Tsao et al., 2022**).

Fluid and electrolytes balance is crucial for physiology of human body and its normal functioning and metabolism. The body's homeostasis maintains fluid gain and loss balance. The body electrolytes (sodium, potassium, chloride, and bicarbonate) help regulate nerve, muscle function, and maintain acid-base balance and water balance. The vital organ for the fluid and electrolytes balance are the kidney and cardiovascular system (**Trikhatri et al., 2019**). Having the right concentrations of these electrolytes is important for maintaining fluid balance among the intracellular fluid (ICF) and extracellular fluid (ECF) compartments (**Bennet et al., 2021**).

Self-care is critical in CHF management. It refers to specific behaviors that patients perform of their own accord to control their disease and maintain health. Health care reforms have increasingly shifted the self-management responsibility to patients and families, as hospital stays are becoming shorter and less frequent. Therefore, the critical role of patients in their own care is receiving increasing attention. (**Gjoreski et al., 2020**). In CHF, the capacity for self-care can be limited by low health literacy, cognitive deficit, depressive symptoms, presence of multiple comorbidities and low self-efficacy to perform self-care (**Rêgo et al., 2018; Gordoreski et al., 2018**). Therefore, they need serious help regarding teaching them how to deal with their illness independently in the absence of health professionals (**National Institute of Health and Care Excellence, 2018**).

The nursing care plan for patients with CHF should include: relieving fluid overload symptoms, relieving symptoms of anxiety and fatigue, promoting physical activity, increasing medication compliance, decreasing adverse effects of treatment, teaching patients about dietary restrictions, teaching patient about self-monitoring of symptoms, and Teaching patients

about daily weight monitoring is also an important role of the nurse (**Lind et al., 2021; Shen et al., 2022**). Many patients perceived that health care providers did not cover what they wanted to know, and they were given too little information on low-sodium foods or strategies to follow dietary recommendations (**Zuraida et al., 2021**). For this, nurses should interact with patients to identify their educational needs (**Dalal et al., 2019**).

Significance of the study

The problem of fluid and electrolyte imbalance is critical in all patients, particularly those with congestive heart failure. Those patients need to prepare to adhere to a therapeutic regimen for the rest of their lives. If the patient cannot comply, this may lead to serious problems with increased morbidity and mortality risks. Since the patient has a crucial role in helping them-self to comply with their treatment regimen, this study will be carried out in an attempt to determine patients' related knowledge and self-care practices which would help identify their educational needs.

Aim of the study

The study aim was to assess the knowledge and self-care practices and skills regarding congestive heart failure and fluid and electrolytes balance among patients suffering from it.

SUBJECTS AND METHODS

Research design and study settings: The study was carried out using a cross-sectional descriptive design in the outpatient clinics of the cardiology department at Zagazig University Hospitals.

Patients sample: The study population consisted of all patients suffering from congestive heart failure (CHF) and attending the study settings for medical care. The inclusion criteria were age 25-65 years and being diagnosed with CHF. Those having other chronic diseases such as liver failure, cancer, rheumatoid, end-stage renal disease were excluded.

Sample size: A consecutive convenience sampling technique was used to recruit 60 patients according to the set eligibility criteria.

Data collection tools: Two tools were used in data collection for this study, namely an interview questionnaire form and observation checklists for self-care practices.

- ▪ **Interview questionnaire form:** This tool was designed by the researcher to assess patients'

knowledge. It was based on review of related literature **(Bickley and Szilagyi 2017; Jarvis, 2017)**. It included the following parts:

o Part I: Demographic characteristics: This was for collection of patient's demographic data such as age, gender, marital status, level of education, job, residence, income, and crowding index.
o Part II: Medical and health behaviors: This part was concerned with patient's health and disease status such as current illness duration, regular medication intake, follow-up, weight measurement, fluid intake/output mapping, as well as healthy diet, physical exercise, smoking, and sleep quality.
o Part III: This main part was dedicated to assessment of patient's knowledge concerning fluid and electrolytes balance. It included open and closed-ended as well as true and false questions covering the knowledge about body electrolytes and fluids, pH, fluid balance, dehydration/edema, as well as CHF fluid balance, nutrition, patient role, and nurse role.

Scoring: For each of the knowledge items, a correct response was scored 1 and the incorrect zero. For each area and for the total questionnaire the scores of the items were summed-up and the total divided by the number of the items, giving mean scores. These scores were converted into percentage scores. The knowledge was considered satisfactory if the percent score was 50% or more and unsatisfactory if less than 50%.

▪ **Tool II: Observation checklists**: These were used to assess patient's performance of certain self-care practices related to the care of CHF based on pertinent literature **(Scales and Pilsworth, 2008; Smith and Roberts, 2011)**.

These included checklists for measurement of blood pressure (sphygmomanometer and digital methods), pulse rate, respiratory rate, body weight, and assessment of skin turgor and edema.
o Scoring: In each of the observation checklists, the items "not done" and "done" were scored "0" and "1", respectively. The items "not applicable" were not scored and were discounted from the totals. For each procedure, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the checklist. These scores were converted into percentage scores. The practice was considered adequate if the percent

score was 60% or more and inadequate if less than 60%.
o In addition, a physical examination sheet was used to assess patient physical status including vital signs and assessment of edema.

The tools were presented to a panel of five experts from nursing and medical faculty staff for face and content validation. They reviewed the tools for clarity, relevance, comprehensiveness, and understandability. The tools were modulated based on their comments and suggestions. The equipment used were (Sphygmomanometers, Body weight scales, and tape measures) were also calibrated. The reliability of the tools was tested by measuring their internal consistency using the split-half method. They demonstrated high reliability with Guttman split-half coefficients exceeding 0.88 for the knowledge and practice tools.

Pilot study: A pilot study was carried out on six patients representing 10% of the main study sample to test the applicability and clarity of the tools. Necessary modifications were made, and the tools were finalized accordingly. The pilot sample was not included in the main study sample.

Fieldwork: Upon completion of the necessary administrative arrangements, and finalization of the data collection tools, the researcher started the recruitment of the study participants according to the eligibility criteria. The researcher met with the patients individually to explain the aim of the study and its procedures. Eligible ones were invited to participate after full explanation of their research ethics rights. Those who agreed to participate were interviewed using the prepared form.

They were then subjected to physical examination using the designated form. Then, they were asked to perform the selfcare skills of blood pressure, pulse rate, respiratory rate, and body weight measurement, and assessment of skin turgor and edema assessment. Their practice of these skills was observed and recorded on the corresponding checklists by the researcher.

Administrative design and ethical considerations: The study protocol was approved by the research ethics committee at the Faculty of Nursing, Zagazig University. All ethical principles were applied. The objectives and the aims of the study were explained to the

participants, with confirmation of the confidentiality of any obtained information. Patients were free to choose to refuse or to participate in the study, as well as to withdraw at any time with no consequences. The researcher confirmed that the data and information collected would be used only in research and to improve patients' health.

Statistical design: Data entry and statistical analysis were done using SPSS 20.0 statistical software package. Spearman rank correlation was used for assessment of the inter-relationships among quantitative variables and ranked ones. In order to identify the independent predictors of the knowledge and practice scores, multiple linear regression analysis was used and analysis of variance for the full regression models was done. Statistical significance was considered at p-value <0.05.

RESULTS
The study sample consisted of 60 patients whose median age ranged between 33 and 85 years, with slightly more males (55.0%), and 43.3% having basic/secondary level of education as shown in Table 1. The majority were married (85.0%), housewives or retired (66.7%), and having sufficient/saving income (85.0%). Their crowding index was mostly <2 persons per room (80.0%), and 75.0% were residing in rural areas.

Table 2 indicates that patients' duration of illness was mostly 5+ years (60.0%). Only 36.7% of the patients had regular medication intake, 25.0% had regular follow-up, while only one (1.7%) had regular weight measurement, and two (3.3%) had regular lab testing. A few patients (10.0%) had knowledge about the fluid intake/output map. As regards their health behaviors, only 15.0% of them reported having a balanced diet, 53.3% had regular meals, and 10.0% practiced exercise. Meanwhile, more than half (56.7%) had good quality of sleep, and 73.3% never smoked.

Table 3 indicates that all patients in the study sample were either overweight (10.9%) or obese (89.1%) with BMI ranging between 25.7 and 48.9 Kg/m^2. They had either high systolic (96.3%) and/or diastolic (87.0%) blood pressure. Their median systolic and diastolic blood pressure was 150 and 100 mm/Hg respectively. Approximately three-quarters of them (73.3%) had edema. Concerning the knowledge of the patients in the study sample, Table 4 indicates very low levels, with the percentages of patients with satisfactory

knowledge ranging between 1.7% for fluid balance and patient role in CHF and 6.7% for pH and nutrition in CHF. In total, only 3.3% of the patients in the study sample had satisfactory total knowledge.

As regards the practice of self-care skills, Table 5 indicates that only one or two of the patients in the study sample had adequate practice of these skills. Overall, only one (1.7%) patient had adequate total practice of self-care skills.

Table 6 demonstrates statistically significant strong positive correlations between patients' scores of knowledge and practice (r=0.82). Meanwhile, no correlations were shown between their knowledge or practice scores and any of their demographic characteristics. The table also indicates that patients' knowledge and practice scores had statistically significant weak negative correlations with their levels of systolic and diastolic blood pressure, as well as the number of edema sites.

In multivariate analysis, Table 7 demonstrates that the only statistically significant independent positive predictor of patients' knowledge score was the educational level. Conversely, their being smokers was a negative predictor. The model explains 16% of the variation in the knowledge score. As for the practice score, the table shows that the knowledge score was its main statistically significant independent positive predictor, in addition to having good sleep. The model explains 48% of the variation in the practice score.

DISCUSSION
The study aim was to assess the knowledge and self-care practices and skills regarding congestive heart failure and fluid and electrolytes balance among patients suffering from it. The results of the study point to marked deficiencies in these patients' knowledge and self-care practices for maintaining fluid and electrolyte balance.
The age of the CHF patients in the present study sample covered a wide range from the fourth to the ninth decades. However, the mean age was 57.7 years, which means that a large proportion of them were in the fifth decade of age or older. This is the age group with high prevalence of CHF as reported in a study in Austria where the reported mean age was 57.2 years, very close to ours **(Fritz et al., 2023)**. Moreover, it has been shown that the prevalence of CHF increases by 6-10% after the age of 60 years, and the associated

morbidity and mortality increase with advancing age **(Gori et al., 2022)**. Additionally, these patients had a wide spectrum of durations of illness, with more than one half of them having had their CHF for five or more years. In this respect, previous studies have demonstrated the effect of the duration of illness on CHF mortality **(Chen et al., 2022; King and Goldstein, 2023)**.

The gender distribution of the sample was almost equal, with a slight preponderance of the male sex. Gender could have an impact of CHF prevalence and prognosis and may influence self-care practices. In line with this, sex differences in CHF were reported in a study in Mozambique **(Lo et al, 2023)**. Furthermore, a review article **(Delco et al., 2023)** documented gender-based differences in CHF distribution, patho-physiology, management, and prognosis. The disease seems to affect women at an older age, but with higher incidence or comorbidities. Women also may have better prognosis but poorer quality of life in comparison with women.

According to the present study findings, most of the patients with CHF had unhealthy behaviors. This was evident in their poor dietary habits, lack of practice of exercise, insomnia, and poor sleep quality, as well as smoking. These lifestyle behaviors would certainly have a negative impact on their knowledge and practice, and consequently on their disease progress and prognosis. In line with this, a study of self-care and outcomes of CHF patients in Tuscany, Italy, found that a majority of these patients did not practice any physical exercise **(Guidotti et al., 2022)**. Furthermore, **Belak et al., (2022)** in a matched cohort study in the United States demonstrated the effectiveness of medically-tailored meals in reducing CHF complications. Meanwhile, a study in Nepal demonstrated the close relationship between CHF and disturbed sleep **(Banjade et al., 2023)**.

Concerning the self-management of CHF, only slightly more than one-third of the patients in the current study reported regular medication intake. This low compliance could be related to medications' side effects, or lack of knowledge. Moreover, only one-fourth of the patients mentioned having regular follow-up, and one-tenth knew about fluid intake/output map. Even worse, only two of them had regular laboratory testing, and one had regular weight measurement. As a consequence of poor compliance to management of CHF, the majority of these patients had edema. These findings are undoubtedly due to deficient patient education.

The untoward effects of non-compliance on the progress and prognosis of CHF have been emphasized in a study in India **(Singh et al., 2023)**.

A main objective of the present study was to assess the knowledge of the patients with CHF concerning their illness, with emphasis on fluid/electrolytes balance. The results revealed markedly deficient knowledge, with very low percentages of patients having satisfactory knowledge of various areas, particularly regarding fluid balance. Such deficient knowledge is quite expected given the socio-demographic characteristics of these patients, in addition to the lack of proper patient education. In agreement with this, a study in France demonstrated a major deficiency in patients' knowledge related to their CHF **(Kobayashi et al., 2022)**. Meanwhile, the crucial role of patient education has been emphasized in a study in the United States **(Patel et el., 2022)**.

As for the factors influencing the knowledge of the present study patients suffering from CHF, the present study multivariate analysis identified the level of education as the only statistically significant positive predictive, while smoking was a negative predictor. This is quite plausible since a higher educational level is expected to have a positive influence on individuals' health awareness and their seeking for various sources of information as highlighted by **Kim et al. (2023)** in a study in Korea. On the other hand, the smoking habit is a major unhealthy behavior that could have a negative impact on all other patient's health awareness and behaviors, which in congruence with previous literature **(Gupta et al., 2023)**.

Moreover, the current study results demonstrated significant negative correlations between patients' knowledge scores and their number of symptoms and signs, systolic and diastolic blood pressure, and edema. The findings underscore the importance of promoting the knowledge of the patients suffering from CHF given its impact on their disease prognosis and outcomes. In agreement with this, a study of CHF in Japan demonstrated the effect of knowledge and perception of illness on self-care and care-seeking behaviors of these patients **(Asai et al., 2023)**.

The current study also assessed patients' practice of self-care skills, which included blood pressure measurement using a sphygmomanometer or digital equipment, pulse and respiratory rates, body weight, skin turgor, and edema. The results demonstrated that only one or two of the patients

had adequate practice of these skills. This again reflects the deficiency of the patient education that should have been provided for them during their care. In congruence with this, **Jaarsma et al. (2021)** highlighted the importance of self-care in long-term management of CHF.

Regarding the factors influencing patients' practice of self-care skills, the present study multivariate analysis identified the knowledge score as the main positive predictor of patients' practice score. The finding gives emphasis to the role of sound knowledge of the disease, its etiology, clinical features, management, and prognosis on patient's self-care practices. This strong positive association between knowledge and practice scores is often reported in the literature (**Al-Qahtani et al., 2023**).

Moreover, the multivariate analysis identified having good sleep as a positive predictor of patients' practice score. This is quite plausible since good sleep is an indication that the patient's health condition is stable and is an important factor in the management of CHF as well. In line with this, a narrative study described the negative impacts of disturbed sleep on the symptoms and prognosis of CHF patients (**Patel et al., 2023**).

Lastly, the current study results demonstrated that the patients' scores of practice of self-care skills had significant negative correlations with their number of symptoms and signs, systolic and diastolic blood pressure, and their edema. The findings underscore the importance of being able to practice these self-care skills in alleviating the disease symptoms and signs as clarified by **Lee et al. (2018)**.

Conclusion and recommendations

The study concludes that the knowledge and self-care practices of the patients with CHF in the study setting are very deficient. They are influenced by their educational level, smoking, and sleep habits. Hence, an educational program is urgently needed to be applied by nurses to improve the knowledge and self-care skills of the patients suffering from CHF.

REFERENCES

1. **Al-Qahtani A.M. (2023)**: Clean hands, safe care: how knowledge, attitude, and practice impact hand hygiene among nurses in Najran, Saudi Arabia. Front Public Health.; 11:1158678.
   doi: 10.3389/fpubh.2023.1158678. PMID: 37521984; PMCID: PMC10372436.

2. **Asai K., Hatamochi C., and Minamimura F. (2023)**: Association Between Illness Perception and Care-Seeking Intention in Patients With Chronic Heart Failure. Clin Nurs Res.;32(3):669-676.
   doi: 10.1177/10547738221114710. Epub 2022 Aug 8. PMID: 35934946.

3. **Banjade P., Kandel K., Itani A., Adhikari S., Basnet Y.M., Sharma M., and Surani S. (2023)**: The Interplay between Obstructive Sleep Apnea, Chronic Obstructive Pulmonary Disease, and Congestive Heart Failure: Time to Collectively Refer to Them as Triple Overlap Syndrome? Medicina (Kaunas).; 59(8):1374. doi: 10.3390/medicina59081374. PMID: 37629664; PMCID: PMC10456446.

4. **Belak L., Owens C., Smith M., Calloway E., Samnadda L., Egwuogu H., and Schmidt S. (2022)**: The impact of medically tailored meals and nutrition therapy on biometric and dietary outcomes among food-insecure patients with congestive heart failure: a matched cohort study. BMC Nutr.; 8(1):108. doi: 10.1186/s40795-022-00602-y. PMID: 36192812; PMCID: PMC9528877.

5. **Bennet D., Khorsandian Y., Pelusi J., Mirabella A., Pirrotte P., and Zenhausern F. (2021)**: Molecular and physical technologies for monitoring fluid and electrolyte imbalance: A focus on cancer population. Clin Transl Med.;11(6):e461. doi: 10.1002/ctm2.461. PMID: 34185420; PMCID: PMC8214861.

6. **Bickley LS., and Szilagyi PG. (2017)**: Bates Guide to Physical Examination and History Taking. 12th ed., Philadelphia, PA.: Wolters Kluwer/Lippincott Williams & Wilkins.

7. **Chen J., Li Y., Liu P., Wu H., and Su G. (2022)**: A nomogram to predict the in-hospital mortality of patients with congestive heart failure and chronic kidney disease. ESC Heart Fail.;9(5):3167-3176.
   doi: 10.1002/ehf2.14042. Epub 2022 Jun 28. PMID: 35765720; PMCID: PMC9715887.

8. **Dalal H.M., Taylor R.S., Jolly K., Davis R.C., Doherty P., Miles J., van Lingen R., Warren F.C., Green C., Wingham J., Greaves C., Sadler S., Hillsdon M., Abraham C., Britten N., Frost J., Singh S., Hayward C., Eyre V., Paul K., Lang C.C., and Smith K. (2019)**: On behalf of the REACH-CHF investigators, the effects and costs of home-based rehabilitation for heart failure with reduced ejection fraction: the REACH-CHF multicentre randomized controlled trial, Eur J Prev Cardiol; 26(3):

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Fluid And Electrolytes Balance Among Patients Suffering From It*

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262–272, https://doi.org/10.1177/204 74873 18806358.

9. **Delco A., Portmann A., Mikail N., Rossi A., Haider A., Bengs S., and Gebhard C. (2023)**: Impact of sex and gender on heart failure. Cardiovasc Med.;26(03):88-94 DOI: https://doi.org/10.4414 /cvm.2023.02274

10. **Fritz J., Belovari K., and Ulmer H. (2023)**: Aetiology, ejection fraction and mortality in chronic heart failure: a mediation analysis. Heart Published Online First: 18 September 2023. doi: 10.113 6/heartjnl-2023-322803

11. **Gjoreski M., Janko V., Slapničar G., Mlakar M., Reščič N., and Bizjak J. (2020)**: Classical and deep learning methods for recognizing human activities and modes of transportation with smartphone sensors. Information Fusion;62:47-62. [doi: 10.1016/j.inffus.2020.04.004]

12. **Gordoreski E.Z., Goyal P., Hummel S.L., Krishnaswami A., Goodlin S.J., and Hart L. (2018)**: Domain Management Approach to Heart Failure in the Geriatric Patient. J Am Coll Cardiol. [cited Sep 16, 2019];71(17): 1921- 36. Available from: https://doi.org/10.1016/j. jacc.2018.02.059

13. **Gori M., Marini M., De Maria R., Gonzini L., GoriniM., and Cassaniti L. (2022)**: Age-related changes in clinical characteristics and outcomes of chronic heart failure outpatients in a cardiology setting. A report from the Italian Network on Heart Failure, International Journal of Cardiologyl 346: 36-44, https://doi.org/10.1016/j.ijcard.2021.11.014.

14. **Guidotti E., Pennucci F., Valleggi A., De Rosis S., and Passino C. (2022)**: A longitudinal assessment of chronic care pathways in real-life: self-care and outcomes of chronic heart failure patients in Tuscany. BMC Health Serv Res.;22(1):1146. doi: 10.1186/s12913-022-08522-0. PMID: 36088408; PMCID: PMC9463807.

15. **Gupta C.U., Gupta C.S., and Gupta S.S. (2023)**: An Evidence Base for Heart Disease Prevention Using a Mediterranean Diet Comprised Primarily of Vegetarian Food. Recent Adv Food Nutr Agric.; 2023 Jul 25. doi:10.2174/2772574X1 4666230725094910. Epub ahead of print. PMID: 37489789.

16. **Jaarsma T., Hill L., Bayes-Genis A., La Rocca H.B., Castiello T., Čelutkienė J., Marques-Sule E., Plymen C.M, Piper SE, Riegel B., Rutten F.H., Ben Gal T., Bauersachs J., Coats A.J.S., Chioncel O., Lopatin Y., Lund L.H., Lainscak M.,** **Moura B., Mullens W., Piepoli M.F., Rosano G., Seferovic P., and Strömberg A. (2021)**: Self-care of heart failure patients: practical management recommendations from the Heart Failure Association of the European Society of Cardiology. Eur J Heart Fail.;23 (1):157-174. doi: 10.1002/ejhf.2008. Epub 2020 Oct 20. PMID: 32945600; PMCID: PMC8048442.

17. **Jarvis C. (2017)**: Physical Examination & Health Assessment. St Louis, MO. Elsevier Inc.

18. **Kim H, Lee S., Park J., Kang J., Hong K., and Yu Y. (2023)**: Public awareness of chronic venous disease in Korea. Journal of Vascular Surgery: Venous and Lymphatic Disorders; 11(Issue 3):477-482.

19. **King K.C., and Goldstein S. (2023)**: Congestive Heart Failure and Pulmonary Edema. 2022 Sep 19. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan–. PMID: 32119444.

20. **Kobayashi M., Wilcke C., and Girerd N. (2022)**: Assessment of Patient Knowledge, Awareness, and Adherence in Heart Failure in a Real-Life Setting: Insights from Data Acquired in Pharmacies. Journal of Clinical Medicine; 11(3):863. https://doi.org/10.3390/jcm11030863

21. **Lee C.S., Bidwell J.T., Paturzo M., Alvaro R., Cocchieri A., Jaarsma T., Strömberg A., Riegel B., and Vellone E. (2018)**: Patterns of self-care and clinical events in a cohort of adults with heart failure: 1year follow-up. Heart Lung.;47(1):40-46. doi: 10.1016/j.hrtlng.2017.09.004. Epub 2017 Oct 18. PMID: 29054487; PMCID: PMC 6497061.

22. **Lind L., Ingelsson M., Sundstrom J., and Ärnlöv J. (2021)**: Impact of risk factors for major cardiovascular diseases: a comparison of life-time observational and Mendelian randomisation findings. Open Heart.;8(2).

23. **Lo S., Mbanze I., Orr J.E., DeYoung P., Checkoway H., Govo V., Jessen N., Damasceno A., and Malhotra A. (2023)**: The prevalence of sleep-disordered breathing and associated risk factors in patients with decompensated congestive heart failure in Mozambique. J Clin Sleep Med.;19(6):1103-1110. doi: 10.5664/jcsm.10510. Epub ahead of print. PMID: 36798985; PMCID: PMC10235722.

24. **National Institute of Health and Care Excellence (2018)**: Chronic heart failure in adults: diagnosis and management. Available

Eur. Chem. Bull. **2023**, *12(Regular Issue 10), 14885 - 14895*

14891

at: https://www.nice.org.uk/guidance/ng106/ chapter/Recomm endations

25. **Patel M., Yarlagadda H., Upadhyay S., Neupane R., Qureshi U., Raco J.D., Jain R., and Jain R. (2023)**: Disturbed Sleep is Not Good for the Heart: A Narrative Review. Curr Cardiol Rev.;19(3):e301122211378. doi: 10.2174/1573403X19666221 130100141. PMID: 36453501.

26. **Patel N., Singh S., Desai R., Desai A., Nabeel M., Parikh N., Singh G., Patel S., Parikh R., and Mahajan S. (2022 :(**Thirty-day unplanned readmission in hospitalised asthma patients in the USA. Postgrad Med J.;98(1165):830-836.
doi: 10.1136/postgradmedj-2021-140735. Epub 2021 Sep 30. PMID: 34593626.

27. **Qiu X, Lan C, Li J, Xiao X, and Li J. (2021)**: The effect of nurse-led interventions on re-admission and mortality for congestive heart failure: A meta-analysis. Medicine (Baltimore).;100(7):e24599.
doi: 10.1097/MD.0000000000024599. PMID: 33607793; PMCID: PMC7899814.

28. **Rêgo M.L.M., Cabral D.A.R., and Fontes E.B. (2018)**: Cognitive Deficit in Heart Failure and the Benefits of Aerobic Physical Activity. Arq Bras Cardiol. [Internet]. [cited Dec 16, 2019];110(1):91-4. Available from: http://dx.doi. org/10.5935/ abc.20180002 13.

29. **Scales K., and Pilsworth J. (2008)**: The importance of fluid balance in clinical practice. Nursing Standard; 22(47): 50-57.

30. **Shen Z., Zhang Y., Yang C., Liu J., Huang C., Zhang X., Zhang Y., and Lin Y. (2022)**: A Smart-Phone App for Fluid Balance Monitoring in Patients with Heart Failure: A Usability Study. Patient Prefer Adherence.; 16:1843-1853. doi: 10.2147/PPA. S373393. PMID: 35942225; PMCID: PMC9356697.

31. **Singh R.K., Meshram R.J., and Tiwari A. (2023)**: A Review of the Mechanism of Action of Drugs Used in Congestive Heart Failure in Pediatrics. Cureus.;15(1):e33811. doi: 10.7759/ cureus.33811.
PMID: 36819391; PMCID: PMC993 1378.

32. **Smith J., and Roberts R. (2011)**: Vital Signs for Nurses. An Introduction to Clinical Observations. Oxford: Wiley-Blackwell.

33. **Tinoco J.M.V.P., Figueiredo L.S., Flores P.V.P., Pádua B.L.R, Mesquita E.T., and Cavalcanti A. (2021)**: Effectiveness of health education in the self-care and adherence of patients with heart failure: a meta-analysis. Rev. Latino-Am. Enfermagem.;29:e3389. Available in: URL. DOI: http://dx.doi.org/10.1590/1518-8345.4281.3389.

34. **Trikhatri C., Rana G., and Angadi S.S. (2019)**: Knowledge and Practice regarding Fluid and Electrolytes Administration among Nurses Working in a Teaching Hospital, Chitwan. IOSR Journal of Nursing and Health Science (IOSR-JNHS); e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 8, Issue 5 Ser. II. (Sep-Oct .2019), PP 12-19 www.iosrjournals.org

35. **Tsao C.W., Aday A.W., Almarzooq Z.I., Alonso A., Beaton A.Z., Bittencourt M.S., Boehme A.K., Buxton A.E., Carson A.P., Commodore-Mensah Y., Elkind M.S.V., Evenson K.R., Eze-Nliam C., Ferguson J.F., Generoso G., Ho J.E., Kalani R., Khan S.S., Kissela B.M., Knutson K.L., Levine D.A., Lewis T.T., Liu J., Loop M.S., Ma J., Mussolino M.E., Navaneethan S.D., Perak A.M., Poudel R., Rezk-Hanna M., Roth G.A., Schroeder E.B., Shah S.H., Thacker E.L., VanWagner L.B., Virani S.S., Voecks J.H., Wang N.Y., Yaffe K., and Martin S.S. (2022)**: Heart Disease and Stroke Statistics-2022 Update: A Report From the American Heart Association. Circulation.;145(8):e153-e639.
doi: 10.1161/CIR.00000000 00001052. Epub 2022 Jan 26. Erratum in: Circulation. 2022 Sep 6;146(10):e141. PMID: 35078371.

36. **Zuraida E., Irwan A.M., and Sjattar E.L. (2021)**: Self-Management Education Programs For Patients With Heart Failure: A Literature Review. Cent Eur J Nurs Midw; 12(1):279–294
doi: 10.15452/CEJNM.2020.11.0025.

Table 1: Demographic characteristics of patients in the study sample (n=60)

Demographic characteristics	Frequency	Percent
Age:		
<60	35	58.3
60+	25	41.7
Range	33-85	
Mean±SD	57.7±11.1	
Median	56.5	

Gender:		
Male	33	55.0
Female	27	45.0
Education:		
None	18	30.0
Basic/secondary	26	43.3
University	16	26.7
Marital status:		
Married	51	85.0
Widow/divorced	9	15.0
Job:		
Employee	15	25.0
Manual work	5	8.3
Housewife/retired	40	66.7
Income:		
Insufficient	9	15.0
Sufficient/saving	51	85.0
Crowding index:		
<2	48	80.0
2+	12	20.0
Residence:		
Rural	45	75.0
Urban	15	25.0

Table 2: Medical history and self-care and management of CHF among patients in the study sample (n=60)

History of present illness	Frequency	Percent
Duration of illness (years):		
<5	24	40.0
5+	36	60.0
Regular medication intake:		
No	4	6.7
Somewhat	34	56.7
Yes	22	36.7
Regular follow-up:		
No	14	23.3
Somewhat	31	51.7
Yes	15	25.0
Regular weight measurement:		
No	50	83.3
Somewhat	9	15.0
Yes	1	1.7
Regular lab tests:		
No	48	80.0
Somewhat	10	16.7
Yes	2	3.3
Know fluid intake/output map:		
No	54	90.0
Yes	6	10.0
Take balanced diet:		
No	51	85.0
Yes	9	15.0
Regular meals:		
No	28	46.7
Yes	32	53.3
Practice exercise:		

No	54	90.0
Yes (all walking)	6	10.0
Sleep quality:		
Poor	26	43.3
Good	34	56.7
Smoking:		
None	40	73.3
Ex-	11	18.3
Current	5	8.3

Table 3: Physical signs among patients (n=60)

Physical signs	No.	%
Body weight (n=55):		
Overweight	6	10.9
Obese	49	89.1
BMI:		
Range	25.7-48.9	
Mean±SD	37.69±5.5	
Median	36.70	
Systolic hypertension (n=54):		
No	2	3.7
Yes	52	96.3
Systolic BP:		
Range	130-190	
Mean±SD	154.4±12.2	
Median	150.0	
Diastolic hypertension (n=54):		
No	7	13.0
Yes	47	87.0
Diastolic BP:		
Range	90-110	
Mean±SD	99.1±4.1	
Median	100.0	
Hypertension (n=54):		
No	2	3.7
Yes	52	96.3
Edema (n=60):		
No	16	26.7
Yes	44	73.3

Table 4: Patients' knowledge of electrolytes and congestive heart failure (n=60)

Knowledge areas	Satisfactory knowledge (50%+)	
	No.	%
Body electrolytes	2	8.3
Body fluids	2	3.3
pH	4	6.7
Fluid balance	1	1.7
Dehydration/edema	2	3.3
CHF	3	5.0
Fluid balance in CHF	3	5.0
Nutrition in CHF	4	6.7
Patient role in CHF	1	1.7
Nurse role in CHF	3	5.0
Total knowledge:		
Satisfactory	2	3.3
Unsatisfactory	58	96.7

Table 5: Patients' practice of self-care skills throughout study phases

Practice of measuring:	Adequate self-care skills practice (60%+)	
	No.	%
Blood pressure (sphygmo-manometer)	0	0.0
Blood pressure (digital)	2	3.3
Pulse rate	1	1.7
Respiratory rate	1	1.7
Body weight	1	7.7
Skin turgor	1	1.7
Edema	1	1.7
Total:		
Adequate	1	1.7
Inadequate	59	98.3

Table 6: Correlation between patients' knowledge and practice scores and their demographic characteristics

	Spearman's rank correlation coefficient	
	Knowledge	Practice
Practice	0.82**	1.00
Demographic characteristics:		
Age	-0.03	-0.04
Education level	0.01	0.01
Income	0.00	0.09
Crowding index	0.00	0.05
Duration of illness	-0.02	-0.03
BMI	-0.06	-0.05
Systolic blood pressure	-0.31**	-0.24**
Diastolic blood pressure	-0.29**	-0.25**
No. of edema sites	-0.26**	-0.23**

(**) Statistically significant at p<0.01

Table 7: Best fitting multiple linear regression model for the knowledge and practice scores

	Unstandardized Coefficients		Standardized Coefficients	t-test	p-value	95% Confidence Interval for B	
	B	Std. Error				Lower	Upper
Knowledge score							
Constant	4.34	1.89		2.295	0.025	0.55	8.14
Education level	10.35	3.43	0.37	3.016	0.004	3.48	17.22
Smoking	-4.37	2.42	-0.22	1.806	0.076	-9.21	0.47
r-square=0.16 Model ANOVA: F=5.51, p=0.006 Variables entered and excluded: age, gender, residence, income, exercise, sleep quality, balanced diet, duration of illness							
Practice score							
Constant	-3.77	1.58		2.391	0.020	-6.93	-0.61
Good sleep	3.93	1.96	0.20	2.010	0.049	0.02	7.85
Knowledge score	0.56	0.08	0.69	7.154	<0.001	0.40	0.72
r-square=0.48 Model ANOVA: F=26.04, p<0.001 Variables entered and excluded: age, gender, education, residence, income, exercise, smoking, balanced diet, duration of illness							