ORIGINAL ARTICLE

Nurses' Level Of Knowledge Regarding Heart Failure Self-Care Education Principles In A Tertiary Cardiology Centre

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ABSTRACT

Introduction: Heart failure is a growing global public health concern due to its rising prevalence and association with high morbidity, mortality, and rehospitalisation rates. Effective patient education on heart failure self-care is crucial to improve patient outcomes and reduce readmissions. Nurses play a vital role in delivering this education, and equipping themselves with adequate knowledge of heart failure self-care principles is essential. This study explored nurses' knowledge of heart failure self-care education principles and the factors influencing their knowledge. **Methods:** A cross-sectional design with convenience sampling was employed, surveying 78 nurses working in the cardiology department of a Malaysian tertiary cardiology centre. The Nurses' Knowledge of Heart Failure Educational Principles Survey (NKHFEP) questionnaire was utilised to assess knowledge scores and social demographic factors. **Results:** The majority of respondents were junior nurses with no prior post-basic cardiac nursing or heart failure certificate courses. The overall mean knowledge score for self-care education was 13.36 ± 2.53, with the lowest scores in exercise and sign/symptom management. Nurses' mean knowledge scores were significantly influenced by factors such as their work unit assignment, work experience, completion of heart failure specialty training, and their source of knowledge. **Conclusion:** These findings suggest a need for more comprehensive heart failure specialty courses, with continuous nursing education focusing on exercise and sign/symptom management. Additionally, nurse rotation across different cardiology units could enhance their understanding of heart failure management.

Malaysian Journal of Medicine and Health Sciences (2025) 21(SUPP4):91-97. doi:10.47836/mjmhs.21.S4.12

Keywords: Nurses' knowledge, heart failure, self-care, education

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INTRODUCTION

Heart failure is a growing public health concern affecting an estimated 26-38 million people worldwide (1–3). New heart failure diagnoses are projected to increase by 46% between 2012 and 2030 (3,4). This rise is partly attributed to its association with high morbidity, mortality, and heart failure rehospitalization rates (3). Notably, a significant proportion of heart failure patients are readmitted within six months of discharge, often due to exacerbation syndrome or difficulties adhering to treatment regimens (5).

This high rate of readmission underscores the importance of patient education in self-care management. Equipping patients with the knowledge and skills to manage their condition is crucial for maintaining their health, reducing rehospitalizations, and ultimately, improving their quality of life. Treatment costs are also substantial and are expected to rise as advancements in technology and new life-prolonging therapies lead to longer lifespans for heart failure patients (6). Effective self-care can help mitigate these financial burdens on both patients and the healthcare system. In Malaysia, as in many countries, this focus on self-care management necessitates equipping nurses with the knowledge and skills to effectively educate patients. Through education, guidance, and ongoing support, nurses empower patients to comprehend their health conditions, self- manage symptoms, follow treatment plans, and make informed choices regarding their well-being. This approach fosters patient autonomy and builds confidence in self-care.

Studies have shown that self-care interventions can significantly improve patients' heart failure knowledge, self-care practices, and treatment adherence (7,8). Consequently, promoting self-care has become the cornerstone of heart failure management. American Heart Association and European Society of Cardiology emphasize the importance of a multidisciplinary heart failure care team approach in hospitals and outpatient clinics (3,9). However, effective patient education requires nurses to possess a strong foundation in heart failure self-care principles (8).

Several studies have highlighted that nurses' knowledge of heart failure self-care education may be inadequate (4,8,10,11), particularly those who haven't undergone specialized heart failure training (12). Nurses themselves have expressed a desire for more information on heart failure education (10,13) and in-service training to enhance their ability to guide patients in self-management (14).

There is a paucity of research investigating nurses' knowledge of heart failure self-care education principles in the Malaysian context. Unlike some countries, Malaysia appears to lack a critical mass of nurse specialists trained in heart failure who can provide patient education before discharge. Furthermore, self-care education principles are not currently integrated into the nursing curriculum or specialty cardiac courses offered in Malaysia (8). Hence, this study aims to explore Malaysian nurses' knowledge regarding heart failure self-care education principles and investigate the social and demographic factors that influence and predict nurses' knowledge in this area. By identifying these knowledge gaps, the study can inform the development of educational programs, ultimately improving patient outcomes and potentially reducing hospital readmission rates for heart failure patients in Malaysia.

MATERIALS AND METHODS

The study utilised a validated 20-item, dichotomous Nurses' Knowledge of Heart Failure Education Principles (NKHFEP) questionnaire developed by Nancy M. Albert, with permission from the authors. The questionnaire demonstrated excellent test-retest reliability. It covered five principle key areas of heart failure self-care: diet, fluids and weight management, signs and symptoms of deterioration, medications, and exercise.

The study was conducted at a National Tertiary Cardiac Referral Centre in the Klang Valley, serving as the main referral hub for complex cardiac cases from the central region of West Malaysia and nationwide. It is also a pioneer in establishing a heart failure clinic to address the increasing prevalence of heart failure cases. The facility includes three inpatient cardiology wards and an outpatient clinic, with approximately 90 cardiac nurses working across both inpatient and outpatient cardiology departments. With the rising number of heart failure cases, the nursing department has recently established a dedicated heart failure nursing team to manage patient treatment and self-care education.

A cross-sectional design with convenience sampling was employed in this study. Data were collected from September to November 2021 among 78 nurses working in coronary care units (CCU), cardiac high dependency wards (CHDW), and cardiology wards /daycare. Nurses who had completed their mentorship program were included, while those on attachment from other units were excluded. Ethical approval was obtained from the Medical Research and Ethics Committee (MREC) (KKM/NIHSEC/P21-1168(12)). Data were analysed using IBM SPSS Statistics version 26. The sum of correct responses was calculated as the knowledge mean score (SD). The relationship between respondents' demographic characteristics and knowledge scores was analysed using parametric tests, following confirmation of normality assumptions.

RESULTS

Demographic characteristics

Table I summarises the demographic characteristics of the respondents. Of the participants, 42 (53.8%) worked in critical care units, while 36 (46.2%) worked in cardiology wards or daycare settings. In terms of experience within cardiology, nearly half (51.3%) had 1-5 years, and 48.7% had 6 or more years.

Table I: Demographic data of the respondents (N= 78)

Demographic variable		Frequency (n)	Percentage (%)
Age	20-30	38	48.7
	≥ 31	40	51.3
Working unit	CCU	21	26.9
	CHDW	21	26.9
	Cardiology ward/ daycare	36	46.2
Years in cardiology department	1-5	40	51.3
	≥ 6	38	48.7
Attended post basic in cardiology course	Yes	31	39.7
	No	47	60.3
Attended Heart Failure certificate course	Yes	11	14.1
	No	67	85.9
Sources of knowledge regarding HF	Unit Orientation	8	10.3
	Experience in taking care HF patient	60	76.9
	Nurse Colleague	24	30.8
	Physician	5	6.4
	Literature or CPG	3	3.8
	Continuous Nursing education	20	25.6

The data suggests a gap in post-basic cardiology education. Most respondents (60.3%) had not attended relevant courses, and a significant majority (85.9%) lacked heart failure certificate training. Experience caring for heart failure patients emerged as the primary knowledge source (76.9%). Information sharing among colleagues (30.8%) and continuing nursing education (25.6%) were also reported.

Overall nurses' knowledge score

The normality assumption for the nurses' total knowledge score was confirmed using a normality test. The mean knowledge score (±SD) of the respondents was 13.36 (±2.53). Scores ranged from a minimum of 7 to a maximum of 19 out of a possible 20. A high proportion of respondents correctly answered questions about core heart failure concepts: new-onset fatigue as a symptom (85.9%), fluid restriction (78.2%), avoidance of NSAIDs (76.9%), and dietary restrictions (lean deli meat) (76.9%).

However, knowledge gaps were identified in other areas (Table II). Over 40% of respondents incorrectly believed that heart failure patients should entirely restrict activity and avoid exercise altogether (43.6%). Similarly, a significant proportion (48.7%) misunderstood the importance of notifying a physician for low blood pressure without accompanying symptoms. Weight monitoring by comparing with dry weight (55.1%) and notifying a physician for dizziness lasting less than 15 minutes (55.1%) were also identified as areas requiring improvement.

The five topics in heart failure self-care principles was analysed (Table III). Average mean scores ranged from 0.54 ± 0.32 to 0.71 ± 0.26. These scores suggest that nurses have a stronger grasp of dietary, fluid, and weight management concepts compared to exercise and sign/ symptom management.

Association between demographic characteristics and nurses' knowledge of heart failure self-care education principles

Independent t-tests and ANOVA were conducted to explore associations between nurses' knowledge scores and factors including age group, work unit, experience, education level, heart failure speciality training, and knowledge sources. Notably, educational level did not significantly influence knowledge scores. Nurses who had completed cardiology post-basic courses did not demonstrate a stronger understanding of heart failure self-care compared to those who hadn't. However, nurses who had attended dedicated heart failure training scored significantly higher in the overall knowledge score ($p<0.05$) and showed a better grasp of sign and symptom management. Among knowledge sources, only

Table II: Frequency and percentage of questions answered correctly by respondents (N= 78)

Knowledge according to topic		Frequency (n)	Percentage (%)
Topic: Fluid and weight	Q1: Patients with heart failure should drink plenty of fluids each day.	59	75.6
	Q5: If the patients gains more than 1.4kg in 48hours without other heart failure symptoms, they should not be concerned.	56	71.8
	Q10: If patients feel thirsty, it is ok to remove fluid limits and allow them to drink.	61	78.2
	Q12: If a patients wakes up at night with difficulty breathing, and the breathing diffilculty is relieved by getting out of bed and moving around, this does not mean that the heart failure condition has worsened.	53	67.9
	Q14: Once the patients heart failure symptoms are gone, there is no need for obtaining daily weights.	56	71.8
	Q15: When assessing weight results, today's weight should be compared with the patients weight from yesterday, not the patient's ideal or " dry " weight.	43	55.1
	Q17: Weight gain of 1.4kg in 5 days without symptoms.	50	64.1
Topic: Diet	Q2: As long as no salt is added to foods, there are no dietary restrictions for patients with heart failure.	58	74.4
	Q9: It is ok to use potassium-based salt substitutes (like"No salt" or " Salt Sense) to season food.	49	62.8
	Q13: Lean deli meats are an acceptable food choice as part of the patients diet.	60	76.9
Topic: Medication	Q7: If patients take their medications as directed and follow the suggested lifestyle modifications, their heart failure condition will not return.	46	59.0
	Q8: When patients have aches and pain, aspirin and non-steroidal anti – inflammatory drugs (NSAIDs like ibuprofen) should be recommended.	60	76.9
Topic: Exercise	Q4: Patients with heart failure should decrease activity and most forms of active exercise should be avoided.	34	43.6
	Q20: New onset or worsening of leg weakness or decreased ability to exercise.	50	64.1
Topic: Sign and symptom	Q3: Coughing and nausea / poor appetite are common symptoms of advanced heart failure.	47	60.3
	Q6: Swelling of the abdomen may indicate retention of excess fluid due to worsening heart failure.	57	73.1
	Q11: If patients adds extra pillows at night to relieve shortness of breathing, this does not mean that the heart failure condition has worsened.	55	70.5
	Q16: BP recording of 80/56mmHg without symptoms.	38	48.7
	Q18: Dizziness or light headedness when arising that disappears within 10-15minutes.	43	55.1
	Q19: New onset or worsening of fatigue.	67	85.9
Overall (Mean±SD)		**13.36±2.53**	
Minimum, Maximum score		**7, 19**	

Table III: Respondents' knowledge score and rank according to the principles' topic

Principles Topic	Overall Mean±SD	Min, max score	Average mean score±SD	Rank
Diet	2.14±0.76	0, 3	0.71±0.26	1
Fluid and weight	4.85±1.55	1, 7	0.69±0.22	2
Medication	1.36±0.70	0, 2	0.68±0.35	3
Sign and symptom management	3.94±1.31	1, 6	0.66±0.22	4
Exercise	1.08±0.64	0, 2	0.54±0.32	5

continuous nursing education significantly improved understanding of heart failure self-care, particularly in fluid and weight management ($p<0.05$).

Age and years of experience also emerged as significant factors influencing heart failure knowledge of sign and symptom management ($p=0.029$ and $p=0.019$, respectively). Nurses aged over 31 and with more than six years of cardiology experience demonstrated a better understanding of this topic.

The work unit significantly impacted overall heart failure knowledge scores. Post-hoc analysis revealed that nurses in critical care units (coronary care and high dependency wards) had a better understanding, especially regarding fluid and weight management and dietary management. However, the findings for exercise management were counterintuitive. Nurses in cardiology wards demonstrated a significantly better understanding of the importance of exercise for heart failure patients compared to those in critical care units ($p<0.05$).

Binary logistic regression was used to identify factors predicting nurses' knowledge of heart failure self-care principles. Five significant variables from the bivariate analysis (age, work unit, cardiology experience, heart failure speciality training, and knowledge source from continuous nursing education) were included. However, only the work unit emerged as a significant predictor of knowledge level ($p<0.05$). The model fit was adequate (-2 Log likelihood: 79.85, Nagelkerke R-squared: 0.323). Nurses in coronary critical care and high dependency wards had 7.8 times the knowledge score of nurses in cardiology wards.

DISCUSSION

This study's findings indicate that the knowledge of cardiac nurses in this setting falls below recommended levels. The instrument's author recommends a minimum score of 17 for nurses regularly caring for heart failure patients. Compared to studies from Spain (8), the USA (15), Malaysian nurses exhibited lower mean knowledge scores. However, a study from Poland (10) reported a similar knowledge level, suggesting global variations in nurses' heart failure self-care knowledge. This disparity might be attributed to limited exposure to heart failure self-care education and a lack of specialised training for Malaysian nurses. Research and guideline directed medical therapy for heart failure are also less well-developed in the ASEAN region, including Malaysia (16). The first edition of Malaysian heart failure clinical practice guidelines emerged in 2014, and the development of multidisciplinary heart failure teams lags behind contemporary standards.

The principles of heart failure education were first introduced by the instrument author, Nancy M. Albert, highlighting five key informational themes essential for educating heart failure patients. These themes include: (i) fluid and weight management, (ii) diet, (iii) medication, (iv) exercise, and (v) symptom monitoring. Nurses are required to incorporate these five principles when providing health education to heart failure patients. These themes cannot be overlooked, as they provide crucial information for patients to effectively manage their self-care after discharge.

Findings from this study indicate that among the five key principles of heart failure self-care, the area with the least correct responses from nurses was related to the concept of decreasing activity and avoiding exercise. This finding suggests a misconception that heart failure patients require complete activity restriction to prevent deterioration. This misconception likely stems from a lack of exposure to heart failure rehabilitation programmes. The European Society of Cardiology (ESC) strongly recommends exercise rehabilitation for heart failure patients due to the documented benefits of physical conditioning training in improving activity tolerance and health-related quality of life (9). Heart failure rehabilitation is a comprehensive approach extends beyond education on self-care practices such as fluid, weight, diet, and medication management. Therefore, nurses should initiate patient education regarding physical activity while in the ward, facilitate referral to a heart failure rehabilitation programme, and monitor patients' progress within the programme.

Topis in heart failure self-care that gain less correct responses from nurses was regarding sign and symptom monitoring, especially regarding acceptable BP range for heart failure patients, which parallel with other studies (4,10,12,17). This explained that the nurses were not well aware of the physician's target treatment and the side effects of medications (18). Nurses may not be aware of the suggested pharmacotherapeutic regime for heart failure patients is to maintain systolic BP of nearly 80mmHg to reduce cardiac workload. Tremendous efforts to heighten the nurses' knowledge and recognition of heart failure symptoms should be put in place, especially regarding the warning signs of worsening conditions onset and when to notify the physicians. This was supported by a study from Zeng (19), indicating that patients had minimal knowledge of recognising heart failure symptoms. It was significantly associated with the education that heart failure patients had received.

While nurses achieved the highest scores in diet, followed by fluid and weight management, and medication topics, their understanding appeared superficial. For example, they grasped basic dietary concepts like salt restriction and deli meat avoidance, but lacked in-depth knowledge about salt substitutes suitable for heart failure patients. Similarly, fluid restriction and daily weight monitoring were understood, but not their association with symptom worsening (e.g., nocturnal shortness of breath) or the significance of weight gain. These findings suggest a potential knowledge gap attributable to generic undergraduate nursing curricula that may not adequately prepare nurses for specialised heart failure care (13). The post-basic cardiology nursing course, designed to equip nurses with advanced knowledge of cardiac patient care, should theoretically address this gap. In Malaysia, the post-basic cardiology nursing course is offered to registered nurses who wish to advance their knowledge in cardiology nursing. The course curriculum of the post-basic cardiology nursing covers general pathophysiology of cardiac diseases, including heart failure, current management strategies, and cardiologist practices (20). It is expected that nurses who have completed this course would have a deeper understanding of heart failure. However, the study finding did not support this initial hypothesis. This unexpected result highlights the need for further investigation, as the post-basic cardiology nursing curriculum may not cover heart failure education in sufficient depth. In contrast, in other countries, heart failure education is often provided by advanced practice registered nurses, such as clinical nurse specialists and nurse practitioners, within nurse-led heart failure clinics (21). These professionals typically undergo specialized heart failure training at the master's level or higher, equipping them with advanced knowledge and skills in heart failure management. The integration of advanced practice registered nurses in heart failure clinics has been shown to provide evidence-based care, leading to improved health outcomes for heart failure patients. Therefore, it is recommended to incorporate specialized heart failure training and establish advanced practice registered nurse roles in Malaysia.

The knowledge gaps among nurses regarding heart failure self-care education may hinder their ability to confidently and competently educate patients. The content of existing post-basic cardiology nursing needs careful review to ensure it aligns with current best practices for heart failure patient care. It is recommended to develop a more comprehensive specialised heart failure course for Malaysian nurses would significantly equip them with the necessary knowledge to address patients' information needs and empower them to take on the role of self-care educators in the future.

This study's findings also revealed that age, years of experience, and work unit significantly influenced nurses' knowledge, particularly regarding sign and symptom monitoring. Nurses working in critical care settings, who predominantly encounter acute heart failure patients, demonstrated greater familiarity with diuretic treatment, fluid restriction, and salt restriction regimens. Conversely, ward or daycare nurses, responsible for supervising and monitoring activity and exercise performance during the stabilization stage, showed a stronger understanding of these aspects. This suggests that experience caring for patients at different stages of heart failure influences nurses' knowledge of self-care principles. Higher knowledge scores, likely acquired through daily practice in cardiology settings, can lead to increased nurse confidence and improved comfort in delivering educational content to heart failure patients, particularly regarding medication administration (22).

The variations in nurses' understanding of heart failure self-care topics based on their work unit, potentially leading to inconsistencies in patient education. Nurse rotation across different cardiology units could be explored as a strategy to address this knowledge gap. This would expose them to patients at various stages of heart failure, allowing them to broaden their experience and knowledge by providing care tailored to each patient's specific needs. The development of standardized heart failure educational programs and securing funding for nurse training must be prioritized by nursing leadership in both clinical and academic settings.

Continuous nursing education plays a crucial role in maintaining professional competency and keeping nurses updated on evidence-based practice changes. Nursing educators and leaders should prioritize continuous nursing education sessions focused on heart failure self-care topics. A multidisciplinary approach to continuous nursing education delivery is recommended, involving heart failure expert cardiologists, dieticians, pharmacists, and physiotherapists. This would allow nurses to understand the roles and expectations of each team member in supporting heart failure patients, including rehabilitation strategies (particularly exercise and self-care at home) to improve their quality of life.

This study is limited by the scarcity of recent research on nurses' knowledge of heart failure self-care education. This may be partly due to a shift in focus among heart failure nursing experts in Western countries towards the evolving role of nurse specialists and the development of self-care education content in the early twenty first century. Additionally, the cross-sectional study design limits causal inferences from the findings. Furthermore, the relatively small sample size restricts the generalizability of the results to the entire Malaysian cardiac nurse population. Nurses' practices in heart failure management may vary across different public and private cardiac centres. Future studies could address these limitations by incorporating a larger, geographically diverse sample across various public

and private cardiac centres in Malaysia to obtain more generalizable findings.

CONCLUSION

This study found that Malaysian nurses, on average, demonstrated lower knowledge levels in the heart failure self-care management compared to their counterparts in some Western countries. Among the five key topics related to heart failure self-care education, nurses demonstrated the weakest understanding in exercise management, followed by signs and symptoms management. Notably, nurses' knowledge scores were predicted by their work unit. Age and years of experience were also identified as significant factors in sharpening nurses' knowledge and skills, thereby enhancing their competence. Additionally, this study found that nurses who had undergone specialised heart failure training or participated in continuous nursing education demonstrated a better grasp of self-care management topics. These findings highlight the potential benefits of tailored heart failure educational programs based on nurses' work units to enhance their knowledge and skills in heart failure self-care.

ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude and appreciation to all those who have made this study possible. We are particularly grateful to the cardiology department and nurses from Hospital Sultan Idris Shah, Serdang, for their willingness to participate in this research and for providing the opportunity to conduct this study. We would also like to acknowledge the valuable assistance of Madam Normala and Madam Norizan in data collection.

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