

Enhancing Knowledge and Self-Care Behavior of Heart Failure Patients by Interactive Educational Board Game

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Abstract

Objective: To evaluate the effects of an educational board game on heart failure (HF) patients' knowledge and self-care behavior.

Methods: In this randomized controlled study with a follow-up of 3 months, 76 patients with HF with reduced ejection fraction, who had been enrolled in our multidisciplinary HF program, were divided into two groups. During their follow-up appointment at the HF clinic usually 2 weeks after discharge, the interventional group participated in an HF educational board game conducted in Thai language, while the control group received the usual care including standard education. The primary outcome was the change of score achieved in the specialized HF knowledge and self-care behavior assessment.

Results: In the intervention group, the knowledge and self-care behavior significantly improved (all $P < 0.001$), whereas both scores were unchanged in the control group ($P = 0.09$ and $P = 0.21$). Mean score change for knowledge and self-care behavior showed greater improvement in the intervention group when compared with the control group ($P < 0.002$ and $P < 0.006$).

Conclusion: Participation in an interactive educational board game resulted in an increase in the HF patients' knowledge and self-care behavior.

Practice Implications: An interactive educational board game may be used as an alternative educational tool in HF patients.

Keywords: Heart failure knowledge, Heart failure self-care behavior, Heart failure educational, Board game

Introduction

HEART FAILURE (HF) IS A CHRONIC illness that has become a major public health problem with statistics showing an increased incidence of HF every year. Nowadays, HF is highly prevalent in Thailand. Hospital readmission is common among HF patients with a rate of 35.2% within 3 months of their initial discharge.¹ The major causes of recurrent symptoms and hospital readmissions include lack of self-care knowledge and improper self-care behavior, such as skipped medication, eating a high-sodium diet, drinking alcohol, and lack of recognition of symptoms.^{2,3}

The prevention of HF exacerbation depends on suitable self-care behavior and receiving continuous healthcare. Edu-

cating patients and their relatives on limiting high-sodium diet consumption, regular weight monitoring, assessment of excess fluid, and adjustment of diuretic dose by themselves could prevent the aggravation of HF and reduce readmission rates.^{4,5} Thus, an effective educational program provided by a health-care team is crucial to improve the patients' outcome.^{6,7}

The current pattern of enhancing knowledge for HF patients is a one-way communication technique through which nurses provide information to patients. This is a weak link as it does not stimulate the patients' interests and memories, making this way of enhancing knowledge unsuccessful. Various styles of giving knowledge need to be improved by developing interactive games, particularly learner-based games.⁸ The major advantages of interactive games are patient participation and

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engagement of the learners. By playing and having fun at the same time, learners can meaningfully develop their learning during or after playing the games. Gaining knowledge through games is based on group process learning, resulting in the exchange and interaction between instructors and patients, and among the patients. This style of learning has been proven to be fun and interesting.^{9,10} Furthermore, it stimulates the patients' interest and memory and helps them to develop knowledge and skills of self-care, and thus potentially resulting in a decrease in readmission rates.

In this study, the researchers were eager to learn about the efficacy of using interactive educational board games to provide knowledge to HF patients. Hopefully, this education method may promote patients' self-care, eventually reducing the burden of HF rehospitalization, reducing costs, and improving the quality of life. Thus, the primary objective was to compare the effects of both an interactive educational program and a standard educational program used to improve the knowledge and self-care behaviors of patients with HF.

Materials and Methods

This was a prospective, randomized study with a 3-month follow-up. Written informed consent was obtained from each patient and the study protocol was approved by the Research Ethics Committee of Faculty of Medicine, Chiang Mai University.

Participants in this study were patients diagnosed with HF and discharged from Maharaj Nakorn Chiang Mai Hospital for 2 weeks. Before they enrolled in the study, all participants received the standard education session at the time of hospital discharge. At the first follow-up at the HF clinic, which provided outpatient education, patients were screened and invited to participate in the study. The inclusion criteria were (1) being able to respond to the questions and (2) being willing to participate in the study.

Subjects were assigned by simple randomization into two groups, a control group and an intervention group. The intervention group received one session of the HF interactive educational board game, organized by the researcher in Thai language, which lasted for 30 minutes per round of playing. The group playing consisted of small groups, with three to four participants and/or a few caregivers in the groups. It was necessary to play board games 12 times to include all the 38 intervention participants in the study. The control group received the onetime usual outpatient education provided by the HF nurse, which did not include the researcher. The study questionnaires in Thai language were completed to assess their knowledge and self-care behavior at baseline before the educational session and at the 3-month follow-up (Fig. 1 and Table 1).

Research Instruments

Interactive educational board game

The interactive educational board game used in our study was created by Patrick Jourdain, MD. The Servier (Thailand) Company Limited bought the copyright license for reproduction and distribution. The game contents were translated into Thai by Thai cardiologists and HF specialist nurses from four university hospitals. Some questions were modified to suit the lifestyle and culture of Thai people: for example, foods with added shrimp paste containing a large amount of salt should be avoided. True or false? Shrimp paste is a Thai flavoring. This HF educational tool aims to improve care for patients with an ongoing or stable medical condition. It teaches patients and/or their caregivers about the treatment of HF and gives advice regarding managing the disease in everyday life. Nurses were the ones who organized the game. A tool box contains a board, the rules of the game, specific "knowledge" cards, specific "role-play" cards relating to a situation that puts the patient at risk or that requires a

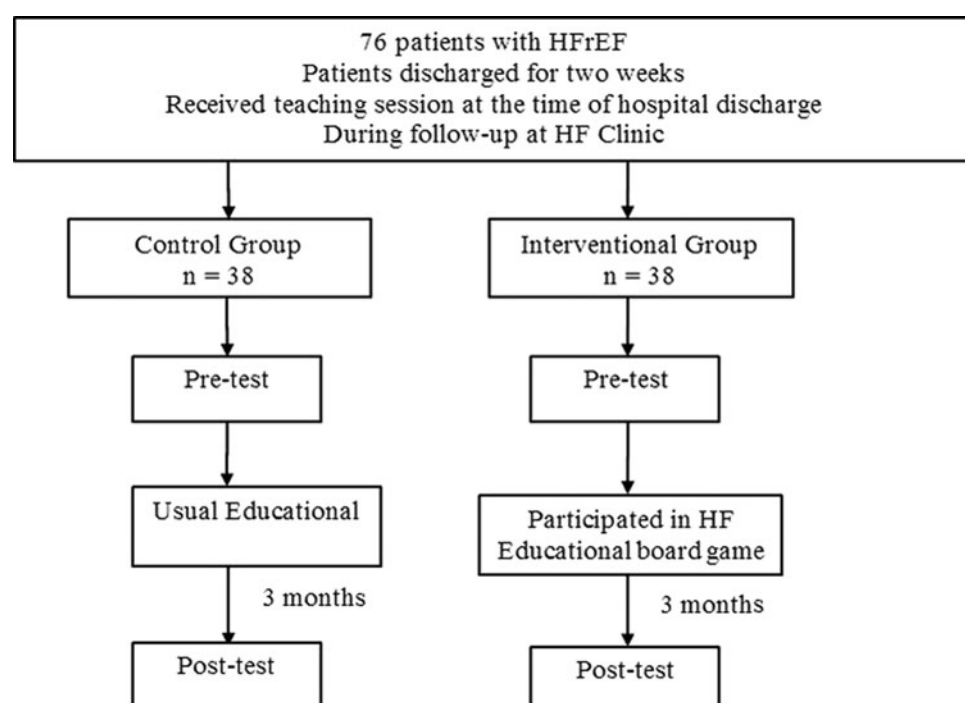


FIG. 1. Flow diagram of the randomized controlled trial.

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TABLE 1. CHARACTERISTICS OF AN INTERACTIVE EDUCATIONAL BOARD GAME FOR HEART FAILURE

<i>Health topic(s)</i>	<i>HF self-management</i>
Targeted age group(s)	>15 years
Other targeted group characteristics	Outpatient clinic
Short description of game idea	Monopoly-like board game to learn about HF self-management
Target player(s)	small group
Guiding knowledge or behavior change theory(ies), models, or conceptual framework(s)	Group process learning
Intended health behavior changes	HF self-management, self-monitoring, decision-making
Knowledge element(s) to be learned	HF-related food and water consumption, medicines, weight monitoring, and what to do if signs or symptoms worsen
Behavior change procedure(s) (taken from Michie inventory) or therapeutic procedure(s) used	Improved knowledge reinforced through discussion, immediate feedback, and reward mechanism will motivate behavior change
Clinical or parental support needed?	Game instructions
Data shared with parent or clinician	Yes
Type of game	Interactive/stimulative/educative
Story (if any)	None
Synopsis (including story arc)	None
How the story relates to targeted behavior change	NA
Game components	
Player's game goal/objective(s)	The player who reaches the end with the highest number of health points wins the game
Rules	Roll the dice and move mover forward, draw question card, according to square the mover lands and answers the questions to earn point (s)
Game mechanic(s)	Dice rolling, card drawing, answer questions correcting to earn point(s).
Procedures to generalize or transfer what is learned in the game to outside the game	Assessed knowledge by questionnaire feedback
Virtual environment	
Setting (describe)	Movers start at the beginning and move forward to the end. There are five types of squares along the way: knowledge, role-play, healthcare professional, smile, and blank
Avatar	A mover
Game platform(s) needed to play the game	Board game
Sensors used	None
Estimated playtime	30 minutes

HF, heart failure.

particular reaction, 6 “player” counters, a 6-sided dice, and 50 colored health points. Written game instruction questionnaires and answers were provided. Game instructions were given by an HF specialist nurse with experience in HF patient's education (Appendix 1).

Standard outpatient education in HF clinic

The standard outpatient education in HF clinic was a one-on-one education session for patients and caregivers. The education topics included clinical presentation of HF, treatment, lifestyle modification, self-monitoring, and management of early symptoms.

Questionnaires

Self-response questionnaires were used to assess knowledge and self-care behaviors. All questionnaires were developed in Thai language through the review of relevant literature by researchers who did not participate in the game translation. The questionnaires were further validated by two consultant cardiologists, a nurse instructor, and two HF nurse specialists.

The knowledge element of the HF questionnaires included 28 itemized questions administered verbally or in writing to the patients. The format was True/False questions. Total scores ranged from 0 to 28. A higher score indicated a higher level of knowledge. The validity and reliability using Kuder-Richardson 20 for this questionnaire were 0.8 and 0.75, respectively. The self-care behavior part of the HF questionnaires included 25 item surveys with a 5-point Likert scale to measure the frequency of self-care behaviors. A Likert format was adopted for response alternatives (0=never, 1=rarely, 2=sometimes, 3=often, and 4=always). The total score is the sum of the scores for the 25 items with higher scores corresponding to higher self-care levels. The validity and reliability using Cronbach's alpha coefficient for this questionnaire were 0.72 and 0.71, respectively (Appendix 2).

Data analysis

Cohen's statistical power analysis was used to determine the sample size as 34, but to cover for the possible dropout of 10% (4 patients), 38 patients were recruited for each group.

TABLE 2. PATIENTS' CHARACTERISTICS EXPRESSED AS PERCENTAGES OR MEAN (STANDARD DEVIATION)

	Total (N=76)	Control group (N=38)	Intervention group (N=38)	P
Age, years (mean $\pm$ SD)	57.9 $\pm$ 14.8	56.0 $\pm$ 15.9	59.4 $\pm$ 13.7	0.27
Male	59 (77.6)	29 (76.3)	30 (78.9)	0.78
Marital status				0.93
Not married	17 (22.4)	9 (23.7)	8 (21.1)	
Married	48 (63.1)	24 (63.2)	24 (63.2)	
Separated, widowed	11 (14.5)	5 (13.2)	6 (15.7)	
Education level				0.89
No formal education	6 (7.9)	3 (7.9)	3 (7.9)	
Elementary education	27 (35.5)	13 (34.2)	14 (36.8)	
High school	21 (27.6)	11 (28.9)	10 (26.3)	
Bachelor's degree and above	22 (28.9)	11 (28.9)	11 (28.9)	
Occupation				0.59
Housekeeper	27 (35.5)	12 (31.6)	15 (39.4)	
Business	21 (27.6)	10 (26.3)	11 (28.9)	
Government	18 (23.7)	9 (23.7)	9 (23.7)	
Farmers	10 (13.2)	7 (18.4)	3 (7.9)	
Household income				0.55
<5000 Baht	38 (50)	18 (47.4)	20 (52.6)	
5001–15,000 Baht	14 (18.4)	6 (15.8)	8 (21.1)	
15,001–30,000 Baht	15 (19.7)	10 (26.3)	5 (13.2)	
>30,000 Baht	9 (11.8)	4 (10.5)	5 (13.2)	
NYHA				0.764
Class I	13 (17.1)	6 (15.8)	7 (18.4)	
Class II	63 (82.9)	32 (84.2)	31 (81.6)	

NYHA, New York Heart Association.

Questionnaires were collected anonymously and sorted by a concealed reference number. The outcome assessors were blinded to the assigned group.

Continuous data presented as mean $\pm$ standard deviation and compared between groups using Student's *t*-test. Categorical data presented as number (%) and compared between groups using the chi-square test.

A paired *t*-test was used to compare the differences between the pre- and postknowledge and self-care behavior scores in each group.

Student's independent *t*-test was used to compare the changes of score between groups.

A two-tailed *P*-value of less than 0.05 was considered statistically significant.

Results

Thirty-eight patients participated in the intervention group and 38 in the control group. The baseline characteristics are shown in Table 2 and the overall mean age was 58 years. Most subjects (77.6%) were male, 63.2% were married, and almost half of the patients (43.4%) had no education or completed education below the high school level. There were

no statistical differences between the groups. There were no dropouts because participants were in the HF management program and the well follow-up.

We have found that the knowledge and self-care behaviors of the intervention group significantly improved (pre- vs. postknowledge score: 23.74 ± 3.03 vs. 26.11 ± 1.67 , $P < 0.001$; pre- vs. post-self-care behavior score: 79.61 ± 11.83 vs. 87.89 ± 9.52 , $P < 0.001$), whereas both scores were unchanged in the control group (pre- vs. postknowledge score: 24.05 ± 2.77 vs. 24.63 ± 2.64 , $P = 0.09$; pre- vs. post-self-care behavior score: 79.37 ± 12.63 vs. 81.32 ± 11.01 , $P = 0.21$) (Table 3).

Moreover, the mean change of knowledge and self-care behavior scores was greater in the intervention group when compared with the control group (Table 4).

Discussion

In this study, an HF patient educational technique, using an interactive board game, resulted in better knowledge and self-care behavior improvement after assessing by questionnaires and comparing the results with the standard education. The card game contained questions regarding general

TABLE 3. THE KNOWLEDGE AND SELF-CARE BEHAVIOR SCORES

	Control (n=38)			Intervention (n=38)		
	Pretest	Posttest	P	Pretest	Posttest	P
Knowledge	24.05 ± 2.77	24.63 ± 2.64	0.09	23.74 ± 3.03	26.11 ± 1.67	<0.001
Self-care behavior	79.37 ± 12.63	81.32 ± 11.01	0.21	79.61 ± 11.83	87.89 ± 9.52	<0.001

Data presented as mean $\pm$ SD or *N* (%).
SD, standard deviation.

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TABLE 4. MEAN SCORE CHANGE

	<i>Control</i>	<i>Intervention</i>	<i>P</i>
Knowledge	0.58	2.39	0.002
Self-care behavior	1.95	8.29	0.006

knowledge of HF, food and water consumption, medicines, exercise, and self-monitoring for signs and symptoms of HF. While answering these questions, players could exchange their views with their peers while getting additional information from nurses via role-play, stimulated scenarios, discussion, and immediate feedback. The interactive board game could also help the patient to develop problem solving and communication skills, such as describing the symptoms more accurately, which would eventually help the patients to respond better to disease-related events. The method could also be adapted for other disease education programs that require optimal patient self-care.

Interactive education has been studied in people having various diseases, including acute and chronic conditions. The educational board game in public schools has improved knowledge about acute diseases such as dengue fever.⁹ Similarly, the meta-analysis showed that the educational games can improve the level of knowledge and self-management in young people with chronic conditions.¹¹ In addition, games also improved diabetes-related knowledge, self-efficacy, communication with family and friends, self-care behaviors, and clinical utilization in young adults.^{12,13} Also, one study in older adults with HF showed that playing interactive digital e-health games resulted in improvement in HF self-management knowledge.¹⁴

Compared with the videogame, there are fewer published studies using board games. In general, board games are low tech and easier to use and so can be seen as a more suitable activity for older population who are usually not “digital natives.” Therefore, we believe interactive board games may be applicable to a broader population; one in which the subjects were older or perhaps with a lower education level. Also, group interactive board games such as the one used in our study, where players are physically present, promote interpersonal interaction. This would allow more opportunities for knowledge and experience sharing and supportive encouragement among the members and the nurse conducting the game.

Interactive educational board games can be adapted in content and challenges related to the special diseases, local environment, as well as characteristics of patients and caregivers. In combination with an active learning processes, enhancing patients’ engagement, and providing immediate feedback, educational board games can be a great tool for patient health education programs. An educational program increases patients’ knowledge and understanding, treatment, and daily self-care and self-management in HF patients. The benefits of this educational game on outcomes should be further studied.

Limitation

The limitation of this study is the lack of reliability of self-reported self-care behavior measures. Patients may know the correct behavior, but one cannot assume that these behaviors were practiced unless directly measured. Also, retention of knowledge was not reevaluated. The benefit seen here may

be weaned off after a certain period. To further the knowledge in this area, the next studies should explore the impact of board games on hard clinical outcomes, such as re-hospitalization and mortality.

Conclusion

In a randomized controlled trial, we provided evidence that an interactive educational board game as a comprehensive educational program resulted in enhancing patients’ knowledge and the self-care behaviors of HF patients compared with a traditional education approach.

Practice Implications

An interactive educational board game is an effective educational tool and may be used as an alternative educational method in HF patients. Being adaptable to any disease, patient characteristics, and local culture, educational games enhance patients’ engagement in an active learning process. This educational method promotes patients’ knowledge, self-care behavior, and hopefully improves outcomes in HF patients.

Acknowledgment

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Ethics Approval and Consent to Participate

The study protocol was approved by the Medical Ethics Committee of Faculty of Medicine, Chiang Mai University. Patients’ informed consent was waived due to the nature of prospective study.

Author Disclosure Statement

No competing financial interests exist.

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Appendix 1

An Interactive Educational Board Game for Heart Failure (HF). A board game using in our study was invented by Patrick Jourdain, MD*, and Servier (Thailand) Company Limited bought the copyright license for reproduction and distribution. The game contents were translated into Thai language and some questions were modified to suit lifestyle and culture of Thai people (by Thai cardiologists and HF specialist nurses).

Contents

One board, 6 movers, one 6-sided dice, 30 “knowledge” question cards, 20 “role-play” question cards, 50 pins (as health points).

Objectives

The player who reaches the end with the highest numbers of health points wins the game.

Setup

1. Each player gets a mover to represent himself or herself as he or she moves around the board.
2. Each player will begin the game with five health points.
3. The “knowledge” question cards and the “role-play” question cards are shuffled and placed face down on the board.
4. To decide who goes first, each player rolls the dice. Whoever rolls the highest number will play first, then continues clockwise around the board.

How to Play

1. A player rolls the dice and reads the number. A mover is moved forward that number of spaces. For example, if you roll a three, move your mover to square three. On your next turn, if you roll a four, move your mover forward four squares, ending up on square seven.
2. If the mover lands on “knowledge” square, the player picks up a top “knowledge” question card and reads it out before giving an answer. The answer will be checked by the instructor. If it is correct, the player will get one health point. But if it is wrong, the player will lose one health point.
3. If the mover lands on a “role-play” square, the player picks up a top “role-play” question card and reads it out before giving an answer. The answer will be checked by the instructor. If it is correct, the player will get two health points. But if it is wrong, the player will lose two health points.
4. If the mover lands on a “healthcare professional” square, the player who has less than five health points will regain the original five health points. The player who has five health points or more will not get any additional health points.
5. If the mover lands on a “smile” square, the player gets one health point.
6. If the mover lands on a blank square, nothing happens.
7. All players are allowed to discuss and share their own experiences under the guidance of the instructor.

“Knowledge” Question Cards

In “knowledge” set, there are 27 closed-ended questions and 3 open-ended questions. The questions are carefully constructed to provide comprehensive knowledge about self-care. The questions and answers are as follows:

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<i>Questions</i>	<i>Answers</i>
1. Give three signs or symptoms of HF	Breathlessness, edema, weight gain, orthopnea, coughing at nighttime, fatigue
2. It is possible to suffer from HF even if the heart contracts well. True or false?	True
3. Is it weight or waist measurement that should be monitored in the case of HF?	Weight. An increase may indicate an aggravation of the disease
4. If you have HF, you will have to take medical treatment for the rest of your life, even if you feel well. True or false?	True
5. Myocardial infarction can lead to HF. True or false?	True
6. The earlier you notify a doctor about a change in your health, the shorter the stay in hospital. True or false?	True
7. When does long-term treatments of HF begin to have the maximum effect? After 24 hours, 1 week, or 2–3 months?	2–3 months
8. Do diuretics improve breathlessness, heart function, or both?	Breathlessness. They treat the symptoms but not the disease
9. HF can worsen if the diet contains too much salt. True or false?	True
10. Water restriction is more important than salt restriction. True or false?	False
11. Monitoring kidney function by means of creatinine levels is important in the case of HF. True or false?	True
12. Patients with HF should avoid exercise. True or false?	False. They should exercise in a controlled manner and progress gradually
13. Can fatigue, nausea, and vomiting be symptoms of HF?	Yes. It is linked to poor irrigation of the muscles resulting from a lack of power in the heart. Moreover, liver congestion can cause abdominal discomfort, nausea, and vomiting
14. Why are people with HF breathless?	Because HF can lead to the accumulation of water in the lungs. This prevents the oxygen from passing through the alveoli and then into the blood
15. If breathlessness prevents you from lying down, you should phone for an appointment. True or false?	False. You should call paramedic ambulance immediately
16. What diuretic have you been prescribed?	(According to the player's prescription)
17. A change in potassium level may cause the heart to race. True or false?	True
18. Frozen meal, marinated meat, dried meat, and fermented food contain salt. True or false?	True
19. Marinade, fish sauce, soya sauce, monosodium glutamate, and soy bean paste contain salt. True or false?	True
20. Canned food, instant noodles, and essence of chicken contain salt. True or false?	True
21. Foods adding shrimp paste contain a large amount of salt and should be avoided. True or false?	True
22. Reducing heart rate could be beneficial in terms of reduction of HF events. True or false?	True. The aim is to reduce heart rate if it is above 60 beats/min
23. HF can cause depression. True or false?	True, like any other chronic illness
24. When you have a long trip, you can stop taking medications for 24 hours. True or false?	False
25. Due to its prognostic relevance, it is important to check your heart rate regularly. True or false?	True. There is an increased risk for a heart rate >60 beats/min
26. If you want to indulge in a special meal, you simply have to double your treatment on the previous day. True or false?	False. If you do so, you may cause your blood pressure to drop too far
27. If your blood pressure is high, your heart is pumping well. True or false?	False. High blood pressure is a disease that can worsen HF
28. Herbs, nonsteroidal anti-inflammatory drugs (NSAIDs), and muscle relaxants are not harmful in HF patients. True or false?	False. They can aggravate symptoms of HF
29. You should regularly check for edema by pressing your thumb over foot, ankle, and leg. True or false?	True
30. If you have high potassium level, you should not eat banana, orange, and juice. True or false?	True

“Role-Play” Question Cards

In “role-play” set, there are 20 open-ended questions to ask about the action plan when some common scenarios occur. The questions and answers are as follows:

<i>Questions</i>	<i>Answers</i>
1. You suffer from dizziness or blackout when you get up out of your chair and your treatment was changed yesterday. What do you do?	Correct: I sit back down again or lie down. I try again 10 minutes later, getting up slowly. If I again suffer malaise, I phone my doctors. Incorrect: It is nothing to worry about. I always get over it. I will decrease my treatment myself because I felt better before.
2. You cannot remember whether you took your medication this morning. What do you do?	Correct: I need to be more organized (using a pill box or a notebook, etc.) or seek help (from pharmacists, doctors, nurses, or family). I take my treatment this evening as usual. Incorrect: I will take the morning medication with the evening medication, or I will take a double dose this evening.
3. You are so breathless and cannot do your usual activities of daily living. What do you do?	Correct: I call doctors or nurses in the HF clinic. If I cannot contact them, I go to the emergency department at the hospital. Incorrect: I will wait. It will pass.
4. Your legs have been swelling for the last 2 or 3 days and you cannot put your shoes on. What do you do?	Correct: I call doctors or nurses in the HF clinic. Incorrect: I must have walked too far yesterday. It will pass. Or I will have to buy a new pair of shoes.
5. Your colleagues have given you a trip to the mountains as a present. What do you do?	Correct: I will check that the resort is at an altitude of less than 1000 m. Incorrect: I cannot go to the mountains. It is not a good idea.
6. You have felt bloated and nauseous for the past 2 days and you are very tired. What do you do?	Correct: I call doctors or nurses in the HF clinic, because my HF may be progressing, even if I am not breathless. Incorrect: I must have eaten something that disagreed with me. I will take a rest.
7. You have put on 4 kg in 2 days. What do you do?	Correct: I go to the emergency department with my last prescription. Incorrect: I will wait for another day or two.
8. Your friends invite you over for dinner. What do you say to them?	Correct: I would love to, but you will have to adapt the menu so that I do not have too much salt. I monitor my weight in the days before and after the meal and limit my consumption of salt as much as possible. Incorrect: I cannot have dinner with friends, because I suffer from HF.
9. You have put on 1 kg in 2 days. What do you do?	Correct: I reduce my salt intake and check my weight every day. I call if I put on more than 2 kg over 48 hours in succession. Incorrect: I go to the emergency department. It's not worth trying to eat less. My scales must be wrong.
10. You have been stable for the past year and your cousin asks you if you still have to have blood tests. What do you say?	Correct: Yes, regularly, for as long as I have treatment to take, even if I have no clinical symptoms. Incorrect: No, he is right. Blood tests are needed only when I have a change in my health.
11. Your friends ask you for exercise, such as jogging and aerobic dance. What do you say?	Correct: I would love to. I can exercise with gradual increase in intensity. Incorrect: I cannot do any physical activity.
12. Last night, you did not sleep well because you were breathless when lying down. This morning you feel better. What do you do?	Correct: I go to the emergency department with my last prescription. Incorrect: I feel better, so it was not my heart.
13. Last night, you partied and you ate a lot of salty food. What do you do today?	Correct: I eat as little salt as possible. I monitor my weight on a daily basis. Incorrect: I do not do it often. Nothing is going to happen to me.
14. You are doing the shopping for your meal. How do you select what to buy?	Correct: I look at the salt content indicated on labels. Incorrect: If it is salt-reduced, I can eat it. I can eat what I like because my condition is stable. I can eat everything.

<i>Questions</i>	<i>Answers</i>
15. For the past 2 days, you have felt more tired than usual but you are not more breathless. What do you do?	Correct: I call doctors or nurses in the HF clinic. Incorrect: I will rest so that I feel better. Oh, these medications just do not work.
16. Your friends tell you that you do not need to monitor your weight because you are not breathless anymore. What do you say to them?	Correct: No, I have to monitor my weight regularly. Incorrect: They are right. My condition is stable.
17. Your brother-in-law maintains that because alcohol is not salty it cannot damage you. What do you say to him?	Correct: Alcohol is extremely dangerous because it can cause numerous illnesses, including certain forms of HF. Incorrect: Yes, I can drink as much as I want.
18. The nurse tells you that you have to monitor some clinical signs and symptoms to prevent a new compensation. What are those signs and symptoms?	Correct: Edema Blood pressure and (pre-)syncope Breathlessness
19. For the past few days, you have had pain in the chest and left arm. The pain is becoming more and more frequent, but you are not breathless. What do you do?	Correct: I go to see a doctor immediately. It may be the early symptoms of heart attack. Incorrect: It is nothing to worry about. I am not breathless, so it is not my heart.
20. Your friend asks you to play badminton. What do you say?	Correct: I would love to, but you will have to adapt the intensity for my safety. I would prefer jogging instead, so that I can adjust the intensity myself. Incorrect: Let's go! My condition is stable. The more I exercise, the stronger my heart is.

Appendix 2

Heart Failure Questionnaire

Please check ☒ in the column

<i>Questionnaire</i>	<i>True</i>	<i>False</i>
1. People with HF cannot be cured, but need lifelong and continuous treatment		
2. HF can cause fluid overload and pulmonary edema		
3. You must avoid high-sodium diet		
4. You can add several flavors into your food such as stock cubes, monosodium glutamate, sauce, fish sauce, and salt		
5. You should avoid buying or eating out because you cannot control the sodium level in the food at the restaurant		
6. You should refrain from eating preserved food, vegetables, fruits, and canned food		
7. You could eat instant noodles and instant rice porridge		
8. You should not eat salty snacks		
9. The amount of water you drink must be guided by your doctor and nurse		
10. You have to measure drinking water		
11. Medicines could treat your illness; therefore, when you get better, you can stop taking all medicines		
12. In case of forgetting to bring medicines with you when traveling to other provinces, stopping drugs for 1–2 days is allowed if you do not experience any symptoms. However, you should take medicines regularly when you get home		
13. Medicines used to treat HF could lower blood pressure		
14. Diuretics could help reducing excess fluid in the body		
15. Decoction and herbal medicines that are not approved by the Government Pharmaceutical Organization are dangerous for your illness and are completely prohibited		
16. You can take orphenadrine drugs or injection when suffering from aches and pains or leg or knee pains		
17. Workout by walking for an appropriate time could make you healthier		
18. Patients with HF are not allowed to do both soft and hard exercises as they could worsen the illness		
19. Weight measurement could prevent excess fluid in the body and recurrence of HF		
20. Weight measurement can be done at any time		
21. Your weight measurement is only done according to doctor's and nurse's advice; otherwise, you gain no benefits from it		
22. Edema could be noticed by pressing down on the shin		

<i>Questionnaire</i>	<i>True</i>	<i>False</i>
23. The observation of urine output is useful for assessing edema		
24. Decreasing edema or swelling in the initial stages could prevent your fatigue		
25. If you swell, gain weight, or feel tired, these symptoms are not relevant to the amount of drinking water and high-sodium diet, so you can drink water normally		
26. If you gain 1–1.5 kg weight in 1–2 days or your legs and feet swell or you feel more tired, these symptoms are not normal. You can take more diuretics		
27. If your weight gains more than 4 kg in 3 days or your legs and feet swell or you feel so tired, taking more diuretics is advised and medical attention is not necessary		
28. If you lose a lot of weight or dehydrate from diarrhea, you should take less diuretic drugs and consult your doctor and nurse		

Self-Care Behavior Assessment

Please check ☒ in the column

<i>Questionnaire</i>	<i>Done</i>				
	<i>Irregular</i>	<i>Frequently</i>	<i>Sometimes</i>	<i>Once in a while</i>	<i>Not done</i>
1. You eat salty foods					
2. You or your family cooks food					
3. You buy food at the market					
4. You eat outside the home or in the party					
5. You or your family puts fish sauce, salt, sauce, soy bean paste stock cubes, and monosodium glutamate when cooking					
6. When you eat outside, you always tell chef not to put monosodium glutamate in the food					
7. You eat food cooked with shrimp paste, pickled fish					
8. You eat chili sauce such as red hot chili sauce, shrimp paste chili sauce, and fermented fish spicy dip					
9. You eat fermented food/canned food such as canned fish, fish eagle					
10. You eat instant noodles, instant rice porridge					
11. You drink alcohols					
12. You drink energy drinks, mineral water					
13. When you swell, feel tired, dyspnea, or orthopnea, you limit the amount of fluids you drink					
14. You take medication as prescribed					
15. You forget to take your medicine					
16. You always read the labels before taking medicine					
17. You buy other medicines to eat					
18. You take herbal medicine					
19. You observe your abnormal signs after taking medicine					
20. You use NSAIDs and muscle relaxants					
21. You measure drinking water each day					
22. You weigh yourself in the morning					
23. You press the shin to assess swelling					
24. You evaluate symptoms, such as tiredness, shortness of breath, trouble breathing when lying flat					
25. You evaluate the swelling of the body such as shin, eyelids, face limbs, and abdomen					