Final Report

A Social Robot as a Health Educator for Heart Failure Patients Using the Teach-Back Method

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Heart failure (HF) is a chronic condition whose evolution can be medically managed but for which there is no cure. To maintain optimal health and quality of life, HF requires patients to understand their condition well and engage in ongoing self-management behaviors. Self-care behaviors that are crucial to improved quality of life and avoidance of unnecessary hospitalizations include medication adherence, dietary modification, symptom monitoring, and the timely reporting of symptoms associated with worsening HF. Despite advances in treatment, HF continues to be one of the leading causes of hospitalization among adults over 65 (Malik et al., 2021; Nair et al., 2020).

Effective patient education is an indispensable component of effective HF management. However, many patients have an incomplete understanding of the disease process, their prescribed treatment regimens, and the self-care behaviors required to successfully manage their condition. In rural healthcare settings, the challenges associated with HF education may be further complicated by clinician time constraints, limited access to specialized HF educational resources, and varying levels of patient health literacy. Traditionally, patient HF education involves nurse or provider-led encounters. Often, this does not allow enough time to verify comprehension of core principles in HF management, nor does it support long-term learning of essential information. Unfortunately, many patients remain at high risk for poor self-management and unnecessary hospitalization (Friel, 2016; Lambrinou et al., 2014). These preventable readmissions represent a quality-of-care concern and a significant financial risk for healthcare organizations under value-based reimbursement models such as the Centers for

Medicare and Medicaid Services' Hospital Readmissions Reduction Program (McILvennan et al., 2015).

The problem addressed in this project was an instructional performance gap related to variability in patient understanding of HF health literacy and self-care principles and the limited opportunities for healthcare providers to provide quality HF education due to the limitations associated with brief clinical encounters. To successfully manage their condition, HF patients should be able to explain crucial concepts in their own words, demonstrate understanding of the importance of medication adherence, dietary and fluid restrictions, symptom monitoring, and identify appropriate actions to take when HF symptoms worsen.

To address this instructional gap, I designed, developed, implemented, and evaluated a social robot-mediated HF education intervention employing the teach-back method. I selected the teach-back method because it is an evidence-based instructional approach in healthcare that requires learners to restate the information they have learned in their own words. Teach-back also allows misunderstandings to be identified and corrected during instruction (Yen & Leasure, 2019). I created a character to serve as a patient health educator named Sheila using the Furhat social robot (see Figure 1). Sheila delivered standardized HF education based on the American Heart Association's Discharge Packet for Patients Diagnosed with Heart Failure (*Discharge Packet for Patients Diagnosed with Heart Failure*, 2023) while prompting participants to respond to teach-back questions throughout the interaction. This final report summarizes the full instructional design process, including front-end analysis, instructional design decisions, pilot implementation, evaluation findings, revisions to the training solution, and my reflection on the overall process.

Figure 1

Sheila, the Social Robot Heart Failure Patient Educator

Note. Sheila is a Furhat social robot programmed to deliver structured HF education using the teach-back method.

Front-End Analysis

Learner Analysis

The target population for this instructional intervention consisted of adult learners who were recruited from communities in Southeast Kansas. A total of 11 volunteers participated in the pilot implementation, which was conducted in person over two Saturday sessions in a clinical after-hours setting. The participants ranged in age from 55 to 80 years, with a mean age of approximately 70 years. The majority of participants were female (n = 7), with four male (n = 4) participants. Volunteers were mainly recruited from Chanute, Kansas, with additional participants residing in the nearby communities of Humboldt and Iola. Some participants reported a history of heart failure and/or other cardiac conditions such as myocardial infarction, while others had no known cardiac history. All participants demonstrated sufficient vision and hearing to interact with the social robot. No participant reported a formal diagnosis of cognitive

impairment. However, one participant's spouse indicated possible mild cognitive changes that had not been formally evaluated. A summary of participant demographic information is presented in Table 1.

Table 1

Participant Demographic Characteristics (N = 11)

Characteristic	Category	n	%
Gender	Female	7	64%
	Male	4	36%
Race/Ethnicity	White	11	100%
Education Level	Some college, no degree	3	27%
	Master's degree	4	36%
	Associate degree	1	9%
	Bachelor's degree	1	9%
	Doctorate	1	9%
	Trade/technical training	1	9%
Prior HF Education	Yes	3	27%
	No	8	73%
Hours of HF Education	None	7	64%
	Less than 1 hour	2	18%
	3-5 hours	1	9%
	Greater than 5 hours	1	9%

Task Analysis

The task analysis focused on the crucial self-care knowledge and behaviors that patients with HF need to master to effectively manage their condition and avoid unnecessary hospitalization. Patients not only must improve their knowledge and understanding of HF, but also how to apply that knowledge to daily self-care management decisions. I organized the instructional content around the key actions that HF patients are expected to perform, which included daily weight monitoring, adhering to sodium and fluid restrictions, taking medications as prescribed, recognizing signs and symptoms of worsening HF, and knowing when to contact a healthcare provider.

To perform these tasks successfully, patients must be able to recall HF information, explain it in their own words, and be able to apply it to their specific health situation. With this in mind, the instructional sequence of the robot-mediated interaction was designed to move from basic concepts of HF to specific self-care behaviors aligned with optimal HF management. Each section introduced a critical HF topic, asked the learner to respond to a teach-back prompt delivered by the robot, which then provided reinforcement or re-teaching when needed. By structuring the interaction in this way, the instructional content directly supported the learning needs and performance expectations that were identified through the task analysis.

Context Analysis

The context analysis took into consideration the typical setting in which HF education occurs and the setting where the pilot implementation would take place. In clinical practice, HF education is often delivered in an acute care setting prior to discharge or in outpatient settings such as cardiac rehabilitation and a cardiologist's or a family practitioner's office. These environments have many limitations such as time constraints, competing clinical priorities,

patient fatigue, emotional stress, and limited opportunity to verify patient understanding of information provided during brief encounters. Consequently, patients may receive important HF education, but often leave without being able to explain or apply the information to their own self-care in a meaningful way that maintains optimal health and preserves quality of life.

The instructional intervention was designed to act as a supplemental educational tool that could provide consistent, repeatable HF education using the teach-back method. During the pilot implementation, the interaction took place in a private clinical setting during after-hours, allowing participants to complete forms and testing separately before engaging with the robot. Additionally, the physical arrangement of the clinic allowed the participant to interact independently with the social robot while I monitored the session from another room. This supported standardized delivery of instruction while reducing my influence during the interaction. It also allowed me to observe how participants responded to the robot-mediated instruction via live video feed that is integrated into the Furhat web interface.

Instructional Design Decisions and Strategies

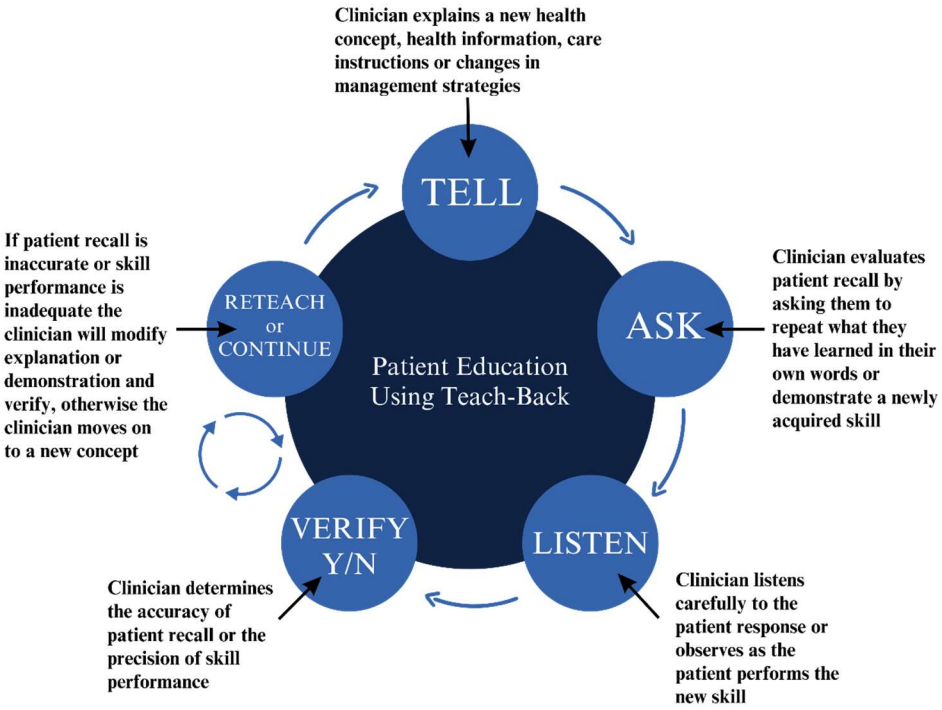
The instructional intervention was based on the ADDIE instructional design model (Lee & Lee, 2025). The results of the front-end analysis helped inform key design decisions related to instructional strategy, content organization, delivery method, and learner engagement. The teach-back method was selected as the primary instructional strategy due to its established effectiveness in healthcare education through promoting comprehension and retention. The teach-back method requires learners to restate information provided in their own words, allowing educators to identify misunderstandings and provide re-education or reinforcement during the instructional process (Yen & Leasure, 2019). This approach relies on an instructional sequence

that is a circular pattern of content delivery, educator inquiry, learner response, evaluation, and feedback.

The instructional content was chunked into segments that aligned with essential HF knowledge and self-care behaviors identified during the task analysis. These segments included general HF knowledge, medication adherence, sodium and fluid restriction, daily weights, symptoms of worsening HF, and appropriate response to signs of HF exacerbation. The learning content was presented using clear, concise language devoid of medical jargon to support accessibility across participants with varying levels of prior HF knowledge and health literacy.

Figure 2

Teach-Back Method in Patient Education



Note. Diagram for the teach-back method adapted from Teach-Back Effective Communication and Understanding, by Great Plains Quality Innovation Network, n.d. (https://greatplainsqin.org/blog/teach-back-i-effective-communication-and-understanding/).

Additional instructional strategies were incorporated to encourage learner engagement. The interactive nature of the social robot-mediated instruction was intended to sustain learner attention while encouraging active participation through turn-taking between the learner and the robot. Immediate feedback in the form of a green LED light ring provided positive reinforcement for correct responses. Similarly, a red or amber LED light ring, along with the repetition of key concepts, signaled opportunities to address misunderstandings immediately during instruction. Consistency and repeatability were central to the design of the patient HF instructional interaction. Each participant received the same learning content to ensure standardized delivery across the pilot implementation. At the same time, the teach-back method allowed individualized pacing of instruction when participants demonstrated incorrect responses, providing additional instruction to assist comprehension before moving to the next segment.

Pilot Implementation

The pilot implementation was conducted in-person over two sessions held on April 4 and April 11, 2026, in a private clinical setting in Southeast Kansas. The implementation took place after hours to ensure a controlled, private environment for the interaction. There was a total of 11 volunteers who participated in the pilot implementation. Upon arrival, participants provided consent for photography, videography, and audio recording (see Appendix A), completed a contact form (see Appendix B), and completed a demographic and HF education history form (see Appendix C). Then, the participants were administered the Atlanta Heart Failure Knowledge

Test-v2 (AHFKT-v2) as a pre-test to establish baseline HF knowledge (Reilly et al., 2009; see Appendix D).

Immediately following completion of baseline measures, the participants were taken to a separate room where they were seated in front of Sheila, the social robot health educator. I initiated the instructional interaction from an adjacent room using the Furhat web interface. I did not provide any direct assistance or intervention during the session to allow participants to interact with the system independently. The instructional interaction required participants to engage with the robot in a structured sequence of content delivery combined with teach-back responses. The entire interaction averaged approximately 35 minutes, but varied based on the participants' responses and the need for re-teaching.

Upon completion of the social robot instructional interaction, participants again completed the AHFKT-v2 as a post-test measure of short-term learning. Following the post-test, the participants engaged in a brief exit interview to provide feedback regarding their impressions of their experience and to make recommendations (see Appendix E). An example of participants' interactions with the social robot during the pilot implementation is shown in Figure 3.

Figure 3

Participants' Interactions With "Sheila" the Social Robot Health Educator

Note. Composite image showing multiple participants engaging independently with the social robot in the clinical setting.

Evaluation of Results

The evaluation of the pilot implementation included both qualitative and quantitative data collected immediately after the instructional intervention. The purpose of this evaluation was to describe participant performance, identify patterns in learning outcomes, and document participant experiences after the social robot-mediated instruction.

Qualitative Results

Qualitative data were collected through a structured exit interview that was conducted immediately following the instructional interaction. The participants' responses provided insight into their perceptions of the instructional content, interactive experience, and thoughts regarding areas for improvement. Participant responses were reviewed and organized into recurring themes. A summary of these themes is presented in Table 2.

Table 2

Summary of Themes From Participant Exit Interview

Theme	Summary of Findings
Clarity of Instruction	Information was clear and easy to understand
	Auditory delivery supported learning
Engagement	Experience described as interesting, enjoyable, and increasingly comfortable over time
Response Time	Limited time to respond
	Participants were sometimes interrupted.
Response Recognition	Correct or nuanced responses not always recognized accurately
Feedback	Desired clearer, more specific feedback responses
Interaction Style	Preference for more natural, conversational dialogue
	Desire ability to seek clarification or ask questions
Naturalness	Mixed perceptions, some found interaction natural
	Others noted unnatural elements
Educational Value	Viewed as a useful supplemental tool in addition to healthcare provider led education

Clarity and Understanding of Instructional Content

In general terms, the participants' reactions to the social robot instructional prototype were positive. Participants indicated that the information presented by the social robot health educator was clear, understandable, easy to follow, and relevant to improving their understanding of HF and self-care. One participant described the information as being delivered,

"without feeling like the information was over my head." Participants noted that hearing the information aloud supported learning, especially for those having a preference for auditory learning over reading written materials. Additionally, several participants specifically indicated that the sections on medication management, fluid restriction, and how to recognize symptoms of worsening HF were particularly helpful.

Interaction Experience and Engagement

Participants reported their general perception of the instructional interaction. Several participants described their experience as "interesting," "fun," and "informative," while others perceived the interaction as less natural when compared to human-to-human interaction. Some participants indicated that interacting with the social robot educator became more comfortable after the first few turns. Others noted that the interaction felt "not too natural" or "somewhat unnatural," specifically when related to the facial animations of the robot or conversational flow. Additionally, participants expressed a desire for increased conversational flexibility. They expressed a desire to be able to interrupt the robot to ask follow-up questions or request clarification during the interaction.

Response Timing and Interaction Constraints

Participants consistently mentioned the maximum allowed response time before being interrupted as a constraint negatively affecting the quality of the educational interaction. Participants indicated they wanted more time to process the robot's request and to formulate their answer without worrying about being interrupted, especially if providing detailed answers. Participants noted they were frequently interrupted before completing their answer due to system-imposed time limits. Additionally, participants reported that the robot did not always recognize correct responses. Participants indicated they found themselves adjusting the wording

of their responses to align with what they perceived to be the expected responses to avoid being counted as incorrect. Participants indicated this distracted from the learning process, especially if they were taking mental notes of the key words and phrases used by the robot that they believed they would be expected to regurgitate later when asked to repeat what they had learned.

Feedback and Instructional Support

Participants indicated they wanted the robot to provide specific feedback about which parts of their answers to questions were correct or incorrect. Additionally, participants expressed a desire to have the robot provide detailed information and clarification when their responses were deemed incorrect. Participants also expressed a desire for further opportunities for repeated social robot-mediated instruction.

Perceived Value of the Instructional Prototype

Participants generally indicated that the instructional prototype had potential value as an educational tool. Several participants stated that they would recommend the social robot health educator to others, particularly if used as a supplement to traditional HF education. Participants emphasized that robot-mediated HF education may be helpful to those individuals who have a preference for auditory learning or for whom repeated exposure to educational content is needed for long-term learning. However, participants indicated a preference for human-to-human interaction, suggesting that the robot would be most effective when used in conjunction with human instruction and not as a replacement.

Quantitative Results

Pre- and post-intervention HF knowledge was assessed using the AHFKT-v2 (Reilly et al., 2009). A total of 11 participants completed both the pre-test and the post-test. Participant scores demonstrated variability across individuals at baseline and following the instructional

prototype. Pre-test scores ranged from 9 to 21 correct responses. Post-test scores ranged from 14 to 22 correct responses. The mean pre-test score was 15.9, and the mean post-test score was 18.3. At the individual level, 8 participants demonstrated an increase in total test scores following the instructional intervention, 2 participants demonstrated no change, and 1 participant demonstrated a decrease in score. The improvement among participants who demonstrated learning gains ranged from 1 to 5 additional correct responses. The largest increases were observed among participants with lower baseline scores, while participants with higher initial scores demonstrated smaller changes or no change. One participant demonstrated a decrease in score from pre-test to post-test, with a reduction of three correct responses. A summary of individual participant scores and changes is presented in Table 3.

Table 3

Summary of Pre- and Post-Intervention AHFKT-v2 Scores (N = 11)

Participant ID	Pre-Test Score	Post-Test Score	Change (Δ)
P01	17	17	0
P02	17	18	+1
P03	14	18	+4
P04	16	16	0
P05	15	19	+4
P06	14	19	+5
P07	15	20	+5
P08	21	18	-3
P09	9	14	+5

P10	19	22	+3
P11	18	20	+2

Table 4

Descriptive Summary of AHFKT-v2 Scores

Measure	Pre-Test	Post-Test
Mean	15.9	18.3
Range	9–21	14–22

Reflection of Evaluation Results

The findings from the pilot implementation of a social robot health educator using the teach-back method in HF education indicated that the instructional prototype was associated with increased short-term knowledge gains for the majority of the participants. Although most participants demonstrated some degree of improvement in post-test scores, the variability in outcomes may suggest that the instructional experience and efficacy were not equal for all individuals. The qualitative findings provided some context for these results. Although participants reported that the instructional content was clear and easy to understand, several limitations were also identified in the interactional design and technological limitations. These included an insufficient time for learner response, challenges with intent recognition of the participants' responses, and limitations in personalized feedback following responses. The participants also expressed a desire for increased opportunities for more spontaneous back and forth dialogue between themselves and the social robot to more closely simulate the conversational exchanges in human-to-human interaction.

Based on these findings, several opportunities to revise the educational intervention were identified. This included increasing the maximum allowable response time, improving intent recognition to better capture the meaning behind the participants' words, and enhancing feedback to provide more detailed guidance, specifically when participants' answers were judged to be incorrect. Additional modifications were identified that could support more flexible and interactive dialogue during the instructional process.

Addressing some of the limitations that were identified requires the evaluation of additional technological solutions. For the purpose of this project, generative artificial intelligence and alternative automated speech/intent recognition systems were not integrated into the social robot health educator prototype. To fully address the participants' concerns and desires for improved interactional functionality, I will need to evaluate and then implement more advanced off-the-shelf technologies that support longer listening times and more flexible conversational capabilities. However, the integration of more advanced technologies will require careful consideration for risk management. Proper guardrails must be implemented to ensure patient safety and the accuracy of the information provided to patients who may be medically fragile. These findings have already informed the next iteration of the instructional prototype and will continue to provide direction for refining the instructional design and social robot interaction to better align with the needs of learners and the system's capabilities.

Conclusion

This project involved the design, development, implementation, and evaluation of a social robot-mediated instructional intervention for HF using the teach-back method. The findings from this pilot implementation suggested that the intervention was associated with short-term gains in participant knowledge of HF and the self-care behaviors required to manage

their condition. The project also helped identify areas for refinement in both instructional design and system interaction. The results represent an initial step in exploring the use of social robots to support patient education. The findings suggest that this approach may assist healthcare providers in delivering consistent, structured education that supports patient understanding and their ability to engage in self-care.

Participants responded positively to the instructional experience and demonstrated a higher level of acceptance of the technology than anticipated. Concerns related to the interaction feeling unnatural or the character being perceived as “uncanny” did not appear to significantly impact engagement or learning in this context. Completion of this project has reinforced my interest in the use of social robots for healthcare education while at the same time highlighting important areas that require further investigation. More research is needed to determine whether the short-term knowledge gains can be converted to long-term learning and sustained over time. Additionally, it will be important to assess whether increased knowledge necessarily leads to improved adherence to self-care behaviors. More work is needed to explore the role that social robots may play in supporting patient motivation and behavior change in HF management.

In summary, this project provided valuable insight into both the potential and the limitations of social robot-mediated instruction. While further development and evaluation are required, the preliminary findings are encouraging and serve as a motivator to continue to explore this approach as a tool to enhance patient education and improve comprehensive healthcare delivery.

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Appendix A

Photograph/Video/Audio Release

EMPORIA STATE
UNIVERSITY
■ UNIVERSITY PHOTOGRAPHY

I grant to Emporia State University and its legal representatives and assigns, the irrevocable and unrestricted right to use and publish video/audio recordings, and photographs of me, or in which I may be included, for editorial, trade, advertising, and any other purpose and in any manner and medium; and to alter and composite the same without restriction and without my inspection or approval. I hereby release Emporia State University and its legal representatives and assigns from all claims and liability relating to said video/audio recordings and photographs.

Name (Please Print)	Project
Signature Date	If Minor, Signature of Parent/Guardian
Address	Witness Name (Please Print)
Phone Number	Witness Signature Date

Appendix B

Participant Contact Information

Full Name Last _____ First _____ Middle Initial ____

Address _____ City _____ State _____

Telephone (_____) _____

Date of Birth _____/_____/_____

Email _____

Appendix C

Participant Demographic and Medical History Form

Participant Numeric Identifier XXXXXXXXX

Gender (circle one) Male Female Not Listed Prefer Not to Answer

What race/ethnicity best describes you?

- ○ American Indian or Alaskan Native
- ○ Asian / Pacific Islander
- ○ Black or African American
- ○ Hispanic
- ○ White / Caucasian
- ○ Multiple ethnicity/ Other (please specify)

Education

- ○ Some high school, no diploma
- ○ High school graduate, diploma or the equivalent (for example: GED)
- ○ Some college credit, no degree
- ○ Trade or technical training
- ○ Associate degree
- ○ Bachelor's degree
- ○ Master's degree
- ○ Professional degree
- ○ Doctorate degree

Have you ever received heart failure patient education?

- Yes
- No
- Unsure

How many hours of heart failure patient education from a healthcare professional have you received?

- None
- Less than one hour
- One to three hours
- Three to five hours
- Greater than five hours

Appendix D

Atlanta Heart Failure Knowledge Test

ATLANTA HEART FAILURE KNOWLEDGE TEST (AHFKT-V2)

(Correct answers are marked with an asterisk)

We have some questions about heart failure. Select one response for each question. Don't worry if you are not sure of the answers; just do the best you can.

1. Heart failure is a problem in which:

- a. There is too much blood in the body
- b. The heart is unable to pump enough blood *
- c. The blood vessels in the heart are clogged
- d. The heart skips beats

2. Which of the following statements about heart failure is TRUE?

- a. It can be cured with drugs and other treatments.
- b. A person with heart failure cannot live a normal life.
- c. Heart failure cannot be cured, but it can be controlled.*
- d. Heart failure means the heart has stopped beating.

People with heart failure can do many things to help themselves. Think about each of these activities and decide if they would be helpful for someone with heart failure.

	Yes	No
3. Avoid salty foods	*	
4. Drink lots of fluids		*
5. Stop smoking	*	
6. Drink alcoholic drinks each day to relax		*
7. Skip heart failure medicines when they feel better		*

8. Know when to call the doctor or nurse for symptoms of heart failure	*	

9. ACE inhibitors (ex. Capoten, Vasotec, Lisinopril, or Zestril) are medicines used to treat heart failure. These drugs help the heart pump stronger by:

- a. Removing extra fluid and salt from the body
- b. Causing blood vessels to get smaller
- c. Blocking the harmful effects of stress hormones*
- d. Improving blood counts (reducing anemia)

10. People who have heart failure take diuretics (Lasix, "water pills") so that:

- a. Their kidneys will make more urine and pass more water*
- b. Their heart will beat more steady
- c. The blood vessels in their body will widen or relax
- d. Their heart will pump stronger

11. People with heart failure who are taking a diuretic (“water pill”) need to:

- a. Know if they need to take extra potassium with their water pill*
- b. Take the diuretic after 3-4 pm in the day
- c. Not worry about signs and symptoms of dehydration
- d. Drink lots of water to replace lost fluid

12. If a person with heart failure gains 2-3 pounds in a few days, this usually means he/she:

- a. Is eating too many calories and gaining weight
- b. Has extra water in the body*
- c. Needs to drink more fluid
- d. Needs to be getting more exercise to burn calories

13. How often should a person with heart failure weigh themselves?

- a. Every day*
- b. Every week
- c. Every month
- d. Once in a while

14. The best time of day for persons with heart failure to weigh themselves is:

- a. At bedtime
- b. Upon awakening in the morning*
- c. At or around lunchtime
- d. When they remember to do it

15. Persons with heart failure should call their doctor if they have which of the following symptoms?

- a. Weight gain of 2-5 pounds in 1-2 days
- b. Increased swelling of the ankles and/or stomach
- c. More shortness of breath
- d. All of the above*

16. How often should a person with heart failure exercise?

- a. Every week
- b. Every day*
- c. Several times a day
- d. 2-3 times per week

17. A person with heart failure should stop and rest when doing physical activity if:

- a. They feel short of breath or winded
- b. They have chest pain or discomfort
- c. They feel dizzy or lightheaded

- d. All of the above*

18. Which is a big source of sodium (salt) in the diet?

- a. Processed foods (such as tv dinners)
- b. Smoked or cured meats
- c. Table salt
- d. All of the above*

19. Which has the LOWEST amount of sodium (salt)?

- a. Fresh fruits*
- b. Canned vegetables
- c. Reduced sodium soup
- d. Frozen dinners

20. Which food has the MOST sodium (salt)?

- a. Sliced tomato
- b. Broiled fish
- c. Baked ham*
- d. Skim milk

21. Which dessert has the LOWEST amount of sodium?

- a. Hot fudge sundae
- b. Baked apple*
- c. Low-fat instant pudding made with skim milk
- d. Chocolate cake made from a mix

22. Select the fast food with the LOWEST amount of sodium.

- a. Fried chicken

- b. Cheeseburger
- c. Baked potato with sour cream and chives*
- d. Taco salad

23. Some people with heart failure are told by their doctor to limit fluids. Which of the following count as fluids?

- a. Water and clear liquids
- b. Milk, ice cream, and yogurt
- c. Jello, pudding, and soups
- d. All of the above*

24. If a person with heart failure has a headache or pain, which would be the best medicine to take?

- a. Aspirin
- b. Tylenol (Acetaminophen)*
- c. Advil® or Motrin® (Ibuprofen)
- d. Anacin Regular Strength or Excedrin

25. The recommended total daily amount of sodium that persons with heart failure should eat is:

- a. 3,000 milligrams
- b. 2,500 milligrams
- c. 1,500 milligrams*
- d. 500 milligrams

Use the picture of the soup label to answer questions 26 and 27:

26. How many servings are in the can?

- a. 1

- b. 2
- c. 2 ½*
- d. 3

27. How much sodium is in one serving of soup?

- a. 15mg
- b. 890mg*
- c. 445mg
- d. 2225mg

28. A person with heart failure who is trying to limit their fluids may reduce symptoms of thirst by:

- a. Chewing gum or sucking hard candy*
- b. Cutting back on their medications
- c. Drinking small amounts every 30-60 minutes to prevent thirst
- d. Warming fluids before drinking

29. If a person with heart failure forgets to take their medicine, they should:

- a. Take their medicines as usual the next day
- b. Take the medicines as soon as remembered*
- c. Take double the dose the next day
- d. Call their doctor immediately

30. It is important for a person with heart failure to:

- a. Make sure they get the flu shot every year
- b. Receive the Pneumovax vaccination to prevent pneumonia

- c. See their heart failure doctor regularly
- d. All of the above*

Appendix E

Exit Interview

General Experience

Overall, how would you describe your experience interacting with the Furhat Social Robot?

(Open-ended)

On a scale of 1 to 5, how engaging did you find the Furhat Social Robot during the session?

1 = Not engaging at all

5 = Very engaging

Did you feel comfortable communicating with the robot? Why or why not? (Open-ended)

Educational Content

Do you feel that the information provided about heart failure management was clear and easy to understand?

Yes

Somewhat

No

(If "No" or "Somewhat," please explain.)

On a scale of 1 to 5, how effective was the Furhat Social Robot in teaching you about heart failure management?

1 = Not effective at all

5 = Very effective

What part of the education session did you find most helpful?

(Open-ended)

Was there any information you felt was missing or unclear during the session? (Open-ended)

Perception of the Robot

On a scale of 1 to 5, how trustworthy did you find the Furhat Social Robot?

1 = Not trustworthy at all

5 = Very trustworthy

Did the robot's tone of voice, facial expressions, and responses feel appropriate and empathetic?

Yes, always

Sometimes

No, not really

(If "Sometimes" or "No," please explain.)

How natural did the interaction with the robot feel compared to interacting with a human?

(Open-ended)

Suggestions and Overall Feedback

What improvements, if any, would you suggest for the Furhat Social Robot's interaction or teaching style?

(Open-ended)

Would you recommend this type of robot-assisted education to others with heart failure? Why or why not?

(Open-ended)

Do you have any additional comments or feedback about your experience?

(Open-ended)