Impact of Discharge Teach-Back Education on Heart Failure Patients' Knowledge/Self-Care Behaviors and 30-Day Readmissions

Statistical Analysis Plan (SAP)

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1. Introduction

This Statistical Analysis Plan (SAP) reflects the analyses that were performed for the completed project evaluating the impact of a structured discharge teach-back education intervention on heart failure self-care behaviors and 30-day heart failure-related readmissions.

2. Key Study Dates (Actual)

- Study Start Date: September 11, 2025 (Actual)
- Primary Completion Date: October 11, 2025 (Actual)
- Study Completion Date: November 10, 2025 (Actual)

3. Study Overview (as implemented)

- Design: Single-site quasi-experimental pre-test/post-test (within-subject).
- Intervention: Approximately 30-minute discharge teach-back education session.
- Measure: European Heart Failure Self-care Behavior Scale-9 (EHFScB-9).
- Follow-up: 30-day heart failure-related readmission determined via study-site electronic health record (EHR) review.
- Actual sample: N = 57 participants with complete pre- and post-intervention EHFScB-9 assessments.

4. Demographic Reporting

Due to the relatively small sample size and the potential risk of breach of confidentiality, detailed demographic data were not reported. However, all participants met the inclusion criteria and represented a clinically appropriate population for the intervention supporting the project's aim to improve transitional care and reduce readmissions.

5. Statistical Software and Significance Threshold

- Software: IBM SPSS Statistics, Version 29.0.1.0 (171).
- Statistical significance threshold: two-sided $p < 0.05$.

6. Outcomes and Scoring

6.1 EHFScB-9 Outcomes

The EHFScB-9 includes nine self-care domains/items. Pre- and post-intervention item scores were summarized. For between-group analyses, EHFScB-9 improvement was operationalized as the pre-to-post change (improvement) score.

6.2 Readmission Outcome

Thirty-day heart failure-related readmission was coded as yes/no based on study-site EHR review.

7. Analytic Methods (Performed)

- Descriptive statistics summarized pre- and post-intervention EHFScB-9 scores.
- Paired-samples t-tests evaluated pre- to post-intervention changes across all nine EHFScB-9 domains/items.
- Because the number of readmissions was extremely low (n = 1), logistic regression was not feasible.
- A Mann–Whitney U test was used to compare EHFScB-9 improvement scores between the readmitted and non-readmitted groups (exploratory; underpowered).
- Scale reliability was assessed using Cronbach's alpha (pre- and post-intervention).
- Effect sizes were calculated for the overall pre/post change using Cohen's d and Hedges' g.

8. Results Summary (Completed Study)

8.1 EHFScB-9 Pre/Post Ranges and Notable Item Improvements

Pre-intervention scores ranged from 1.65 to 4.00, indicating moderate to low engagement in heart failure self-care practices. Post-intervention scores improved substantially, ranging from 1.02 to 1.26. The most notable improvements were observed in recognizing weight gain (Q4), responding to fatigue (Q6), and daily weight monitoring (Q1), with mean differences of 2.86, 2.63, and 2.37, respectively.

8.2 Paired t-test Findings

Paired-samples t-tests confirmed statistically significant improvement in all nine self-care behaviors, with p-values < .001. The overall mean difference between pre- and post-intervention scores was 1.99, with a t-value of 16.542.

8.3 Effect Sizes

Effect size calculations supported the clinical relevance of the intervention (Cohen's d = 2.19; Hedges' g = 2.16), representing a very large effect.

8.4 Reliability

Reliability analysis demonstrated excellent internal consistency for the EHFScB-9, with Cronbach's alpha values of .902 pre-intervention and .939 post-intervention.

8.5 Readmission Outcomes and Mann–Whitney U Test (Exploratory)

Of the 57 participants, 56 (98.2 percent) were not readmitted, and 1 participant (1.8 percent) experienced a heart failure-related readmission within 30 days. To assess whether readmission status influenced self-care improvement, a Mann–Whitney U test was conducted to compare EHFScB-9 improvement scores between readmitted and non-readmitted groups. Results indicated no statistically significant difference between groups (Mann–Whitney U = 5.500; Wilcoxon W = 1601.500; Z = -1.370; Asymptotic Sig. (2-tailed) = .171; Exact Sig. [2*(1-tailed Sig.)] = .211). Interpretation is limited by the extremely low number of readmissions (n = 1), which rendered the comparison underpowered.

8.6 Descriptive Improvement Scores (Non-readmitted Group)

For the non-readmitted group, the mean improvement score was -18.52 (SD = 7.26), with a median of -20.00 and a range of 30.00.

9. Limitations Relevant to Analysis

- Between-group comparisons by readmission status were underpowered due to a single readmission event (n = 1).
- Logistic regression modeling was not feasible because of sparse events.
- Readmissions were determined via study-site EHR review; readmissions to outside facilities may not have been captured.