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Title

Development and Validation of the Care Transitions Scale for Patients with Heart Failure:

A Tool for Nurses to Assess Patients' Readiness for Hospital Discharge

Short title: Care transitions scale for heart failure

Abstract

Aim: This study aimed to develop and assess the validity and reliability of the Care

Transitions Scale for Patients with Heart Failure (CTS-HF) as a nurse-reported measure

for evaluating patients' readiness for hospital discharge.

Methods: We conducted a cross-sectional study of cardiovascular ward nurses from

163 hospitals across Japan. Structural validity was assessed using exploratory analysis

with development participants and confirmatory factor analysis with validation

participants. Convergent validity was assessed by correlation with the Discharge

Planning of Ward Nurses Scale (DPWN). Hypotheses testing for construct validity was

performed as comparisons between subgroups of transitional care practice.

Results: Valid responses were obtained from 704 nurses (development participants, n =

352; validation participants, n = 352). The final scale comprised 21 items divided into

six factors: "Clear preparation for how to manage health at home," "Adjusting to home care/support system," "Transitions of medication management from hospital to home," "Dealing with patients' concerns and questions," "Transitions of disease management from hospital to home," and "Family support." The indices of fitness supported these results (comparative fit index = 0.944, root mean square error of approximation = 0.057). The CTS-HF was significantly correlated with the DPWN. The nurses' subgroup with higher transitional care practice had higher CTS-HF scores. Cronbach's alpha was 0.93 for the CTS-HF.

Conclusions: The CTS-HF showed sufficient reliability and validity for use in evaluating discharge care. Further studies are needed regarding the usefulness of this scale in nursing practice.

INTRODUCTION

The transition of care from hospital to home is a vulnerable period for patients and may result in anxiety and disruptions in the continuity of care. This is an issue particularly for patients with heart failure and their families. Heart failure is a serious public health problem associated with significant mortality and morbidity. It affects older people, and its prevalence is increasing (Savarese & Lund, 2017). In a study of patients' experiences with heart failure, certain patients reported struggling with complex problems in the transition from hospital to home, such as uncertainty regarding symptoms management at home caused by inadequate or vague instructions, inadequate knowledge about self-care, and depressive symptoms (Grant et al., 2018; Nordfonn et al., 2019; Sevilla-Cazes et al., 2018). Thus, there is a growing interest in effective transitional care interventions for patients with heart failure.

Transitional care is defined as a set of actions designed to ensure the coordination and continuity of healthcare while patients are transferred between different locations (Coleman, 2003). Ward nurses play a pivotal role in responding to the emotional burden of treatment for patients with heart failure, and they participate in supporting discharge planning and transitional care. Ward nurses are, therefore, important figures that may reduce patients' emotional distress during the transition. To improve transitional care,

discharge support departments have been established in acute care hospitals in Japan.

Nurses working in the discharge support department play an important role in the

smooth and timely care transitions of patients with high care needs (Tomura et al.,

2011). Moreover, ward nurses also play a key role in transitional care in Japan by

coordinating multidisciplinary tasks and educating patients and also their families to

assist them at home (Miyamoto et al., 2019). However, it has been reported that it can

be difficult to practice adequate transitional care support when there is limited time in

acute care hospitals, and several obstacles are reported by nurses, such as high

workloads and shift work (Graham et al., 2013; Moriya et al., 2020). Implementation of

a new structured discharge readiness tool in clinical practice may help increase patients'

and their families' readiness for hospital discharge and reduce inadequate transitional

care. Such a scale may contribute to guaranteeing transitional care quality in nursing

settings with high workload and shift work.

      When patients are discharged from hospital with inadequate readiness for

continued care, readmissions and complications may increase (Considine et al., 2019).

Therefore, efforts have been made to improve the quality of support for discharge. To

improve discharge planning practice, scales have been developed for nurses to self-

evaluate discharge support (home transfer support), which have helped nurses

effectively. The currently used validated self-evaluation scales for discharge planning in Japan are the Discharge Planning of Ward Nurses (Sakai et al., 2016), the Discharge Planning-Process Evaluation Measurement (Chiba, 2005), and the Nurses' Discharge Planning Ability Scale (Tomura et al., 2013). These self-evaluation scales are valuable instruments. Moreover, in recent years, the use of patient-centered indicators such as "medical staff-reported assessments from patients' perspectives" and "patient-reported outcome measures" has attracted attention (Reeves et al., 2021). Thus, we consider that it would be necessary to develop a new patient-centered scale to assess patients' readiness for hospital discharge, as the aim is to assess transitional care for individual patients and not evaluate general nursing practice.

In Western settings, the same transitional care nurses provide comprehensive care from hospitalization to immediate post-discharge (Hirschman et al., 2015). On the contrary, in Japan, it is rare for the same nurse to continue to provide care post-discharge, and care is shifted to outpatients or visiting nurses (Sumikawa et al., 2022). Therefore, we consider that a patient-centered scale that can be utilized in continuous nursing is necessary. Patient-reported outcome measures have been rarely used in transitional care for older adults, as the number of older patients who can answer the questionnaires may be limited (Schick-Makaroff et al., 2021). In addition, medical staff-

reported assessments of patient-centered indicators reflect both the patients' perspective and the medical staff's assessment.

In transitional care, nurse-reported assessments of patients' readiness for hospital discharge predicted increased post-discharge anxiety, burdens, and readmission than did patient-reported assessments (Weiss et al., 2010, 2019). Consequently, we consider that a nurse-reported scale for evaluating the quality of patients' readiness for hospital discharge is necessary.

This study aimed to develop the Care Transitions Scale for Patients with Heart Failure (CTS-HF)—a patient-centered measure for nurses to assess patients' readiness for hospital discharge—and test its psychometric properties. This instrument may help ward nurses enhance continuous care for patients with heart failure from hospital to home and facilitate effective communication between patients and ward nurses regarding a common discharge plan of care and patients' individual goals and preferences.

METHODS

Design

We conducted this study in three stages comprising development and validation

procedures. First, we developed a conceptual framework and refinement procedure

using semi-structured interviews and a questionnaire process. Second, we examined the

content validity of the items in the questionnaire using content validity ratios. Finally, a

psychometric evaluation of the developed scale was conducted using a nationwide

questionnaire survey targeting cardiovascular ward nurses.

Item Pool Generation and Refinement

First, we developed the conceptual framework to measure patients' readiness for

hospital discharge through a systematic review of patient-reported scales of transitional

care and reports of patients with heart failure (Yoshimura & Sumi, 2022a, 2022b). We

reviewed 47 reports and seven different existing measures; then, we developed an initial

item pool with a conceptual framework of six categories to assess patients' readiness for

hospital discharge.

Second, we generated a range of necessary items encompassing the readiness

for hospital discharge of patients with heart failure. The first-edition item pool was

evaluated by seven expert nurses based on the COnsensus-based Standards for the

selection of health Measurement INstruments (COSMIN) methodology (Mokkink et al.,

2018). In this method, seven or more experts consider what would be a "highly

sufficient" method for the qualitative evaluation of content validity. The expert nurses

included certified nurse specialists with qualifications from the Japanese Nursing

Association, cardiovascular ward nurses, home visiting nurses, and discharge planning

nurses. They evaluated all items in terms of relevance, comprehensibility, and

comprehensiveness using a questionnaire. Regarding relevance, each item was

evaluated as "relevant," "needs to be considered," or "not relevant." In terms of

comprehensiveness, items were evaluated as "easy to understand," "hard to

understand," or "cannot understand." As for comprehensiveness, we asked if any items

should be added or changed for each category. In addition, to gain insight into the expert

nurses' transitional care experience, we conducted individual semi-structured

discussions about the item pool. Subsequently, we refined the items and generated a

second-edition item pool.

Content Validity Testing

The quantitative content validity of the second-edition item pool was assessed using the

content validity ratio (CVR) method. The expert nurses were requested to specify

whether each item was relevant on a 4-point scale from 1 to 4 (1 = "not relevant", 2 =

"somewhat relevant", 3 = "very relevant, but in need of minor sentence revisions", 4 =

"very relevant") (Haynes, 1995). The CVR was calculated using the formula below:

$$CVR = (Ne - N/2)/(N/2)$$

Ne stands for the number of experts providing scores of 3 or 4 for the item in question, and N is the total number of expert nurses. In our study, considering N was 7, if the CVR was 0.85 or higher, the item was considered acceptable. Thus, all items with a CVR of less than 0.85, as well as all duplicates, were removed. For items with a CVR of 0.85 or higher, we reviewed the wording and made minor refinements to those items with scores of three. Through the above procedure, the list was refined to 32 items, which comprised the finalized item pool.

Survey Participants

Participants were cardiovascular ward nurses who had more than two years of nursing experience (not managers) in the hospital setting. Their hospitals needed to meet the following requirements: 1) being a specialized treatment and nursing facility for patients with heart failure, and 2) having at least 15 beds dedicated to cardiovascular patients at all times. The facilities included in this study were practical training hospitals for certified nurses in chronic heart failure or advanced treatment hospitals across Japan. The minimum sample size for factor analysis was determined using the general rule for

factor analysis, where a minimum of seven to 10 times the number of items in the pool

is required (Costello & Osborne, 2005; Mokkink et al., 2010). To effectively assess the

development of the scale, the sample was divided into two groups: Group 1 comprised

development participants, and Group 2 comprised validation participants. Thus, the

required minimum sample size was 640 participants in total, since there were 32 items

in the CTS-HF.

Survey Method

A cross-sectional survey was conducted using a self-administered anonymous

questionnaire. First, we requested the cooperation of the directors of the nursing

departments in 373 hospital via mail or interview, and 163 hospitals consented to

cooperate (cooperation rate = 43.6%). The directors decided on the number of

participating nurses and distributed the provided questionnaire to them. If consent was

obtained, an explanation of the research, a questionnaire, and a reply envelope were

provided to the participants. The number of participants ranged from five to 20 at each

hospital. Participants returned their questionnaires via post. Data were collected from

February to April 2022.

Survey Questionnaire Items

The survey questionnaire comprised four parts: (a) the 32-item candidate draft of the Care Transitions Scale for Patients with Heart Failure (CTS-HF); (b) the Discharge Planning of Ward Nurses (DPWN) Scale; (c) a 15-item self-evaluation of transitional care practices for patients with heart failure; and (d) a participant characteristics questionnaire.

The CTS-HF items are rated on a four-point Likert scale (1 = "strongly disagree," 2 = "disagree," 3 = "agree," and 4 = "strongly agree"), with a fifth response being "don't know/not applicable."

The DPWN is a 24-item scale for ward nurses to self-evaluate their discharge planning practices and continuous care in Japan (Sakai et al., 2016). It consists of four subscales: "Collecting information from the patients and their families," "Decision-making support for the patients and their families," "Effective use of social resources," and "Home healthcare coaching by multidisciplinary collaboration in healthcare professionals inside and outside of the hospital." Item scores as follows: 1 = "not done at all," 2 = "not done," 3 = "not very well done," 4 = "done a little," 5 = "done," and 6 = "done well." Simple total score and total subscales scores were calculated. Cronbach's alpha for the DPWN was 0.949 in this survey.

The items in the self-evaluation of transitional care practices were scored on a five-point Likert scale: 1 = "not done," 2 = "not very well done," 3 = "done a little," 4 = "done," and 5 = "done well." We divided the respondents into two subgroups for each item: those nurses who answered "done well" or "done" were categorized as a "High transitional care practice group;" while those who answered "not done," "not very well done," or "done a little" were the "Low transitional care practice group."

Data Analysis

Data were statistically analyzed using SPSS version 26 and AMOS version 26 (IBM SPSS Japan, Tokyo, Japan). Significance level for the statistical tests was set at $p < 0.01$ (two-tailed). We analyzed the item pool using exploratory factor analysis (EFA) for determining the scale items with Group 1 participants and then used confirmatory factor analysis (CFA) to validate the EFA-derived factor solution with the participants from Group 2. Additionally, convergent validity, hypotheses testing for construct validity, and reliability were assessed for validation with Group 2. Details of these analyses are provided below.

Participants' characteristics and the items of the CTS-HF were examined using standard frequency analysis and descriptive statistics, namely the mean and standard

deviation (SD). To identify items for possible exclusion, we evaluated ceiling and floor effects of the CTS-HF. To assess structural validity, we used EFA with the maximum likelihood method and promax rotation to explore the factor structure of the CTS-HF. The number of factors was determined based on the number of eigenvalues greater than 1.0. Items were further eliminated when factor loadings were less than 0.5. Based on the results of the EFA, we performed CFA using the maximum likelihood method to obtain the structural equation model. The results of the CFA were evaluated using the chi-square divided by degree of freedom (CMIN/DF), comparative fit index (CFI), Bollen's incremental fit index (IFI), and root mean square error of approximation (RMSEA).

Convergent validity was evaluated using Pearson's correlation between the CTS-HF and DPWN overall and subscales scores. The correlation coefficient values with the total score were higher than 0.40, and statistical significance ($p < 0.01$) was expected, since we referred to the guidelines for correlations with instruments measuring relevant but dissimilar constructs (Prinsen et al., 2018).

Construct validity was examined by considering whether the CTS-HF scores differed between nurses who were categorized into the high and low transitional care practice groups. We conducted two-sample t-tests to examine this hypothesis regarding construct validity.

Finally, CTS-HF reliability was verified by assessing internal consistency using Cronbach's alpha and the split-half method (Spearman-Brown's formula) for the whole scale and each factor. In addition, we also analyzed item-remainder correlations (Pearson's correlation coefficient).

Ethical Considerations

All participants were provided written information regarding the purpose and methods of this study, burden of answers, protection of anonymity, voluntary participation, and how the results of this study would not be used for anything other than research. Participants were informed that they were free to drop out, and findings would be presented as a paper at conferences. Returning the completed questionnaire was considered as providing consent. The survey and study were approved by the Ethics Committee of the the Department of Health Sciences, Hokkaido University (approval number: 21-69-1).

RESULTS

In total, 1,873 questionnaires were distributed, and 706 were returned (response rate of 37.7%). Two returned questionnaires had at least 15% of the items missing, and these

were excluded from the analysis. As a result, 704 questionnaires were analyzed (valid

response rate of 37.6%). Missing values on the DPWN were supplemented by the

average rank of each item, since the DPWN score is a simple total score (IBM

Corporation, 2021). The percentage of missing values had ranges of 0.0%–0.6% in the

item pool of CTS-HF, 0.0%–0.4% in the DPWN, and 0.0%–1.8 % in the items of the

self-evaluation of transitional care practices.

Table 1 shows participants' characteristics. The characteristics of the

participants were not significantly different between Group 1 and Group 2. The average

age was 35.8 years (SD 9.2) for Group 1 and 34.9 years (SD 8.6) for Group 2, with the

latter having an average of 12.0 years (SD 7.8) of nursing experience and 6.8 years (SD

5.2) of cardiac nursing experience.

Item Analysis and Item Selection

Table 2 shows the results of the item analysis for the 32-item CTS-HF. The mean

individual item scores ranged from 2.73 to 3.44 and SDs ranged from 0.56 to 0.76 in

Group 1. Ceiling effects were detected in two items (item 1: Review of home healthcare

experience which patients had before hospitalization, and item 11: Information

regarding contacts for emergency and deconditioning). We excluded items 1 and 11

from the EFA.

An EFA was conducted on 30 items, as shown in Table 3. Based on the number of eigenvalues greater than 1.0, a six-factor structure provided a reasonable solution explaining 58.3% of the total variance. The eigenvalues for the factors were 12.78, 2.04, 1.47, 1.39, 1.14, 1.080, and 0.899, in order.

We considered the convenience, usability, and relevance of items in transitional care practice, and items with a loading value of ≥0.5 were retained. Thus, nine items (2, 3, 4, 7, 12, 16, 21, 29, and 30) were removed due to their factor loading being <0.5. Based on the above results, the final version of the CTS-HF had 21 items and a six-factor structure.

We named Factor 1 "Clear preparation for how to manage health at home," and this contained five items (5, 6, 8, 9, and 10) related to self-care at home. Factor 2 was labeled "Adjusting to home care/support system," which included four items (22–25) related to social support at home. Factor 3 was "Transitions of medication management from hospital to home," and this contained four items (17–20) regarding the continuation of medication management. Factor 4 was labeled "Dealing with patients' concerns and questions," which included three items (26–28). Factor 5 was "Transitions of disease management from hospital to home," which included three items (13–15)

about methods of disease management. Factor 6 was "Family support," which included

two items (31–32).

Structural Validity

Figure 1 shows the goodness-of-fit indicators for the final CTS-HF model with Group 2.

The CFA showed the following values: CFI = 0.944, IFI = 0.945, RMSEA = 0.057, and

CMIN/DF = 2.16. The standardized factor loadings varied as follows: between 0.51 and

0.88 for each item of each of the six factors, and between 0.45 and 0.70 for the

correlation coefficients between factors.

Reliability

Cronbach's alpha for the total CTS-HF was 0.930, and as follows for the subscales:

0.846 for Factor 1, 0.849 for Factor 2, 0.759 for Factor 3, 0.874 Factor 4, 0.791 for

Factor 5, and 0.869 for Factor 6.

Spearman-Brown coefficient (split-half reliabilities) for the total CTS-HF was

0.865 and as follows for the subscales: Factor 1, 0.795; Factor 2, 0.846; Factor 3, 0.794;

Factor 4, 0.869; Factor 5, 0.718; and Factor 6, 0.871.

The lowest item-remainder correlation was for item 17 ("Understanding of any

changes in medication"), which was 0.489 (p < 0.001). For all items except item 17, the item-remainder correlation was higher than 0.5 (p < 0.001). Correlations for each subscale were as follows: Factor 1, from 0.551 to 0.647; Factor 2, from 0.557 to 0.622; Factor 3, from 0.489 to 0.609; Factor 4, from 0.586 to 0.679; Factor 5, from 0.519 to 0.626; and Factor 6, from 0.604 to 0.623.

Scoring

Given the fit of the CFA model and Cronbach's alpha, the 21 items of the CTS-HF scoring involved calculating simple mean scores (1–4) on answered items, which were then converted with a linear transformation to a 0–100 scale. For calculating simple mean scores, the summarized score (excluding the response of "don't know/not applicable") was divided by the number of answered items. The conversion with a linear transformation to a 0–100 scale is as follows: [(Mean score - 1)/3]*100. Higher scores denoted a better readiness for hospital discharge. The reason for this scoring was that some items, such as the utilization of social resources or family support, did not apply to certain patients—referring to previous scales (Coleman et al., 2005). The mean score of the CTS-HF was 70.17, the median was 68.25, and the SD was 13.11 in Group 2. The minimum score was 14.29 and the maximum was 100. The mean score was 74.27 (SD =

16.62) for Factor 1, 70.19 (SD = 17.53) for Factor 2, 65.02 (SD =15.89) for Factor 3,

67.85 (SD = 15.59) for Factor 4, 74.07 (SD = 17.92) for Factor 5, and 65.75 (SD =

22.35) for Factor 6 in Group 2.

Convergent and Construct Validity

Table 4 shows the results of convergent validity testing. Convergent validity was

evaluated by examining how well the total CTS-HF total score and factor scores

correlated with the DPWN Scale's total score and subscale scores. Pearson's correlation

coefficient for the total scores was 0.527 ($p < 0.001$).

Table 5 shows the results of the hypothesis testing for construct validity as

comparisons between subgroups of transitional care practice. The high transitional care

practice group showed a significantly higher CTS-HF score on all variables (two-

sample t-test: $p < 0.001$).

DISCUSSION

Inadequate transitional care is one of the causes of hospital readmission, and adequate

readiness for hospital discharge is associated with the success of management

interventions for patients with heart failure (Albert, 2016; Vedel & Khanassov, 2015).

Developing a structured scale of patients' readiness for hospital discharge to transitional

care practices may contribute to stable home care and quality of life for patients with

heart failure. The implementation of a scale to share patient readiness for discharge

among the nursing team can help to enhance transitional care particularly in settings

characterized by shift work and high workload. In addition, a numerical evaluation of

discharge readiness by nurses is useful for care evaluation at the ward management

level. The validated scale can be used as a tool to verify the effectiveness of transitional

care intervention studies or nursing management. To our knowledge, the CTS-HF is the

first scale to assess discharge readiness in patients with heart failure in Japan.

In this study, we developed a six-factor, 21-item CTS-HF as a nurse-reported

scale to assess patients' readiness for hospital discharge. First, the initial item pool of

the CTS-HF was developed based on a literature review and two rounds of discussions

with seven expert nurses. This item pool was then assessed using the CVR. Through

these development processes, the content validity of the CTS-HF was confirmed.

Second, we explored the structure of the CTS-HF with a sample of 352 nurses (Group

1) and then evaluated the reliability and validity of the obtained scale with a further

sample of 352 participants (Group 2). Our results confirmed that the final CTS-HF is a

reliable and valid scale and can be used to accurately assess the readiness for hospital

discharge of Japanese patients with heart failure.

Structural Validity

A structure of six factors and 21 items was identified through EFA in the development

participant group (Group 1). The cumulative proportion of variance explained was

58.28%, and exceeding 50% is considered a moderate contribution (Williams et al.,

2010). Therefore, the CTS-HF adequately explained the concepts required for readiness

for hospital discharge for patients with heart failure, and factorial validity was

acceptable. On the other hand, we considered that the remaining approximately 42% of

variance could be explained by the individuation of patients. Patients with heart failure

are frequently readmitted, and we considered that the variance that cannot be explained

by common factors may be due to patients' care transition experiences, preferences, or

involvement of reliable medical staff who can be consulted after discharge.

Regarding structural validity, we conducted a goodness-of-fit analysis, with

CFI = 0.944, IFI = 0.945, and RMSEA = 0.057 among the validation participants

(Group 2). These fit indices almost satisfied the standard criteria for good measurement

properties (CFI and IFI > 0.95, RMSEA < 0.06) and were also well out of the range of

cut-off values for bad fit (CFI and IFI < 0.9, RMSEA > 0.1).

Some items of the CTS-HF factors were similar to existing scales of transitional care and heart failure scales. Items in Factor 1 ("Clear preparation for how to manage health at home"), which included nutrition management (Item 8), discussions about what patients can do to decrease their risk of worsening heart failure (Item 9), and exercise procedures (Item 10), all overlapped with the Japanese version of the European Heart Failure Self-Care Behavior Scale (Kato et al., 2008). On the other hand, item 5 (review of heart failure self-management at home) and item 6 (goal-sharing to prevent worsening heart failure at home) were new items of preparation for discharge according to the individuality of the patient.

Factor 2 ("Adjusting to home care/support system") included elements similar to existing discharge support scales, such as the DPWN, Discharge Planning-Process Evaluation Measurement, and Nurses' Discharge Planning Ability Scale (Chiba, 2005; Sakai et al., 2016; Tomura et al., 2013). A novel element introduced in Factor 2 of the CTS-HF was shared decision-making of home care and social resources (item 23). Patient participation is an important element in discharge planning, and shared decision-making is also vital in the care of patients with heart failure (Hamel et al., 2018; Schjødt et al., 2022).

Factor 3 ("Transitions of medication management from hospital to home") is

one important component in the quality assessment of transitional care (Coleman et al., 2005; Graumlich et al., 2008). A new element regarding medication management of the CTS-HF was medication adherence. The items in existing scales refer to understanding the purpose and side effects of all medications and understanding how to use each medication. On the other hand, the medication items of the CTS-HF are different, as the CTS-HF targets patients with heart failure who are generally older adults. Medication adherence has a relationship with quality of life among patients with heart failure (Silavanich et al., 2019); therefore, items 17 (Understanding changes in medicine) and 18 (Understanding of risks of medication self-interruption) were included in consideration of the characteristics of heart failure treatment.

Factor 4 ("Dealing with patients' concerns and questions") was a new component, not found in existing self-assessment discharge planning scales. Discussions between nurses and patients regarding patients' concerns are critical, as poor communication can be a factor contributing to the risk of patient readmission (Stephens et al., 2013). In addition, providing psychological support and assessments of depressive symptoms is necessary to prevent readmission in patients with heart failure (Kato et al., 2009).

Factor 5 ("Transitions of disease management from hospital to home") include

item 13 (Choice of health management tool), item 14 (Methods of symptom monitoring

at home), and item 15 (Medication management at home). These items overlap with

important aspects in disease management for patients with heart failure, which include

symptom monitoring, self-care, and pharmacological treatments (Moertl et al., 2017). It

is an effective practice to select and utilize educational and health records tools that are

suitable for each patient. Factor 5 indicates how it is necessary to assess the continuity

of disease management from the hospital to patients' homes.

Factor 6 ("Family support") is a novel component in the CTS-HF. Family

support is a key component of effective transitional care, as is also family engagement.

Therefore, assessing family preferences, needs, and capabilities is vital (Naylor et al.,

2017).

Consequently, the CTS-HF contains both common and novel components in

relation to existing scales, and it may be a comprehensive tool for measuring readiness

for hospital discharge in patients with heart failure.

Convergent Validity

As expected in relation with convergent validity, the total score of the CTS-HF was

positively moderately correlated with the DPWN's total score (r = 0.527). The weak

correlation between the DPWN's total score and CTS-HF Factor 4 and Factor 6 may be because these factors are new items that were not measured in previous self-evaluated discharge planning scales. The reason why Factor 3 had a weak correlation with the DPWN total score may have been that items in Factor 3 were most specialized for patients with heart failure. Factor 3 is concerned with medication management and adherence being important in supporting the transition period of patients with heart failure (Ekman et al., 2017). The weak correlation between the CTS-HF total score and the DPWN subscale was caused by the factor "Effective use of social resources." The reason for this weak correlation was that the DPWN includes items related to the medical and long-term care insurance systems, while the CTS-HF includes items geared toward sharing decisions regarding home support and medical treatment. In addition, there was a weak correlation with the DPWN subscale "Collecting information from the patients and their families," as the CTS-HF is a measure of readiness for hospital discharge. There were moderate correlations between the CTS-HF and the DPWN in other subscales than those mentioned above. Taken together, these findings suggest that the convergent validity was verified.

Hypotheses Testing for Construct Validity

A comparison group analysis was conducted to assess construct validity. The CTS-HF score was significantly higher in the high versus low practice transitional care group. The number of nurses with high practice scores was small for items such as "interprofessional collaboration across various organizations or care facilities" and "utilization of long-term care insurance or welfare care system." This is consistent with the results of previous studies (Sakai et al., 2016), and ward nurses may ask for discharge planning nurses to adjust social resources. In addition, the number of nurses with high practice scores for "family support" was small, as family caregivers may be unable to visit patients during hospitalization, and thus, ward nurses may not fully understand patients' family status (Sumikawa & Yamamoto-Mitani, 2021). Nevertheless, the CTS-HF scores were significantly lower among participants who reported low transitional practice on all variables. The above results suggest that the CTS-HF is valid.

Reliability

The CTS-HF showed an overall value of Cronbach's alpha of 0.93 and Spearman-Brown coefficient of 0.865, which suggested that internal consistency was sufficient (Cortina, 1993; de Vet et al., 2017; Prinsen et al., 2018). Cronbach's alpha and

Spearman-Brown coefficient for each factor was ≥ 0.7; thus, the CTS-HF was found to

be reliable.

The range of criteria for item-remainder correlations was from 0.3 to 0.7

(Streiner et al., 2015). All CTS-HF items met the criteria, suggesting that the CTS-HF is

reliable. In addition, all items were necessary in the scale, as the item-remainder

correlation was not greater than 0.7.

Implications for transitional care practice

This study provides ward nurses with a validated CTS-HF that assesses patients'

readiness for hospital discharge and supports patients with heart failure in transitional

care practice. The needed nursing components for effective transitional care are

"promote patient engagement of transitional care," "identification of priorities for

transitional care," and "interprofessional communication" (Betz et al., 2021). First,

implementation of CTS-HF can help ward nurses facilitate patient engagement and

patient-centered care, as this scale may contribute to ensuring communication

opportunities between patients and ward nurses.

Second, the validated scale developed in conjunction with ward nurse practice

informs identification of home care priorities. This scale should be addressed before

discharge to better prepare for management of heart failure and care continuity.

Third, using a validated tool can strengthen communication between nurses about readiness for hospital discharge, because ward nurses face the challenge of working in quickly changing situations.

Additionally, an ideal CTS-HF should not only be developed using rigorous psychometric methods, it must also possess items that are meaningful to transitional care practice.The CTS-HF items were developed by surveys of expert nurses and ward nurses, and its content validity was confirmed. From the above, a validated tool that captures the essential components of successful care transitions may be contribute to transitional care practice.

Limitations

This study had some limitations. First, the response rate of the survey was relatively low (valid response rate 37.6%). However, we aimed to collect data representative of ward nurses caring for patients with heart failure in acute care hospital settings and invited the participants from practical training hospitals for certified nurses in chronic heart failure nursing or advanced treatment hospitals across Japan.

Second, we could not conduct a preliminary survey. Thus, did not assess the

tendency of responses to the question items before the main survey. However, we conducted a pre-test with several registered nurses and made efforts to improve the ease of answering and understanding the questionnaire items in the main survey.

Third, we considered the validity and reliability of the CTS-HF based only on data from nurses in this study; thus, we could not verify the predictive validity and inter-rater reliability. Further research is needed to confirm the predictive validity and reliability between evaluators. Thus, future studies should include both the nurse-reported CTS-HF and patients' evaluation of transitional care, issues, and anxieties immediately after discharge. In addition, further studies are needed regarding the applicability, effectiveness, and inter-rater agreement of the CTS-HF in nursing practice.

CONCLUSION

The CTS-HF is a scale for ward nurses to assess readiness for hospital discharge among patients with heart failure. This study showed that the CTS-HF has demonstrated acceptable validity and reliability in this initial evaluation. This tool can thus be used to evaluate the effectiveness of transitional care before hospital discharge. The CTS-HF is expected to contribute to enhance transitional care and continuity of care for patients with heart failure. Ward nurses may use the CTS-HF not only to assist them in

prioritizing readiness for hospital discharge but also to facilitate discussions with patients and family caregivers and foster shared decision-making processes regarding patients' transitional care. More studies are needed to examine the clinical usefulness of the CTS-HF.

Acknowledgments

Disclosure statement

The authors declare no conflict of interests.

Author contributions

Mai Yoshimura, Masumi Kawamura, Satoko Hasegawa, Yoichi M. Ito, Keita Takahashi, and Naomi Sumi contributed to the conception and design of this study, carried out the analysis, drafted the manuscript, and approved the final manuscript.

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Figure Legend

Figure 1: Confirmatory Factor Analysis of the Care Transitions Scale for Patients with Heart Failure (Validation participants (Group 2), n = 352).

Abbreviations: CFI: comparative fit index; IFI: Bollen's incremental fit index; RMSEA: root mean square error of approximation; Factor 1: Clear preparation for how to manage health at home; Factor 2: Adjusting to home care/support system, Factor 3: Transitions of medication management from hospital to home; Factor 4: Dealing with patients' concerns and questions; Factor 5: Transitions of disease management from hospital to home; Factor 6: Family support.
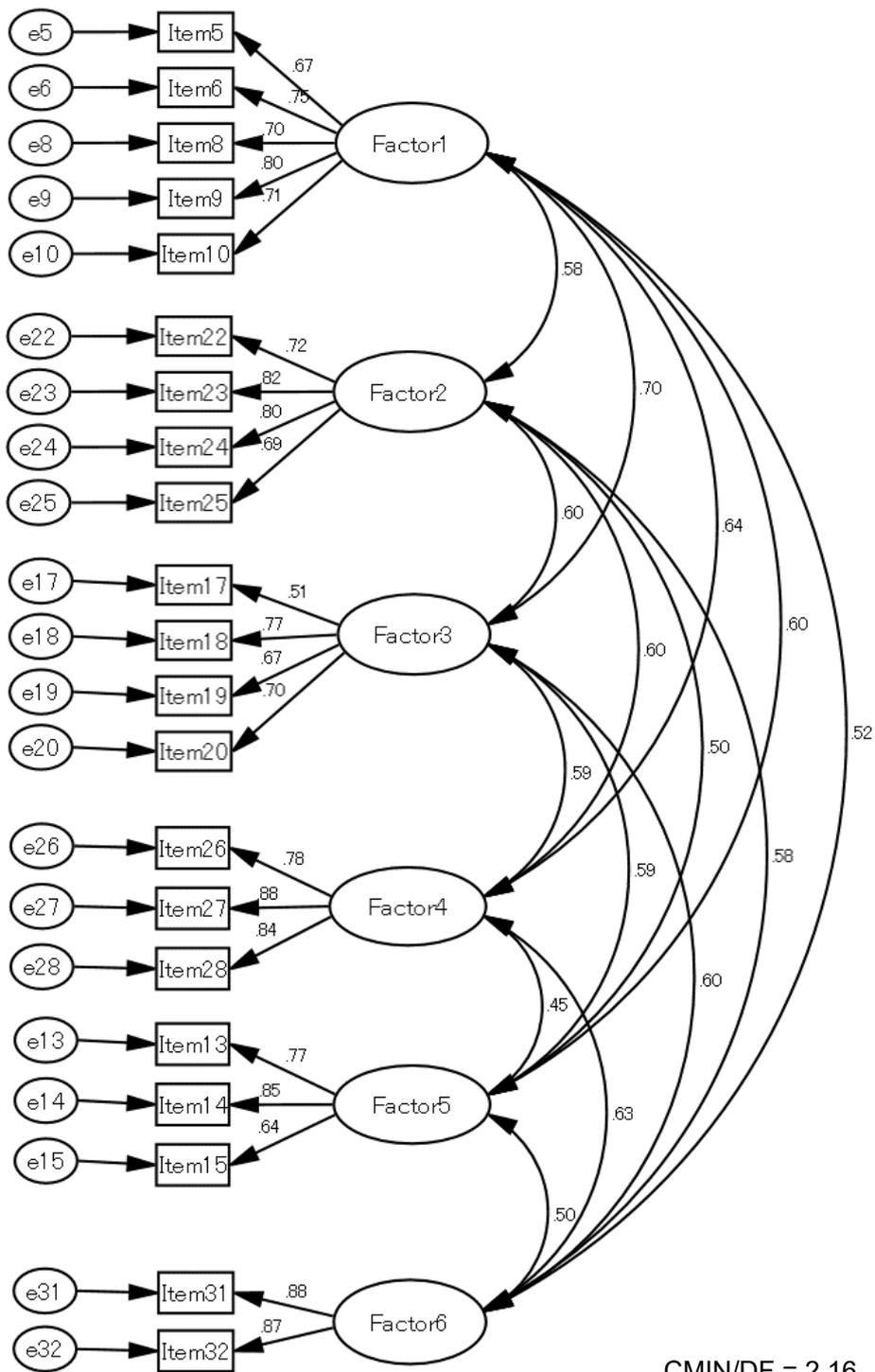
Figure 1

Table 1. Participant characteristics

Characteristics	Development participants Group 1 (N = 352)		Validation participants Group 2 (N = 352)		p value
	n (mean ± SD)	% (range)	n (mean ± SD)	% (range)	
Age (years old)†	(35.8 ± 9.2)	(22–59)	(34.9± 8.6)	(22–58)	0.182
20–29	119	33.8	122	34.7	
30–39	98	27.8	133	32.1	
40–49	104	29.5	90	25.6	
50–59	31	8.8	21	6.0	
Missing	0	0	6	1.7	
Gender‡					
Female	315	89.5	310	88.1	0.479
Male	36	10.2	42	11.9	
Missing	1	0.3	0	0	
Years of experience as a nurse†	(13.1 ± 8.3)	(2–40)	(12.0 ± 7.8)	(2–37)	0.076
2–5 years	85	24.1	89	25.3	
6–10 years	84	23.9	91	25.9	
11–20 years	113	32.1	113	32.1	
21–40 years	70	19.9	58	16.5	
Missing	0	0	1	0.3	
Years of experience as a cardiac nurse †	(7.3 ± 5.9)	(0–29)	(6.8 ± 5.2)	(0–26)	0.180
0–5 years	175	49.7	184	52.3	
6–10 years	100	28.4	99	28.1	
11–15 years	36	102	41	11.6	
16–29 years	39	11.1	25	7.1	
Missing	2	0.6	3	0.9	
Experience as an outpatient nurse	63	17.9	35	9.9	
(in years)†	(3.8 ± 4.4)		(4.4 ± 5.5)		0.178
Experience of working in a discharge support center	11	3.1	11	3.1	
(in years)†	(3.7 ± 1.9)		(3.0 ± 2.5)		0.806
Experience of home-visit nursing ‡	21	6.0	16	4.5	0.403

(Continued)	Development participants Group 1 (N = 352)		Validation participants Group 2 (N = 352)		p value
	n	%	n	%	
Experience of participating in a study program related to discharge planning‡	111	31.5	96	27.3	0.214
Experience of caring for family ‡	83	23.6	76	21.6	0.528
Experience of interprofessional collaboration with staff from the discharge support center ‡					0.461
Yes	286	81.3	286	81.3	
No	56	15.9	49	13.9	
There is no such center in the hospital	9	2.6	14	4.0	
Missing	1	0.3	3	0.9	
Specialist qualification‡					0.883
Certified nurse	21	6.0	23	6.5	
Qualification in the hospital	9	2.6	9	2.6	
Care manager	7	2.0	4	1.1	
Certified heart failure educator of Japan	3	0.9	5	1.4	
Other	2	0.6	1	0.3	
Missing	17	4.8	22	6.3	
Education‡					0.492
Technical school	232	65.9	242	68.8	
University	86	24.4	86	24.4	
Junior college	30	8.5	20	5.7	
Graduate school	3	0.9	2	0.6	
Missing	1	0.3	2	0.6	

SD, standard deviation.

Certified nurse: public qualification of Japanese Nursing Association. Care manager: public qualification of Long-term Care Insurance services in Japan. Certified heart failure educator of Japan: public qualification of the Japanese circulation society.

† Two-sample t-test. ‡ Pearson's chi-square test.

Table 2. CTS-HF item pool, means, standard deviations, and response frequencies (Development participants (Group 1), N = 352)

	Item pool	Mean	SD	Floor effect	Ceiling effect	Min	Max		Strongly Disagree	Disagree	Agree	Strongly Agree	Not Applicable/ Don't know	Missing
									Frequencies					
1	Patient reviewed the living conditions (lifestyle, patient values, living environment, etc.) that they had prior to hospitalization with the nurses.	3.42	0.58	2.84	4.00	1	4	n	1	13	172	158	6	2
								%	0.3	3.7	48.9	44.9	1.7	0.6
2	Patient was sufficiently informed about their health condition (symptoms, condition of heart failure, etc.) and test results by healthcare professionals.	3.28	0.64	2.64	3.92	1	4	n	3	26	191	130	2	0
								%	0.9	7.4	54.3	36.9	0.6	0.0
3	Patient shared their preferences (how they wish to spend time at home, what they wish to do after discharge, where they want to stay to receive care, which treatments they do not want, etc.) with healthcare professionals.	3.20	0.69	2.51	3.89	1	4	n	3	45	180	120	4	0
								%	0.9	12.8	51.1	34.1	1.1	0.0
4	Patient discussed the prospects of the care and treatment after discharge with healthcare professionals and made a decision together.	3.06	0.67	2.39	3.73	1	4	n	3	59	199	85	6	0
								%	0.9	16.8	56.5	24.1	1.7	0.0
5	Patient reviewed past self-management for heart failure symptoms and worsening heart failure with nurses.	3.27	0.68	2.59	3.95	1	4	n	2	40	168	138	4	0
								%	0.6	11.4	47.7	39.2	1.1	0.0
6	Patient shared practicable self-management actions at home to prevent worsening the heart failure condition with nurses.	3.40	0.59	2.81	3.99	1	4	n	1	16	175	158	2	0
								%	0.3	4.5	49.7	44.9	0.6	0.0
7	Patient believes they can practice health management activities after discharge that were introduced during hospitalization.	2.97	0.65	2.32	3.62	1	4	n	1	74	199	66	10	2
								%	0.3	21.0	56.5	18.8	2.8	0.6
8	Patient reviewed the diet with healthcare professionals (daily fluid intake, nutrition balance, how to reduce salt intake, etc.).	3.26	0.62	2.64	3.88	1	4	n	3	23	201	121	4	0
								%	0.9	6.5	57.1	34.4	1.1	0.0
9	Patient discussed what they can do to decrease the risk of worsening the heart failure condition in their daily lives (timing of rest, lower levels of exertion, etc.) with healthcare professionals.	3.25	0.62	2.63	3.87	1	4	n	1	31	198	119	3	0
								%	0.3	8.8	56.3	33.8	0.9	0.0
10	Patient discussed the exercise procedures with healthcare professionals and made a decision together.	3.10	0.68	2.42	3.87	1	4	n	3	54	195	95	4	1
								%	0.9	15.3	55.4	27.0	1.1	0.3
11	Patient knows how to contact medical facilities when they are in an emergency or deconditioning.	3.44	0.58	2.86	4.02	1	4	n	1	12	165	167	7	0
								%	0.3	3.4	46.9	47.4	2.0	0.0

	Item pool	Mean	SD	Floor effect	Ceiling effect	Min	Max		Strongly Disagree	Disagree	Agree	Strongly Agree	Not Applicable/ Don't know	Missing
														Frequencies
12	Patient understands what signs and symptoms need to be observed (heart failure symptoms, dehydration, etc.).	3.22	0.59	2.63	3.81	1	4	n	1	28	211	108	4	0
								%	0.3	8.0	59.9	30.7	1.1	0.0
13	Patient has chosen a useful health management tool (heart failure daily diary, leaflet, application, etc.).	3.26	0.69	2.57	3.95	1	4	n	3	39	170	133	7	0
								%	0.9	11.1	48.3	37.8	2.0	0.0
14	There was decision-making for patients to observe heart failure symptoms and signs contentiously at home (using the heart failure daily diary, introducing home nursing or telemonitoring).	3.28	0.65	2.63	3.93	1	4	n	2	32	177	133	7	1
								%	0.6	9.3	51.5	38.7	2.0	0.3
15	Patient discussed detailed procedures of self-management of medication at home with healthcare professionals and made a decision (one-dose package of medicine, using a calendar, checking with family or visiting nurses, using visiting medical management systems, etc.).	3.31	0.63	2.68	3.94	1	4	n	2	26	180	136	6	2
								%	0.6	7.4	51.1	38.6	1.7	0.6
16	The procedure of post-discharge medication management has been transferred to a healthcare supporter (family, visiting nurses, caregivers).	3.29	0.65	2.64	3.94	1	4	n	2	31	179	135	4	1
								%	0.6	8.8	50.9	38.4	1.1	0.3
17	Patient is well aware of any changes in medication during hospitalization, such as dose changes and type changes of medication.	2.73	0.64	2.05	3.41	1	4	n	9	110	186	36	11	0
								%	2.6	31.3	52.8	10.2	3.1	0.0
18	Patient is well aware of the risks of medication self-interruption and how it leads to worsened symptoms.	3.12	0.64	2.48	3.76	1	4	n	3	44	207	91	7	0
								%	0.9	12.5	58.8	25.9	2.0	0.0
19	Patient is well aware of the proper way to use required medication (per-request medication).	2.87	0.66	2.21	3.53	1	4	n	5	82	202	49	13	1
								%	1.4	23.3	57.4	13.9	3.7	0.3
20	Patient understands the need for regular hospital visits.	3.31	0.58	2.73	3.89	1	4	n	1	19	199	129	4	0
								%	0.3	5.4	56.5	36.6	1.1	0.0
21	Patient checked with nurses about how to go to the hospital.	2.96	0.76	2.20	3.72	1	4	n	8	82	170	84	8	0
								%	2.3	23.3	48.3	23.9	2.3	0.0
22	Patient proposed tailored arrangements to manage medical treatment at home (home oxygen therapy, injection, suction, tube feeding, etc.)	3.11	0.68	2.43	3.79	1	4	n	6	44	195	95	12	0
								%	1.7	12.5	55.4	27.0	3.4	0.0
23	Patient discussed the future use of services at home and social resources after discharge with healthcare professionals and decided during hospitalization.	3.30	0.62	2.68	3.92	2	4	n	0	29	184	134	5	0
								%	0.0	8.2	52.3	38.1	1.4	0.0
24	Patient was informed about the way to arrange medical supplies, medication, and care supplies.	3.06	0.69	2.37	3.93	1	4	n	5	55	189	84	19	0
								%	1.4	15.6	53.7	23.9	5.4	0.0

(Continued)

(Continued)

	Item pool	Mean	SD	Floor effect	Ceiling effect	Min	Max	Frequencies	Strongly Disagree	Disagree	Agree	Strongly Agree	Not Applicable/ Don't know	Missing
25	Information about care and treatment was handed over to healthcare professionals who are in charge of patient's care after discharge (discharge planning conference, information handover to outpatient center or visiting nurses, etc.).	3.29	0.64	2.65	3.93	1	4	n	1	31	180	134	6	0
								%	0.3	8.8	51.1	38.1	1.7	0.0
26	Patient checked the questions and concerns related to disease with healthcare professionals.	3.11	0.57	2.54	3.68	2	4	n	0	40	230	78	4	0
								%	0.0	11.4	65.3	22.2	1.1	0.0
27	Patient discussed their thoughts and worries about needing further support from home healthcare services with nurses.	3.16	0.56	2.60	3.72	2	4	n	0	31	230	88	3	0
								%	0.0	8.8	65.3	25.0	0.9	0.0
28	Patient discussed "what to do" for their worries related to disease and home healthcare with health care professionals.	3.10	0.60	2.50	3.70	1	4	n	1	43	223	79	6	0
								%	0.3	12.2	63.4	22.4	1.7	0.0
29	Patient has people who they can talk to about their worries: families, friends, peer supporters, healthcare professionals, etc.	2.98	0.60	2.38	3.58	1	4	n	2	58	222	55	15	0
								%	0.6	16.5	63.1	15.6	4.3	0.0
30	Patient shared information about circumstances regarding their support system and relationships with family members with nurses.	3.18	0.60	2.58	3.78	1	4	n	2	31	216	99	4	0
								%	0.6	8.8	61.4	28.1	1.1	0.0
31	Family members shared their expectations and preferences of care and treatment with healthcare professionals.	3.06	0.65	2.41	3.71	1	4	n	4	52	210	79	7	0
								%	1.1	14.8	59.7	22.4	2.0	0.0
32	Family members had a consultation about what to do about their worries or care burdens with healthcare professionals.	3.00	0.66	2.34	3.66	1	4	n	5	59	212	70	6	0
								%	1.4	16.8	60.2	19.9	1.7	00

CTS-HF, Care Transitions Scale for Patients with Heart Failure. SD, standard deviation.

4-point Likert scale (Strongly Disagree = 1, Disagree = 2, Agree = 3, and Strongly Agree = 4), with a fifth response being "Don't know/Not applicable."

Table 3. Results of the exploratory factor analysis (Development participants (Group 1), N =352)

Factor name/Items		Factor loadings					
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Factor 1. Clear preparation for how to manage health at home							
9:	Discussions about what they can improve to decrease the risk of worsening heart failure (timing of rest, lower levels of exertion, etc.)	0.870	0.057	0.132	0.021	-0.140	-0.116
6:	Goal-sharing to prevent worsening heart failure condition at home	0.827	0.024	-0.166	0.057	0.134	-0.103
8:	Nutrition management	0.704	0.016	0.024	0.013	0.000	-0.020
5:	Review of heart failure self-management at home	0.690	-0.015	-0.185	0.016	0.220	-0.023
10:	Exercise procedures	0.648	0.024	0.166	-0.099	-0.093	0.109
	(Removed items: 7, 4, 2, and 3)						
7:	Confidence in health management at home	0.451	-0.091	0.423	0.076	-0.186	0.020
4:	Decision of care and treatment after discharge	0.412	0.020	-0.068	-0.051	0.191	0.189
2:	Information on health conditions	0.407	-0.047	0.068	-0.025	0.073	0.085
3:	Preference for treatment, home health care, and livelihood	0.381	-0.045	-0.077	-0.074	0.199	0.285
Factor 2. Adjusting to home care/support system							
23:	Decision of using services at home and social resources	0.091	0.923	-0.133	0.003	-0.041	0.006
25:	Handover of care and treatment (discharge planning conference and information transfer)	-0.070	0.742	0.032	0.113	0.171	-0.133
22:	Arrangement of medical treatment that is practicable at home	-0.106	0.736	0.093	-0.089	-0.017	0.115
24:	Information on medical supplies, medication, and care supplies	0.122	0.721	0.078	0.097	-0.167	-0.035
Factor 3. Transitions of medication management from hospital to home							
17:	Understanding of any changes in medication	-0.086	-0.019	0.810	-0.097	-0.014	0.085
18:	Understanding the risks of medication self-interruption	-0.019	-0.036	0.716	0.067	0.160	-0.122
19:	Understanding the way to use as-needed medication	0.024	0.130	0.673	0.012	-0.083	0.024
20:	Understanding the need for regular hospital visits	0.002	0.036	0.559	0.079	0.251	-0.069
	(Removed items: 21 and 12)						
21:	How to/could go to the hospital	-0.021	0.207	0.460	0.042	0.048	0.009
12:	Understanding the warnings of heart failure signs and symptoms	0.203	-0.119	0.368	0.083	0.278	-0.005
Factor 4. Dealing with patients' concerns and questions							
27:	Concerns and support needs after discharge	0.023	0.084	-0.079	0.823	0.063	0.018
28:	Addressing concerns related to disease and livelihood	-0.067	0.058	-0.017	0.753	0.046	0.143
26:	Concerns and questions about disease	0.074	-0.014	0.053	0.709	-0.065	0.013
	(Removed items: 29)						
29:	Presence of people they can rely on	-0.074	-0.119	0.185	0.450	0.162	0.163
Factor 5. Transitions of disease management from hospital to home							
13:	Choice of health management tools	0.104	-0.083	0.025	0.103	0.757	-0.176
14:	Methods of symptom monitoring at home	0.107	0.004	0.024	0.092	0.751	-0.053
15:	Medication management at home	0.107	0.102	0.132	-0.222	0.525	0.181
	(Removed items: 16)						
16:	Takeover of medication management	-0.057	0.316	0.189	-0.108	0.347	0.084
Factor 6. Family support							
31:	Family preferences and expectations of care and treatment	0.017	0.017	-0.039	0.022	0.031	0.858
32:	Addressing family members' concerns and care burdens	-0.016	-0.013	0.075	0.206	-0.241	0.845
	(Removed items: 30)						
30:	Information about support from family and relationships with family members	0.228	0.079	-0.056	0.110	0.129	0.443

Factor correlation matrix		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
	Factor 1	1.000	0.517	0.603	0.612	0.631	0.583
	Factor 2		1.000	0.620	0.551	0.516	0.593
	Factor 3			1.000	0.648	0.602	0.594
	Factor 4				1.000	0.519	0.608
	Factor 5					1.000	0.513
	Factor 6						1.000

Variance explained = 58.28%. Maximum-likelihood method and promax rotation.

Table 4. Pearson's correlation coefficient between the CTS-HF and DPWN scale (Validation participants (Group 2), N = 352)

| | **CTS-HF** | | | | | | |
	total score	Factor 1. Clear preparation for how to manage health at home	Factor 2. Adjusting to home care/support system	Factor 3. Transitions of medication management from hospital to home	Factor 4. Dealing with patients' concerns and questions	Factor 5. Transitions of disease management from hospital to home	Factor 6. Family support
DPWN scale total score	.527***	.433***	.428***	.338***	.387***	.412***	.382***
Subscales							
a. Collecting information from the patients and their families	.395***						
b. Decision-making support for the patients and their families	.518***						
c. Effective use of social resources	.320***						
d. Home healthcare coaching by multidisciplinary collaboration in healthcare professionals inside and outside of the hospital	.497***						

CTS-HF: Care Transitions Scale for Patients with Heart Failure. DPWN: Discharge Planning of Ward Nurses Scale.

*** Significant correlations, p < 0.001.

Table 5. Hypotheses testing for construct validity as comparison of mean CTS-HF score between subgroups of transitional care practice (Validation participants (Group 2), N = 352)

| Variable | CTS-HF Score | | | | | | p value |
| | High Practice Group | | | Low Practice Group | | | |
	Mean	SD	(n)	Mean	SD	(n)	
1. I can practice transitional care from hospital to home for patients with heart failure.	76.42	13.71	(116)	67.10	11.67	(236)	<0.001
2. I can collect the necessary information related to transitional care from hospital to home.	75.01	13.08	(152)	66.44	11.87	(200)	<0.001
3. I can assess the patient's post-discharge needs for support.	75.20	12.86	(162)	65.89	11.76	(190)	<0.001
4. I can set up plans of transitional care for patients with heart failure.	76.34	13.03	(136)	66.44	11.44	(215)	<0.001
5. I can practice self-care support by taking the post-discharge lives of patients at home into consideration.	75.72	12.90	(162)	65.45	11.34	(190)	<0.001
6. I can discuss transitional care for patients with heart failure at a multidisciplinary team conference.	74.49	12.91	(181)	65.61	11.74	(171)	<0.001
7. I can practice interprofessional collaboration "in hospital" and manage home transitional care for patients with heart failure.	73.65	12.77	(206)	65.07	11.79	(145)	<0.001
8. I can practice interprofessional collaboration "across various organizations or care facilities" and manage home transitional care for patients with heart failure.	78.69	13.38	(66)	68.21	12.26	(286)	<0.001
9. I can arrange and manage for patients to use long-term care insurance system.	74.38	15.32	(75)	69.03	12.23	(277)	<0.001
10. I can arrange and manage for patients to use health and welfare care systems (certifications for patients with disabilities, services, and support for persons with disabilities, etc.).	74.67	16.62	(52)	69.39	12.27	(300)	<0.001
11. I can continue accessing the current situations of patients with heart failure after discharge.	79.06	14.04	(54)	68.56	12.30	(298)	<0.001

| (Continued) | | | | CTS-HF Score | | | p value |

Variable	High Practice Groups			Low Practice Group			
	Mean	SD	(n)	Mean	SD	(n)	
12. My department can receive evaluations about the past practices of hospital-to-home transitional care from inside and outside of the hospital.	79.52	14.15	(42)	68.61	12.30	(301)	<0.001
13. I can practice family support for family members of patients with heart failure.	79.21	12.64	(80)	67.50	12.06	(271)	<0.001
14. I am aware of the worries or expectations of family members of patients with heart failure.	77.15	14.05	(95)	67.59	11.77	(257)	<0.001
15. I confirm whether family members are emotionally ready for patient's discharge or not.	77.95	13.74	(105)	66.87	11.35	(247)	<0.001

CTS-HF: Care Transitions Scale for Patients with Heart Failure.

Hypotheses testing for construct validity: It was hypothesized that nurses who had higher practice transitional care would have higher CTS-HF scores.

5-point Likert scale: Not done = 1, Not very well done = 2, Done a little = 3, Done = 4, and Done well = 5. We divided the respondents into two subgroups for each item: those nurses who answered "Done well" or "Done" were categorized as a "High transitional care practice group," while those who answered "Not done," "Not very well done," or "Done a little" were the "Low transitional care practice group."

The long-term Care Insurance system supports people in need of long-term care in Japan, and everyone aged 40 and above will be insured.