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# Validation of the Registered Nurse Assessment of Readiness for Hospital Discharge Scale

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## Abstract

Background: Statistical models for predicting readmissions have been published for high-risk patient populations but typically focus on patient characteristics; nurse judgment is rarely considered in a formalized way to supplement prediction models.

Objectives: The purpose of this study was to determine psychometric properties of long and short forms of the Registered Nurse Readiness for Hospital Discharge Scale (RN-RHDS), including reliability, factor structure, and predictive validity.

Methods: Data were aggregated from two studies conducted at four hospitals in the Midwestern United States. The RN-RHDS was completed within 4 hours before hospital discharge by the discharging nurse. Data on readmissions and emergency department visits within 30 days were extracted from electronic medical records.

Results: The RN-RHDS, both long and short forms, demonstrate acceptable reliability (Cronbach's alphas of .90 and .73, respectively). Confirmatory factor analysis demonstrated less than adequate fit with the same four-factor structure observed in the patient version. Exploratory factor analysis identified three factors, explaining 60.2% of the variance. When nurses rate patients as less ready to go home (<7 out of 10), patients are 6.4-9.3 times more likely to return to the hospital within 30 days, in adjusted models.

Discussion: The RN-RHDS, long and short forms, can be used to identify medical-surgical patients at risk for potential unplanned return to hospital within 30 days, allowing nurses to use their clinical judgment to implement interventions prior to discharge. Use of the RN-RHDS could enhance current readmission risk prediction models.

Readiness for hospital discharge is a nurse-sensitive outcome of hospital care and an indicator of risk for adverse postdischarge outcomes that can lead to rehospitalization (Weiss, Yakusheva, & Bobay, 2011). Acute care registered nurses (RNs) are responsible for the process of preparing of patients for discharge (Nosbusch, Weiss, & Bobay, 2011; Weiss et al., 2015). Typically, nurses assess discharge readiness informally within the context of preparing patients for discharge, but there is not yet an evidence-based method or instrument in routine used to assist clinical nurses in a formal assessment of a patient's readiness for discharge. The purpose of this study was to validate an instrument for nurse (RN) assessment of readiness for hospital discharge.

Improvement in discharge transition care processes to achieve reduction in readmissions has become a priority for many hospitals in response to implementation of discharge quality metrics, such as the Hospital Consumer Assessment of Healthcare Providers and Systems (Agency for Healthcare Research and Quality, 2017) and financial penalties for readmissions associated with the Affordable Care Act Hospital Readmissions Reduction Program (McIlvennan, Eapen, & Allen, 2015). Available readmission risk assessment tools are based on retrospective analyses of patient demographics and condition-specific parameters (Kansagara et al., 2011); none incorporate a systematic assessment of readiness for discharge by the discharging nurse prior to discharge.

The Readiness for Hospital Discharge Scale (PT-RHDS) was developed and tested in three patient populations (adult medical-surgical, postpartum mothers, and parents of hospitalized children) to measure patient perception of discharge readiness at the time of discharge from acute care hospitalization (Weiss et al., 2007, 2008; Weiss & Lokken, 2009; Weiss & Piacentine, 2006). Psychometric testing of the 21-item PT-RHDS supported reliability and validity of the scale when used with these patient populations (Weiss et al., 2011; Weiss & Piacentine, 2006). Cronbach's alpha reliability estimates ranged from .83 to .93 for the total scale and .65 to .93 for the subscales. Confirmatory factor analysis (CFA) validated the a priori theoretical structure of the scale (Weiss et al., 2011; Weiss & Piacentine, 2006). Predictive validity testing with adult medical-surgical patients indicated that, when patients assess that they are not ready for discharge, they are more likely to experience difficulties during the postdischarge period and have unplanned emergency department (ED) visits or readmissions within 30 days after discharge (Weiss et al., 2007, 2011).

The items of the PT-RHDS were reworded to reflect the nurse as assessor to form a nurse assessment tool (RN-RHDS). In subsequent testing with a small sample of 162 nurse-patient pairs, the RN-RHDS, but not the PT-RHDS, was found to be associated with readmission (Weiss, Yakusheva, & Bobay, 2010). Scores on a short form of the RN-RHDS (a parallel form of an eight-item PT-RHDS short form [PT-RHDS/SF]) was also predictive of readmission in a sample of 254 nurse-patient pairs (Weiss, Costa, Yakusheva, & Bobay, 2014).

Although predictive associations of the RN-RHDS long form and short form have been evident in previous studies (Weiss et al., 2010, 2014), construct validity has yet to be evaluated. Items of the RHDS scales were originally developed from content derived from literature sources and input from clinical nurse experts, with content validation by patients. The underlying factor structure was identified through factor analysis of patient-reported data on the PT-RHDS form (Weiss & Piacentine, 2006). However, nurses may organize their

thinking about discharge readiness differently than patients, producing a different factor structure for the nurse version of the scale. The aims of this secondary analysis are to evaluate the psychometric properties of the long form and short form of the RN-RHDS, including reliability, factor structure, and predictive validity; determine concordance between parallel patient self-report and nurse assessment versions of the RHDS; and examine the utility of the RN-RHDS and a short form of the RN-RHDS (RN-RHDS/SF) as indicators of risk for return to the hospital for readmission or ED visits following discharge. Refinement of the RN-RHDS and validation of a short form based on analysis of the scale structure will provide a structured tool for clinical measurement by nurses of patients' readiness for discharge. The availability of a valid tool of a length suitable for use in practice settings and for integration into electronic health records will contribute to improved discharge transition efforts and readmission reduction.

# METHODS

## Study Design

The study was situated within a conceptualization of hospital discharge as a transitional process, derived from Transitions Theory (Meleis, Sawyer, Im, Hilfinger Messias, & Schumacher, 2000) and Donabedian's (1966) Quality Model, that begins during hospital discharge preparation, has a transition point on the day of discharge, and is followed by a postdischarge period. Readiness for discharge is an outcome measure of the discharge preparation phase and an indicator of potential risks for coping difficulties and return to hospital during the postdischarge period (Weiss et al., 2015).

The design of this psychometric analysis of the RN-RHDS, a measure for nurse assessment of discharge readiness on the day of hospital discharge, included five sequential steps:

1. Test the adequacy of the a priori factor structure of the RN-RHDS that was derived from the factor structure of the patient form of the RHDS using a CFA.
2. Explore possible alternative factor structures that may be unique to the RN-RHDS using exploratory factor analysis.
3. Evaluate the factor structure of RN-RHDS/SF.
4. Estimate the reliability of the RN-RHDS and RN-RHDS/SF.
5. Determine the concordance between RHDS assessments by the nurse using RN-RHDS and patient self-report using the PT-RHDS.
6. Determine the predictive validity of the RN-RHDS and RN-RHDS/SF for return to hospital within 30 days postdischarge.

## Sample and Setting

The sampling target for this study was 300 RN-RHDS assessments for an adequate sample for factor analysis (Comrey & Lee, 1992). Participating nurses and patients were recruited from 16 medical-surgical nursing units in four hospitals within a health system in the Midwestern United States from April to August 2008 for the Sample 1 and from the six of the same medical-surgical units in one of the hospitals from August 2012 to September 2013 for Sample 2. Data were collected from patients and their discharging nurses on the day of discharge for both studies and by electronic data extraction of patient characteristics and postutilization data from hospital information systems.

Three hundred sixteen matched RN-patient pairs were included in this sample; 162 matched pairs were from a prior study (Sample 1; Weiss et al., 2010), and an additional 154 matched pairs (Sample 2) were collected at a later date to achieve the sampling target. Both studies were approved by university and hospital institutional review boards who approved a patient consent form for patients and an informational statement as the consent format for the nurse survey forms used for the study. Sample inclusion criteria were English- or

Spanish-speaking patients, at least 18 years old, discharged to home without home hospice services. Nurses were approached for voluntary participation if their patients being discharged had agreed to participate. There were 132 unique nurses who participated in Sample 1 and 66 unique nurses who participated in Sample 2.

## Instruments and Measures

The RN-RHDS was developed as a parallel measure of the PT-RHDS (Weiss & Piacentine, 2006) to record nurse assessment of hospitalized patients' readiness for discharge by modifying the wording of items from patient-focused to nurse-focused questions. An example is, "How well will you [patient form]/your patient [nurse form] be able to handle the demands of life at home?" For both the RN-RHDS and the PT-RHDS, there are four subscales:

* Personal Status,
* Knowledge,
* Coping Ability, and
* Expected Support.

*Personal Status* refers to how the patient feels physically and emotionally on the day of discharge and includes items related to how much pain or discomfort they are having and their strength and energy levels. *Knowledge* relates to specific information the patient will need to self-manage personal and medical care needs, including possible complications, restrictions, and plan for follow-up. *Coping Ability* refers to the patient's perception of ability to handle self-care, perform any treatments, or deal with demands of life at home. *Expected Support* subscale measures whether the patient will have help with medical care or household activities after discharge (Weiss & Piacentine, 2006). The RN-RHDS consists of 21 items measured on a 0-10 Likert scale, with higher scores indicating greater readiness. Scores are calculated and reported as mean of item scores, with a range of 0-10. The RN-RHDS is administered on the day of discharge.

The eight-item RN-RHDS/SF is a parallel form of the PT-RHDS/SF, which uses the two items from each subscale with the highest item-subscale correlations (Weiss et al., 2014). Initial testing of the RN-RHDS in 162 adult medical-surgical patients (Sample 1) produced a Cronbach's alpha reliability estimate of .90 for the long form (Weiss et al., 2010) and .83 for the short form version (Weiss et al., 2014).

The outcome variables, readmissions and nonadmitted ED visits within 30 days postdischarge, were extracted from electronic information systems through queries across the four study hospitals within the same health system. Readmissions and ED visit occurrences for any reason were counted if they occurred in any of the study hospitals. Readmissions not specifically related to the reason for the acute care hospitalization may reflect a general postdischarge syndrome characterized by the sequelae of hospitalization, including physiological and psychological stresses of hospitalization that result in physiological impairments and depletion of reserves needed for recovery and defense against adverse events (Krumholz, 2013). Because of few ED visits without concurrent readmission, the readmissions and ED visits were recoded into a single dichotomous variable, with 0 = *no return to hospital* and 1 = *one or more returns to hospital via ED visit or readmission*.

Nurse and patient descriptive data were collected to compare first and second sample characteristics. RN descriptive data included years of experience as an RN and level of education-which were self-reported by the nurse at the end of the RN-RHDS form. Patient descriptive data included age in years, gender, ethnicity (Hispanic), lives alone, socioeconomic status (Hollingshead, 1975), and diagnosis categorized as Major Diagnostic Category (Centers for Medicare and Medicaid Services, 2017).

## Procedures

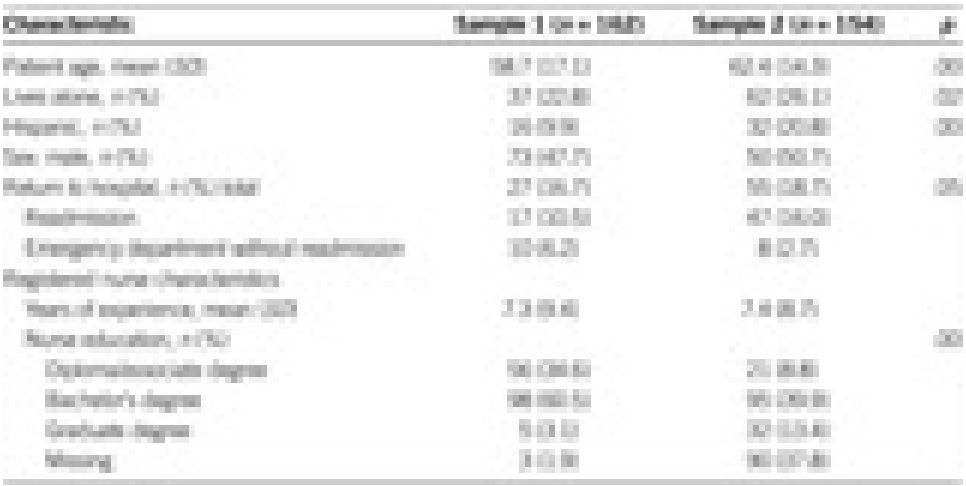
Approval for the study was obtained from the health system and university institutional review boards. Trained research assistants approached the nurses and patients for participation and obtained informed consent. Nurses completed the RN-RHDS within 4 hours before the patient's discharge from the acute care hospital.

## Data Analysis

Descriptive statistics were calculated for RN and patient characteristics. Samples 1 and 2 were compared for similarity. *T* tests were used for nurse and patient characteristics, which were continuous measures; chi-square tests were used for categorical variables. A CFA of the RN-RHDS was used to evaluate the a priori structure derived from the PT-RHDS, and subsequently, exploratory factor analysis was used to identify alternative factor solutions. Concordance between the RN-RHDS and the PT-RHDS was calculated using correlation and cross-tabulation. Predictive validity was evaluated with logistic regression models using the RN-RHDS as the predictor variable and return to hospital within 30 days as the outcome variable, using age, gender, ethnicity, and lives alone, with Major Diagnostic Category and unit fixed effects. Similar procedures were used for analysis of a short form version of the RHDS (SPSS, version 24, Chicago, IL).

**TABLE 1** Registered Nurse and Patient Characteristics (*N* = 316 Nurse–Patient Pairs)

| Characteristic | Sample 1 (n = 162) | Sample 2 (n = 154) | p |
|---|---|---|---|
| Patient age, mean (SD) | 58.7 (17.1) | 62.4 (14.3) | .00 |
| Lives alone, n (%) | 37 (22.8) | 62 (26.1) | .02 |
| Hispanic, n (%) | 16 (9.9) | 32 (20.8) | .00 |
| Sex: male, n (%) | 73 (47.7) | 50 (50.7) | |
| Return to hospital, n (%) total | 27 (16.7) | 55 (18.7) | .05 |
| Readmission | 17 (10.5) | 47 (16.0) | |
| Emergency department without readmission | 10 (6.2) | 8 (2.7) | |
| Registered nurse characteristics | | | |
| Years of experience, mean (SD) | 7.3 (9.4) | 7.4 (8.7) | |
| Nurse education, n (%) | | | .00 |
| Diploma/associate degree | 56 (34.6) | 21 (8.8) | |
| Bachelor's degree | 98 (60.5) | 95 (39.9) | |
| Graduate degree | 5 (3.1) | 32 (13.4) | |
| Missing | 3 (1.9) | 90 (37.8) | |



# RESULTS

Table 1 shows the sample demographics. In comparing Samples 1 and 2, which were from different years but the same settings, Sample 2 patients were significantly older (58.7 vs. 62.4, $p$ = .00), more likely to live alone (22.8 vs. 26.1, $p$ = .02), more likely to be Hispanic (9.9 vs. 20.8, $p$ = .00), and more likely to return to the hospital (16.7 vs. 18.7, $p$ = .05). The samples were combined for the analyses.

## RN-RHDS

Mean item scores on the 21-item RN-RHDS ranged from 7.9 to 9.2 on a 10-point Likert scale. For the total scale, Cronbach's alpha was .90. Interitem correlations ranged from .34 to .78, and there were no corrected item-total correlations of less than .3, indicating that the items were measuring related content domains.

Subscale characteristics were evaluated through Pearson *r* interitem correlations and Cronbach's alpha coefficients. The average Pearson *r* interitem correlations for each of the subscales are as follows: Personal status subscale average was .48 (range .27-.78), Knowledge subscale average was .60 (range .35-.84), Coping Ability subscale average was .73 (range .69-.76), and Expected Support subscale average was .61 (range .41-.80). Cronbach's alpha was assessed for each of the subscales and ranged from .78 for the Personal Status subscale to .92 for the Knowledge subscale, indicating adequate reliability.

## CFA of the Long-Form RN-RHDS

A CFA using AMOS 22 (Chicago, IL) was conducted to test the fit of the RN-RHDS data to the a priori structure of the PT-RHDS. The model was specified with four latent variables representing the four subscales linked to their respective observed variables (items). The latent variables were allowed to correlate. For identification purposes, the path of one measured variable for each latent variable was set to 1 (Arbuckle & Wothke, 1999). Missing values were replaced with substitution of subject-specific mean from the related subscale if less than 20% are missing. In interpreting the model, we examined $[chi]^2$, root mean square error of approximation (RMSEA), and overall fit index. Because the $[chi]^2$ is influenced by the sample size, we also looked at the $[chi]^2$ to degrees of freedom ratio, where it has been suggested that a ratio of less than either 2:1 or 3:1 indicates an acceptable fit (Arbuckle & Wothke, 1999; Ullman, 1996), although others suggest that less than 5:1 ratio may represent an acceptable fit (Kline, 2004). We considered the following general "guidelines" that an RMSEA of less than .05 indicates a "good fit" and an RMSEA of less than .08 indicates an "acceptable fit" (McDonald & Ho, 2002), although Hu and Bentler (1999) suggest .06 for a "good fit." Goodness of fit indices (such as comparative fit index [CFI]) should generally be larger than .90 (Hu & Bentler, 1999; McDonald & Ho, 2002).

The model resulted in a $[chi]^2(183) = 805.37$, $p < .01$, $[chi]^2/df$ ratio = 4.40, CFI = .87, and RMSEA = .10, with a 90% confidence interval of [.097, .111]. All of the items had statistically significant parameters on the a priori designated factor, $p < .01$ (see Table 2), indicating that the items were situated onto the correct factors, with the exception of a single item (physical ability to care for self after discharge), which loaded on Factor 2 (Knowledge) rather than on Factor 1 (Personal Status; Weiss & Piacentine, 2006). Correlations between factors ranged from .11 to .85 (Table 2); Personal Status correlated with Knowledge at *r* = .51 and Coping Ability at *r* = .58. Knowledge and Coping Ability were highly correlated at *r* >= .80, and Expected Support had low correlations with all other factors of less than *r* = .30. Because the chi-square to degrees of freedom ratio and the RMSEA were slightly higher than ideal, the analysis progressed to exploratory factor analysis to identify a possible alternative underlying structure.

TABLE 2. Factor Loadings and Intercorrelations for Confirmatory and Exploratory Analysis of Long-Form Readiness for Hospital Discharge Scale

| | Confirmatory standardized estimates | | | | Exploratory standardized estimates | | |
|---|---|---|---|---|---|---|---|
| Subscale/item (attribute) | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 1 | Factor 2 | Factor 3 |
| Personal Status | | | | | .65 | | |
| RN1 (physically ready)[a] | .64 | | | | | | |
| RN2 (pain/discomfort)[b] | .22 | | | | | | |
| RN3 (patient's strength) | .86 | | | | | .59 | |
| RN4 (patient's energy)[a] | .87 | | | | | .67 | |
| RN5 (emotionally ready) | .42 | | | | .48 | | |
| RN6 (physical ability) | | .63 | | | .71 | | |
| Knowledge | | | | | | | |
| RN7 (care for self ) | | .88 | | | .82 | | |
| RN8 (personal needs) | | .85 | | | .78 | | |
| RN9 (medical needs) | | .90 | | | .83 | | |
| RN 10 (problems)[a] | | .85 | | | .79 | | |
| RN11 (who to call) | | .80 | | | .76 | | |
| RN12 (restrictions)a | | .80 | | | .79 | | |
| RN13 (happens next) | | .78 | | | .76 | | |
| RN14 (services & information) | | .49 | | | .50 | | |
| Coping Ability | | | | | | | |
| RN15 (handle demands)a | | | .86 | | .84 | | |
| RN16 (personal care)a | | | .86 | | .82 | | |
| RN17 (medical treatments) | | | .85 | | .82 | | |
| Expected Support | | | | | | | |
| RN18 (emotional support) | | | | .58 | | .48 | |
| RN19 (help with personal care) [a] | | | | .79 | | .78 | |
| RN20 (help with household) | | | | .95 | | .88 | |
| RN21 (help with medical needs)[a] | | | | .84 | | .78 | |
| Factor Correlations | | | | | | | |
| Factor 2 | .51 | | | | .52 | | |
| Factor 3 | .58 | .85 | | | .21 | .07 | |
| Factor 4 | .11 | .21 | .27 | | | | |

[a]Item included in Short-Form Registered Nurse Assessment of Readiness for Hospital Discharge Scale. [b]Values below .3 were suppressed in the Exploratory Factor Analysis.

## Exploratory Factor Analysis of Long-Form RN-RHDS

The 21 items of the RN-RHDS long form were subjected to principal axis factoring with varimax rotation (allowing correlation among factors; Tabachnick & Fidell, 2001) using SPSS Version 22 (Chicago, IL). Cross-loading values below .3 were suppressed. Adequacy of the sample was supported by the Kaiser-Meyer-Olkin values of .92, exceeding the recommended value of .6 (Pallant, 2013), and Bartlett's Test of Sphericity was significant at .00, supporting the factorability of the RN-RHDS.

Factoring revealed the presence of three components with eigenvalues exceeding 1, explaining 41.5%, 11.7%, and 6.9% of the variance, respectively (Table 2). There were no cross-loadings once values below .3 were suppressed. The rotated solution demonstrated three components with strong loadings and explained 60.2% of variance within the scale. Factor 1 included items from the Personal Status, Knowledge, and Coping Ability subscales in the a priori structure. Two items from the Personal Status subscale loaded together on a Factor 2- these items, strength and energy, were highly correlated ($r$ = .78), and Factor 2 was correlated with Factor 1 at $r$ = .52. Factor 3 included all items from the a priori Expected Support subscale. The resulting structure captures the interrelatedness of Personal Status, Knowledge, and Coping Ability and Expected Support as a dimension with low correlation to other factors reflecting what also emerged in the prior CFA analysis.

## RN-RHDS Short Form

Given the similarities in factor structure from CFA of RN-RHDS in this analysis and CFA of PT-RHDS in a prior study (Weiss & Piacentine, 2006), we moved forward with testing RN-RHDS/SF. The same two items from each of the four original subscales used in the PT-RHDS/SF were used for the eight-item RN-RHDS/SF (the eight items are noted in Table 2). As with the original PT-RHDS, the eight items used in the RN-RHDS/SF had high item-to-subscale correlations ($r$ = .73-.90) in the RN-RHDS long form analysis. The Pearson correlation between the RN-RHDS long and short forms was .96, and the RN-RHDS/SF explained 95% of the variance in the longer form scores.

Mean scores on the RN-RHDS/SF ranged from 7.9 to 8.9 on the 0- to 10-point Likert scale. Internal consistency was examined using Cronbach's alpha coefficient, which was .73. The mean short form interitem correlations ranged from .32 to .70. As there are fewer than 10 items on the RN-RHDS/SF, it is recommended that particular attention be paid to the mean interitem correlation (Pallant, 2013). No corrected item-total correlations were below .43.

Principal axis factoring was conducted on the eight items of the RN-RHDS short form using SPSS Version 24 (Chicago, IL). Inspection of the correlation matrix showed seven out of eight (87.5%) coefficients of .3 and above, and none were in a negative direction. The Kaiser-Meyer-Olkin value was .79, and Bartlett's Test of Sphericity was .00 ($p$ = .000), supporting factorability of the short form.

The rotated solution demonstrated two clear components, both with strong factor loading values and eigenvalues greater than 1, explaining 41.4% and 16.0% of the variance, respectively. The scree plot revealed a clear break after two components. Personal Status, Knowledge, and Coping Ability questions loaded onto one factor, and the two Expected Support questions loaded on the second factor. The two factors were correlated at .21, suggesting that they are measuring different dimensions of readiness.

## Concordance With PT-RHDS

Correlation between RN and patient versions was .11 ($p$ = .06) for the long forms and .12 ($p$ = .04) for the short forms. Using a previously established cutoff score for low readiness of less than 7 (Weiss et al., 2014), concordance between nurse and patient scores was 80.2% (235/293) agreement on being ready (>=7), 2.0% (6/293) agreement on low readiness (<7), and 17.7% (52/293) disagreement between nurse and patient. These findings indicate that, although most patients are ready for discharge as measured by parallel nurse assessment and patient self-report, in nearly one fifth of cases, nurses and patients disagree on readiness for discharge.

## Positive Predictive Validity

Positive predictive validity was estimated for both the long and short versions of the RN-RHDS using return to hospital (occurrence of readmission and/or ED visit) within 30 days postdischarge as the outcome variable. All models included controls for patient characteristics (gender, age, socioeconomic status, ethnicity, lives alone, and socioeconomic status), which were associated with variation in readmission rates in previous studies (Kansagara et al., 2011; Weiss et al., 2010, 2011, 2014), with fixed effects for discharge unit and clustering for nurses. The models were first estimated using the mean item scores for the long and short forms. Then the mean items scores on both forms were dichotomized using less than 7 as a cutoff score for low discharge readiness, based on prior analysis by the research team (Weiss et al., 2014). The models for mean and dichotomized scores were run unadjusted with no patient characteristics and adjusted with patient characteristics added. Results are presented in Table 3. Overall, the RN-RHDS long

form was slightly more predictive than the short form (odds ratio [*OR*] = 3.34 vs. *OR* = 2.93 in the unadjusted models and *OR* = 9.31 vs. *OR* = 6.36 in the adjusted models, respectively). The results indicate that including the patient characteristics in the models improves predictive validity, but unadjusted, as in the clinical practice situation, RN-RHDS was still associated with subsequent return to the hospital.

TABLE 3. Positive Predictive Validity: Odds Ratios for 30 Days Return to Hospital, N = 293

| | | Unadjusted models<br>Adjusted models* | |
|---|---|---|---|
| RN-RHDS mean <7 (long [21-item] form)<br>Control variables | Sex = male | 3.34*** | 9.31***<br>2.24* |
| | Race = White, non-Hispanic | | 0.24** |
| RN-RHDS mean <7 (short [8-item] form)<br>Control variables | Sex = male | 2.93** | 6.36***<br>2.25* |
| | Race = White, non-Hispanic | | 0.24** |

Note. The table includes control variables with p < .05. The following variables were included in all adjustedmodels: age, gender, ethnicity (Hispanic), lives alone, socioeconomic status (Hollingshead Four-Factor Index of Social Status), and fixed effects for unit and Major Diagnostic Categories. RN-RHDS = Registered Nurse Assessment of Readiness for Hospital Discharge Scale. *p < .05. **p < .01. ***p < .001.

## DISCUSSION

The structural characteristics of the RN-RHDS 21-item long form are similar to what has been reported previously with the PT-RHDS (Weiss & Piacentine, 2006) and remain consistent with the theoretical constructs in the literature. When some of the fit statistics of the four-factor structure were slightly above recommended guidelines, the structure of the exploratory factor analysis revealed a coalescence of three of the four factors (Personal Status, Knowledge, Coping Ability) from the original scale. These factors are correlated indicating their reciprocal influence on each other. The exploratory factor analysis solution did not present an improvement over the original structure in terms of delineating the dimensions important to discharge readiness. In the analyses of both long and short forms, Expected Support is weakly related to the other subscale factors and perhaps should be considered as a separate but related concept.

The reliability of the long-form RN-RHDS is similar to previously reported PT-RHDS (Weiss et al., 2010). Short-form reliability is lower but in the acceptable range and is consistent with earlier estimates of reliability in the range of .75-.83 (Weiss et al., 2014); this may be expected as there were a smaller number of items that were specifically chosen to represent each of the four a priori domains; they were items with highest item-subscale correlations and not highest correlations with the scale as a whole. In keeping with the goal of creating a clinically useful nurse assessment tool, it is helpful for nurses to have similar questions on both the patient and RN versions of the forms for consistency and comparison. The short and long forms of the RN-RHDS demonstrate reliability, reasonable factoring results, and predictive validity, suggesting that both forms are acceptable tools for assessing discharge readiness.

The results of this study demonstrate the value of nurse assessment in predicting postdischarge utilization. Discharge readiness is an outcome metric of hospital discharge process and a predictor of return to the hospital in the form of a readmission or ED visit. The results highlight the ability of nurses to anticipate patients at high risk for return to the hospital for readmission or ED visits who may need additional transitional care interventions to prevent return to hospital. The RN-RHDS was developed in response to clinical nurses' requests to provide a discharge assessment for their patients going home. Nurses felt that they were in the best position to know which patients were likely to be readmitted. Nurses are responsible for discharge preparation and may assess discharge readiness informally, but there has been no requisite or tool for formal assessment of discharge readiness on the day of discharge. The availability of a reliable and valid tool may promote standardized assessment of readiness for discharge, which could be incorporated into electronic health records.

In this sample, correlations between nurse and patient assessments of discharge readiness are very low (less than $r$ = .15). When we use a cutoff score for low readiness of less than 7, established in a prior study (Weiss et al., 2014), concordance on readiness is high at 80% but agreement on low readiness is low, indicating that either the nurse or patient, but not both, recorded a low readiness score. Previous research has shown a persistent lack of agreement between RN and patient scores (Weiss et al., 2011, 2014). Explanations for this discrepancy may be a lack of communication between the nurse and patient or lack of awareness about the factors assessed in the tool. For example, nurses may be less aware of available support at home than patients themselves. In addition, nurses assess patients' discharge readiness relative to their experiences with previous patients; patients relate to their own unique perspective of needs after discharge. Another possible explanation is likely a result of nursing experience; having observed many similar patients, nurses may recognize implicit factors that patients do not that may contribute to return to hospital.

The long- and short-form RN-RHDS have different utilities for use in clinical practice. The RN-RHDS/SF is a screening tool that uses two items from each of the four subscales (Personal Status, Knowledge, Coping Ability, Expected Support) to evaluate discharge readiness. The RN-RHDS long form offers the opportunity for a more complete assessment if indicated by low readiness scores on the short form. In both forms, low readiness scores are associated with substantially higher postdischarge return to hospital rates (three to nine times). The scales can potentially be used as one method for evaluating return to the hospital risk. Although there are several readmission risk identification scoring tools, these current risk assessment models are based on retrospective large data set analyses incorporating diagnostic, clinical condition, and demographic factors, but rarely indicators of overall health and function, severity of illness, or social determinants of health (Kansagara et al., 2011). Primary data collection at or near discharge is largely absent in risk assessment tools; in particular, these tools do not include direct assessments of patient condition and functional status at discharge, knowledge of self-care and perceived abilities, and the level of expected support. These factors are assessed in the RN-RHDS.

The value of the RN-RHDS tools may lie in augmenting existing readmission risk determination models by shifting to prospective assessment for identifying patients for unplanned return to hospital. Future studies are needed to evaluate the prospective use of the RN-RHDS in conjunction with typical risk identification by diagnosis and demographics characteristics associated with readmission. Knowing which patients are likely to return to hospital is of vital interest for hospitals as they work fine-tune efforts to identify patients at high risk for readmissions for which the hospital is no longer reimbursed.

In clinical practice, the RN-RHDS offers the discharging nurse a tool for screening patients for low readiness in anticipation of the discharge. This end-of-hospitalization screening could identify patients before discharge who need supplemental efforts to prepare for discharge and/or additional postdischarge transitional care services to mitigate the risks associated with low readiness. Implementation of the RN-RHDS as a standard nursing practice prior to discharge would offer a systematic approach to triggering initiation of targeted nurse actions in response to low-discharge readiness assessments focused on improving the transition to home and reducing the risk of postdischarge problems that lead to return to the hospital.

Strengths of the study include that the sample was derived from multiple nursing units in multiple hospitals and represented a broad range of adult medical-surgical patients discharged from hospitals. The tools are

applicable broadly as an outcome measure of discharge preparation (Weiss et al., 2015) and prospective identification of risk for readmission. A limitation of the study includes capture of return to hospital only to the four study hospitals involved, not to other hospitals outside of the healthcare system. Measuring same hospital occurrences can miss up to 20% of readmissions, thereby underestimating the actual number of readmissions (Nasir et al., 2010). All-cause readmissions were counted; data were not available in the study data sets to exclude planned readmissions. We did not collect data about discharge preparation or readmission reduction programs on study units. We accounted for any differences between units by using unit fixed effects in regression models for predictive validity. The sample included 316 unique discharge events. A single nurse may be included several times in the database discharging several patients. We addressed this by including clustering for nurses in the analysis. There was no reliable method to measure nurse expertise, which may have affected the assessments. Another limitation was that the sample only included adult medical-surgical patients. Results for specific groups of adult patients, such as oncology or other diagnosis-specific categories, may produce different results. The data in the two study samples were collected 6 and 10 years ago. Recognizing that the complexity of healthcare has increased and many hospitals have implemented discharge process improvement initiatives, the relevance of the nurse and patient measures could have changed. Research conducted with the instruments in the intervening period continues to support the relevance and utility. Although the data are dated, the data set used represents the only data available to date with matched patient and nurse readiness assessments in short and long forms needed for parts of the psychometric analysis.

## Conclusion

The RN-RHDS in long and short forms are reliable. The long-form RN-RHDS has a similar factor structure to the patient version of the RHDS. Both forms demonstrate predictive validity for return to hospital (readmissions and ED visits within 30 days of discharge). The study demonstrates the value of nurse assessments of discharge readiness in contributing to efforts to improve the transition to home and decrease unplanned return to hospital. If assessment of discharge readiness becomes a standard nursing practice, nurses will be able to more effectively evaluate their valuable contribution in preparing the patient for discharge to improve postdischarge outcomes.

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