Rehabilitation Providers' Prediction of the Likely Success of the SNF-to-Home Transition Differs by Discipline

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Abstract

Objectives: Our article's primary objective is to examine whether rehabilitation providers can predict which patients discharged from skilled nursing facility (SNF) rehabilitation will be successful in their transition to home, controlling for sociodemographic factors and physical, mental, and social health characteristics.

Design: Longitudinal cohort study.

Setting and Participants: 112 English-speaking adults aged 65 years and older admitted to two SNF rehabilitation units.

Measures: Our outcome is time to "failed transition to home," which identified SNF rehabilitation patients that did not successfully transition from the SNF to home during the study. Our primary independent variable consisted of the prediction of medical providers, occupational therapists, physical therapists, and social workers about the likely success of their patients' SNF-to-home transition. We also examined the association of sociodemographic factors and physical, mental, and social health with a failed transition home.

Results: The predictions of occupational and physical therapists were associated with whether patients successfully transitioned from the SNF to their homes in bivariate (HR=4.96, p=0.014; HR=10.91, p=0.002, respectively) and multivariable (HR=5.07, p=0.036; HR=53.33, p=0.004) analyses. The predictions of medical providers and social workers, however, were not associated

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with our outcome in either bivariate (HR=1.44, p=0.512; HR=0.84, p=0.794, respectively) or multivariable (HR=0.57, p=0.487; HR=0.54, p=0.665) analyses. Living alone, more medical conditions, lower physical functioning scores, and greater depression scores were also associated with time to failed transition to home.

Conclusions/Implications: These findings suggest that occupational and physical therapists may be better able to predict post-SNF discharge outcomes than are other rehabilitation providers. Why occupational and physical therapists' predictions are associated with the SNF-to-home outcome while the predictions of medical providers and social workers are not is uncertain. A better understanding of the factors informing the post-discharge predictions of occupational and physical therapists may help identify ways to improve the SNF-to-home discharge planning process.

Brief Summary:

This study's results suggest that occupational and physical therapists may have unique insights into determining which SNF rehabilitation patients may struggle with the SNF-to-home transition.

Keywords

Post-acute care; care transition; epidemiology

Introduction

Older adults admitted to skilled nursing facilities (SNFs) comprise a medically, psychologically, and socially vulnerable group. In 2014, 1.7 million fee-for-service Medicare beneficiaries were admitted to SNFs, which often includes rehabilitation services for post-acute care.[1] Although most SNF residents prefer to return to the community, only 49.9% of SNF admissions are discharged to either a home, group home, board-and-care, or assisted living facility within 365 days[2] and nearly 1 in 4 of post-acute care residents are rehospitalized.[3,4] There is wide variation in discharge outcomes between higher and lower performing SNFs,[1] indicating an opportunity for improving discharge outcomes.

Many factors may affect an older adult's ability to successfully return to the community, and can include: increasing age, sex, marital status, living alone, low social support, functional impairment, acute and chronic illnesses, frailty, depression, and cognitive impairment and dementia.[5–16] Clinician-rated patient engagement in rehabilitation is also associated with outcomes.[17,18] To our knowledge, however, no studies have examined whether rehabilitation team members in the post-acute SNF care setting are able to predict whether patients will successfully transition from the SNF to home. Patients often fare poorly upon discharge from the SNF to home (25.9% are rehospitalized and 8.1% die within 90 days of SNF discharge),[19] and limited evidence suggests that care transition interventions may improve post-SNF discharge outcomes.[20] Further efforts to improve upon the SNF-to-home transition are needed, and examining whether SNF rehabilitation providers are able to identify which patients will struggle transitioning home may inform efforts to optimize this transition (e.g., help direct limited resources to patients at risk of poor outcomes or identify factors that could be modified prior to discharge).

Our article's primary objective is thereby to examine the association between predictions made shortly following SNF discharge of medical providers (physicians and nurse practitioners), occupational therapists, physical therapists, and social workers with whether an older adult rehabilitation patient will remain in the community after SNF discharge. A secondary objective is to examine what patient-level characteristics (i.e., sociodemographic factors as well as physical, mental, and social health) are associated with a failed transition to home. We hypothesize that the prediction of medical providers, occupational therapists, physical therapists, and social workers will be associated with whether participants are able to remain in their homes.

Methods

Study Population

We conducted a longitudinal study from March 2016 through November 2017 of English-speaking patients aged 65 years and older who arrived to SNF rehabilitation units with a plan to be discharged home. We followed each patient through their SNF stay (up to 90 days) and three months post-SNF discharge. Study staff interviewed patients within two weeks of SNF admission, every 2–4 weeks while they were in the SNF, and at one week, one month, and three months post-SNF discharge.

We recruited patients from rehabilitation units in two SNFs located in Monroe County, NY, that have 566 and 145 beds, of which 28 and 35 beds are for post-acute rehabilitation, respectively. We selected these two SNFs as our study sites for convenience as they are affiliated with University of Rochester and because they serve some of the most medically and socially vulnerable patients in Monroe County, NY. We enrolled 112 older adults into our study, reflecting a response rate of 74.2%, and 11 (9.8%) were lost to follow-up. Responders and non-responders did not differ by SNF site, gender, ethnicity, race, marital status, or age. We excluded patients with a known dementia diagnosis at baseline or who were unable to demonstrate capacity to provide informed consent. We did not use proxy informants. The University of Rochester Research Subjects Review Board reviewed and approved this study, and written informed consent was obtained from all study participants.

Measures

Dependent variable.—Our outcome was time to "failed transition to home" (dichotomized as "yes/no", n=43) and defined here as an SNF rehabilitation patient who transitioned to SNF long-term care (n=15, 34.9%), readmitted to an SNF or a rehabilitation facility following discharge (n=2, 4.7%), had a prolonged hospitalization (n=19, 44.2%), became too ill to participate (n=2, 4.7%), or died (n=5, 11.6%) during the study. Of the 43 participants with a failed transition home, 26 (60.5%) were not discharged from the SNF to home (this group is relevant to our secondary objective).

Independent variables.—Our primary independent variable is defined by the responses of a patient's medical providers, occupational therapists, physical therapists, and social workers to the following statement, which was assessed within a couple weeks after the participant had been discharged from the SNF: *"I believe that this patient will be able to live*

independently in the community and will not be re-admitted to a nursing home or hospital for care in the 3 months following discharge from the skilled nursing facility." Response choices were on a 1 to 7 Likert scale (1, strongly disagree; 2, moderately disagree; 3 somewhat disagree; 4, neither agree nor disagree; 5, somewhat agree; 6, moderately agree; and 7, strongly agree). We dichotomized this variable into "neutral or negative prediction" (responses 1 to 4) and "positive prediction" (responses 5 to 7).

We also examined sociodemographic factors and physical, mental, and social health domains – domains which have been associated with living independently in the community.[5–16] Sociodemographic factors include age, sex, race, marital status, living arrangement, and education. The physical health domain includes the number of medical conditions (ranging from 5 to 26, extracted from SNF charts), physical functioning (PROMIS Bank v1.2 – Physical Function), and pain (PROMIS Bank v1.1 – Pain Interference).[21] The mental health domain includes depression (PROMIS Bank v1.0 – Depression) and self-reported cognitive functioning (PROMIS Bank v1.0 – Applied Cog Abilities).[21] Lastly, the social health domain examined instrumental support (PROMIS Bank v2.0 – Instrumental Support) and ability to participate in social roles and activities (PROMIS Bank v2.0 – Ability to Participate in Social Roles and Activities).[21] With the exception of medical conditions, these variables were assessed at every assessment via Patient Reported Outcome Measurement Information System (PROMIS) computerized adaptable testing methods.[21–23] PROMIS uses the T-score metric that is generally centered on the U.S. general population and standardized with respect to mean (50) and standard deviation (10).[21]

Statistical Analyses

Univariate analyses consisting of means with standard deviations or percentages described the study sample. To account for our outcome (time to "failed transition to home") and time varying covariates, we used Cox proportional hazards modeling.[24] To fulfill the study objective to characterize the patient-level factors associated with a failed transition to home, we used a multivariable Cox model to examine the association of sociodemographic factors and physical, mental, and social health with the outcome. To address our primary objective and test our hypothesis, we used unadjusted Cox models and Cox models adjusting for sociodemographic factors and physical, mental, and social health to evaluate the association of rehabilitation providers' prediction of a successful discharge with our outcome. Cox proportional hazard model assumptions were checked by graphing weighted Schoenfeld residuals,[24,25] and participants lost to follow-up were censored. All analyses were conducted using SAS (version 9.4, SAS Institute, Inc., Cary, NC).

Results

Sample Characteristics

At our initial interview, the mean age of the 112 study participants was 78.1 years and most were female (n=68, 60.7%), non-Hispanic white (n=91, 81.3%), single (n=41, 36.6% not married; n=42, 37.5% widowed), and living alone (n=68, 60.7%) and had at least some college or technical school (n=61, 54.5%). Participants had considerable medical comorbidity (mean number of conditions=13.0), physical functioning was poor (mean

score=26.7), pain was elevated (mean score=60.0), and many reported a decreased ability to participate in social roles and activities (mean score=35.7) (Table 1).

A total of 84 (75.0%) participants were discharged from the SNF to home, and 58 (51.8%) remained in their homes upon the termination of the study, which extended three months following SNF discharge. Medical providers, occupational therapists, physical therapists, and social workers had neutral or negative predictions of post-SNF discharge outcomes for 30.8%, 14.8%, 18.2%, and 29.4% of the participants, respectively (Table 1).

Cox Regression Modeling

In Cox proportional hazards modeling that examined patient-level characteristics, living alone, more medical conditions, lower physical functioning scores, and greater depression scores were associated with an increased risk of a failed transition to home (Table 2).

To help evaluate the extent that rehabilitation providers' predictions are independent from known medical and non-medical determinants affecting care transitions, we conducted unadjusted and adjusted regession analyses. In both the unadjusted and adjusted Cox proportional hazard regression models, occupational and physical therapists' neutral or negative predictions of post-SNF discharge outcomes were significantly associated (p<0.05) with an increased risk that participants would have a failed transition to home (Table 3). We did not find evidence of this association among the medical providers or social workers.

Discussion

Our study examined older adults who were admitted to SNF rehabilitation units with a goal to be discharged back to their homes in the community. In partial support of our hypothesis, occupational and physical therapists' prediction of their patients' ability to live successfully in the community post-SNF discharge were associated with discharge outcomes. Interestingly, in bivariate and multivariable analyses, the predictions of the medical providers and social workers were not associated with the time to failed transition to home outcome. Additionally, nearly a quarter of the study participants (n=26) were not discharged from the SNF to home, which suggests that the initial goal of returning home may have been too ambitious for some. With regard to our secondary objective to examine patient-level factors, we found that living alone, more medical conditions, and worse physical functioning and depression were associated with whether patients had a failed transition to home. While these findings are congruent with prior research on risk factors for long-term care placement, [5–16] direct comparison to other studies is limited in that our failed transition to home outcome is a composite measure that also includes outcomes such as mortality and prolonged hospitalization.

The reasons why the predictions of some rehabilitation team members but not others were associated with post-SNF discharge outcomes are unclear. One possibility is that occupational and physical therapists frequently spend considerable time with the patients (e.g., 30–60 minutes daily) that, when compared to other rehabilitation team members, may provide these therapists a greater depth of patient specific experiences to inform their predictions. Additionally, each rehabilitation discipline has different areas of focus: medical

providers attend to health condition management, social workers address issues regarding in-home services and insurance, and occupational and physical therapists focus on patients' functional status and ability to manage functional impairments at home. This in-depth knowledge of the patients' functional impairment may help occupational and physical therapists more readily identify barriers to a successful SNF-to-home transition.

Our study has several limitations. First, our study was not designed specifically to test the predictive capabilities of SNF rehabilitation team members. The data consequently have some limitations (e.g., we did not ask each rehabilitation team member about each patient or collect information on providers such as years of experience) and our post-SNF discharge prediction findings should be considered exploratory. Second, due to the lack of precision resulting from small cell sizes, the hazard ratio point estimates should be considered cautiously. Third, our failed transition to home outcome is heterogeneous and specific to this study. Comparing our findings to other studies that examined long-term care placement, readmissions, and/or mortality thereby should be done with this limitation in mind. Fourth, the generalizability of our study may be limited because we only recruited from two SNFs and we excluded those with a known dementia diagnosis or who were unable to provide informed consent. Fifth, we do not have information on functional impairment. Lastly, we did not have enough data (n=15) to examine the post-SNF predictions of Speech and Language Pathologists.

Conclusions/Relevance

This study's preliminary results suggest that occupational and physical therapists may have unique insights into determining which post-acute rehabilitation patients will struggle with the SNF-to-home transition. Examining what factors contribute to these insights could help identify ways to further optimize this transition. For example, novel therapeutic targets (e.g., patient resiliency or ability to problem-solve) may be identified that could inform future clinical research efforts to improve the SNF-to-home transition.

Acknowledgements

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Table 1

Sociodemographic Factors, Health Characteristics, and Post-SNF Rehabilitation Predictions of the SNF Rehabilitation Residents (n=112)

	n	% or mean (SD)
Sociodemographic Factors		
Age	112	78.1 (8.6)
Sex		
Female	68	60.7
Male	44	39.3
Race		
Non-Hispanic White	91	81.3
Non-Hispanic Black or Other Race	21	18.8
Marital Status		
Married	29	25.9
Not Married or Separated	41	36.6
Widowed	42	37.5
Living Arrangement		
Lives Alone	68	60.7
Lives with Someone Else	44	39.3
Education		
High School or Less	51	45.5
Some College, Technical School, or College Graduate	61	54.5
Physical Health		
Medical Conditions Number	112	13.0 (3.8)
PROMIS Measures		
Physical Functioning	112	26.7 (8.4)
Pain	112	60.0 (12.0)
Mental Health		
PROMIS Measures		
Depression	112	55.0 (8.5)
Applied Cognitive Abilities	111	47.2 (6.3)
Social Health		
PROMIS Measures		
Instrumental Support	112	53.9 (8.1)
Ability to Participate in Social Roles and Activities	112	35.7 (11.0)
Post-SNF Rehabilitation Prediction		
Medical Providers (Medical Doctor or Nurse Practitioner)		
Positive Prediction	45	69.2
Neutral or Negative Prediction	20	30.8
Occupational Therapists		

	n	% or mean (SD)
Positive Prediction	69	85.2
Neutral or Negative Prediction	12	14.8
Physical Therapists		
Positive Prediction	63	81.8
Neutral or Negative Prediction	14	18.2
Social Workers		
Positive Prediction	36	70.6
Neutral or Negative Prediction	15	29.4

Table 2

Multivariable Cox Proportional Hazards Model of the Association of SNF Rehabilitation Residents' Sociodemographic Factors and Physical, Mental, and Social Health with a Failed Transition to Home

	Hazard Ratio	95% Confidence Interval*	P-Value
Sociodemographic Factors			
Age	1.05	0.99–1.10	0.086
Gender (ref = Female)			
Male	1.23	0.56–2.69	0.612
Race (ref = Non-Hispanic White)			
Non-Hispanic Black or Other Race	0.55	0.21–1.48	0.237
Marital Status (ref = Married)			
Not Married	2.28	0.64–8.07	0.204
Widowed	0.83	0.22–3.12	0.781
Living Arrangement (ref = Lives with Someone Else)			
Lives Alone	3.80	1.16–12.40	0.027
Education (ref = Some College, Technical School, or College Graduate)			
High School or Less	1.31	0.63–2.75	0.472
Physical Health			
Medical Conditions Number	1.11	1.00–1.22	0.045
PROMIS Measures			
Physical Functioning	0.95	0.90–0.99	0.019
Pain	1.00	0.97–1.04	0.939
Mental Health			
PROMIS Measures			
Depression	1.05	1.01–1.09	0.028
Applied Cognitive Abilities	1.01	0.95–1.07	0.734
Social Health			
PROMIS Measures			
Instrumental Support	1.02	0.97–1.07	0.426
Ability to Participate in Social Roles and Activities	0.99	0.96–1.03	0.734

In the Cox Proportional Hazards Model our outcome, failed transition to home (dichotomized as "yes/no"), is defined as an SNF rehabilitation patient who was not discharged from the SNF, transitioned to SNF long-term care, readmitted to an SNF or a rehabilitation facility following discharge, had a prolonged hospitalization, became too ill to participate, or died during the course of our study.

*
Intervals based on 95% Wald confidence limits.

Table 3

Cox Proportional Hazards Models of the Association of Rehabilitation Providers' Post-SNF Prediction with a Failed SNF-to-Home Transition

	Unadjusted			Adjusted		
	Hazard Ratio	95% CI*	P-Value	Hazard Ratio	95% CI*	P-Value
Medical Providers (Medical Doctor or Nurse Practitioner), Neutral or Negative Prediction (n=65)	1.44	0.49–4.25	0.512	0.57	0.12–2.77	0.487
Occupational Therapists, Neutral or Negative Prediction (n=81)	4.96	1.38–17.86	0.014	5.07	1.11–23.08	0.036
Physical Therapists, Neutral or Negative Prediction (n=77)	10.91	2.37–50.16	0.002	53.33	3.51–810.42	0.004
Social Workers, Neutral or Negative Prediction (n=51)	0.84	0.22–3.14	0.794	0.54	0.03–8.61	0.665

In the Cox Proportional Hazards Model our outcome, failed transition to home (dichotomized as "yes/no"), is defined as an SNF rehabilitation patient who was not discharged from the SNF, transitioned to SNF long-term care, readmitted to an SNF or a rehabilitation facility following discharge, had a prolonged hospitalization, became too ill to participate, or died during the course of our study.

Adjusted models included all of the sociodemographic and physical, mental, and social health covariates.

*
Intervals based on 95% Wald confidence limits.