

# Skilled Nursing Facility Organizational Characteristics Are More Strongly Associated With Multiparticipant Therapy Provision Than Patient Characteristics

Rachel A. Prusynski , DPT, NCS<sup>1,\*</sup>, Sujata Pradhan, PT, PhD<sup>1</sup>, Tracy M. Mroz, PhD, OTR/L<sup>1</sup>

<sup>1</sup>Department of Rehabilitation Medicine, University of Washington, Seattle, Washington, USA

\*Address all correspondence to Dr Prusynski at: [rachelp1@uw.edu](mailto:rachelp1@uw.edu)

## Abstract

**Objectives.** Multiparticipant physical and occupational therapy provision has fluctuated significantly in skilled nursing facilities (SNFs) under shifts in Medicare reimbursement policy. Multiparticipant therapy includes group (2–6 individuals per therapist) and concurrent therapy (2 individuals per therapist). This study uses recent patient-level data to characterize multiparticipant therapy provision in SNFs to help anticipate shifts under new Medicare policy and the COVID-19 pandemic.

**Methods.** This secondary analysis used data on 1,016,984 post-acute rehabilitation stays in SNFs in 2018. This analysis identified patient predictors (eg, demographic, clinical) and organizational predictors (eg, ownership, quality, staffing) of receiving multiparticipant therapy using mixed-effects logistic regression. Among individuals who received any multiparticipant therapy, those patient or facility factors associated with high rates of multiparticipant therapy provision were also determined.

**Results.** Less than 3% of individuals received multiparticipant therapy in 2018. Patient functional and cognitive impairment and indicators of market regulation were associated with lower odds of multiparticipant therapy. Effect sizes for organizational factors associated with multiparticipant therapy provision were generally larger compared with patient factors. High multiparticipant therapy provision was concentrated in <2% of SNFs and was positively associated with for-profit ownership, contract staffing, and low 5-star quality ratings.

**Conclusion.** SNF organizational characteristics tended to have stronger associations with multiparticipant therapy provision than patient factors, suggesting that changes in patient case-mix, as expected during the COVID-19 pandemic, may have less of an impact on multiparticipant therapy provision than organizational factors. Results suggest that for-profit SNFs in states with higher market regulation, SNFs providing high volumes of therapy, and SNFs utilizing high proportions of assistants and contract staff may be more responsive to Medicare policy by increasing multiparticipant therapy provision.

**Impact.** This study may help identify SNFs that are more likely to increase multiparticipant therapy provision under new Medicare payment policy.

**Keywords:** Health Policy, Occupational Therapy, Organizational Decision Making, Physical Therapy Modalities, Skilled Nursing Facilities

## Introduction

Medicare spending for skilled nursing facility (SNF) services has almost doubled in the last 15 years, totaling nearly \$28 billion in 2019.<sup>1</sup> Rising costs of SNF services have been driven in large part by increasing rehabilitation costs during short-term post-acute SNF stays.<sup>1–3</sup> New reimbursement policy implemented by the Centers of Medicare and Medicaid Services (CMS) in October 2019 drastically shifted incentives for physical therapy and occupational therapy (OT) provision in SNFs. This new policy, the Patient Driven Payment Model (PDPM), removes incentives in place under the previous Resource Utilization Group (RUG) case-mix classification system that coupled higher payments to higher volumes of therapy.<sup>4,5</sup>

It is anticipated that many SNFs will implement process changes to reduce therapy costs under PDPM.<sup>5</sup> One strategy to reduce therapy staffing costs is to replace individual therapy sessions (1 individual per therapist) with multiparticipant therapy sessions, either group therapy (multiple individuals per therapist doing similar activities) or concurrent therapy (2 individuals per therapist doing different activities).<sup>5,6</sup> Multiparticipant therapy is incentivized under PDPM, because the new policy both removes higher payments for higher volumes of intensive individual therapy and loosens the previous definition of group therapy as exactly 4 patients per therapist and allows 2 to 6 patients per group therapy session.<sup>7,8</sup> Anticipating an increase in multiparticipant therapy under PDPM, CMS limited the provision of multiparticipant therapy to a maximum of 25% of total therapy minutes for each therapy discipline, citing preference for most therapy to be individualized and tailored to patient needs.<sup>5,7,8</sup> However, while CMS is monitoring multiparticipant therapy under PDPM, no financial penalty is incurred for SNFs who exceed the 25% limit.<sup>5,8</sup>

Multiparticipant therapy provision in SNFs has previously fluctuated after changing policy.<sup>9</sup> In 2011 and 2012, CMS implemented policies that devalued multiparticipant therapy minutes when assigning individuals to RUGs (group therapy minutes were divided by 4 and concurrent therapy minutes were divided by 2 when calculating therapy minutes for RUG allocations).<sup>9</sup> Prior to that change, rates of multiparticipant therapy had been as high as 25% of therapy provided, but by 2018, multiparticipant therapy had declined to <1% of total therapy minutes.<sup>9</sup> CMS reported immediate increases in provision of multiparticipant therapy after PDPM implementation, with the percentage of SNF stays that included concurrent or group therapy increasing from <1% to 32% and 29%, respectively.<sup>10</sup> However, variability in patient case-mix, therapy practices, and quality of care across the SNF industry makes it difficult to predict whether multiparticipant therapy provision will change uniformly.<sup>11–15</sup> Additionally, the need for patient isolation during the COVID-19 pandemic reversed the increase in multiparticipant therapy; however, the decline in COVID-19 cases in SNFs after vaccination efforts may usher in another increase in multiparticipant therapy provision as the SNF industry rebounds from the pandemic.<sup>1,15–17</sup> The process of determining patient appropriateness for multiparticipant therapy provision in SNFs has not been studied, making it difficult to predict whether multiparticipant therapy provision may change depending on patient case-mix or whether multiparticipant therapy is more dependent on SNF organizational factors. Finally, targeted

monitoring for increases in multiparticipant therapy under PDPM is important, because the increase in multiparticipant therapy provision in response to new financial incentives under PDPM is not clinically indicated by a concurrent sudden shift in patient case mix or practice recommendations.<sup>15</sup> We are aware of only 1 small study examining multiparticipant therapy and patient outcomes, which showed no association between multiparticipant therapy and patient function<sup>18</sup>; thus, the impact of financially motivated precipitous increases in multiparticipant therapy on patient outcomes is unknown.

The goal of this study was to characterize multiparticipant therapy provision in SNFs immediately prior to PDPM and understand whether multiparticipant therapy provision was associated with patient and/or facility organizational characteristics. We also sought to understand which characteristics were associated with very high rates of multiparticipant therapy provision at or above the 25% limit instituted under PDPM. Establishing a baseline for multiparticipant therapy provision in SNFs prior to policy shifts will allow for comparisons in multiparticipant therapy provision after PDPM implementation and the COVID-19 pandemic as well as inform targeted quality monitoring by suggesting factors that may be associated with larger increases in multiparticipant therapy under new policy incentives.

## Methods

### Design and Data Source

This is a secondary cross-sectional analysis of 2018 CMS patient-level data. We used patient data from the Minimum Data Set (MDS) 3.0, a federally mandated assessment completed for all SNF residents.<sup>19</sup> We included demographics, data on therapy services and other clinical treatments received during the SNF stay, physical and cognitive function, and active medical diagnoses.<sup>20</sup> We merged MDS data with data on the reason for Medicare entitlement and dual Medicare and Medicaid eligibility from the 2018 Master Beneficiary Summary File base segment. We also used 3 publicly available data sources from calendar year 2018, which are aggregated by CMS at the facility level: (1) Provider of Services (POS); (2) Nursing Home Compare (NHC); and (3) Payroll Based Journal files. The POS file includes SNF characteristics such as location and ownership. NHC provides provider-level demographics and quality ratings for SNFs with at least 20 qualifying stays during the calendar year.<sup>21</sup> The Payroll Based Journal serves as an accurate source of daily paid staffing hours and census count.<sup>22,23</sup>

### Study Population

Our national sample included the first Medicare Part A SNF stay per patient in calendar year 2018 that had complete admission and discharge assessments.<sup>24</sup> With the goal of focusing on post-acute short-term rehabilitation stays, we excluded patients missing from the Master Beneficiary Summary File, patients whose SNFs were missing from the NHC or POS files, long-stay patients with a length of stay >100 days, and patients who were admitted and discharged on the same day.<sup>25–28</sup> Finally, consistent with other research focusing on rehabilitation processes in SNFs, individuals on hospice care or who were comatose at admission, individuals who died during their SNF stay, and individuals who received no therapy throughout the SNF stay were excluded.<sup>25,29–31</sup>

Interrupted stays were included if above criteria were met. For subgroup analysis, we then used MDS data on physical therapist and OT minutes to create a subset of individuals who had received multiparticipant physical therapy or OT during their SNF stay.

## Variables

We performed a full cohort analysis and a subgroup analysis of patients receiving any multiparticipant physical therapy or OT. The dependent variable in the full cohort analysis was a dichotomous indicator for the presence of any multiparticipant therapy, defined as physical therapist or OT minutes that were coded as either group or concurrent therapy on any MDS assessment during the SNF stay.<sup>6</sup> For the subgroup analysis, the proportion of multiparticipant therapy was calculated by adding all multiparticipant physical therapist and OT minutes and dividing by all physical therapist and OT minutes during all assessments completed during the SNF stay, and the subgroup analysis independent variable was a dichotomous indicator to reflect whether patients received 25% or more multiparticipant therapy.

We used the same independent variables in both analyses. Patient characteristics included age at SNF admission, gender, non-White race, need for an interpreter, marital status, disability or end-stage renal disease as reason for Medicare entitlement, and Medicare-Medicaid dual eligibility. Characteristics of the SNF stay included length of stay (LOS) and intensity of therapy provision reflected by RUG assignment. We categorized RUG assignment as nonrehabilitation RUGs or 1 of 5 rehabilitation RUGs that reflected the volume of therapy received per week: Rehab-Low (45–149 minutes of therapy), Rehab-Medium (150–324 minutes of therapy), Rehab-High (325–499 minutes of therapy), Rehab-Very High (500–719 minutes of therapy), and Rehab-Ultra High (>720 minutes of therapy).

Patient characteristics from the MDS admission assessment were selected based on CMS risk adjustment methods for rehabilitation-related quality outcome measures.<sup>32,33</sup> Functional characteristics included the activities of daily living (ADL) functional score on admission, which summarizes levels of independence on 7 functional tasks.<sup>34,35</sup> The ADL scale ranges from 0 to 28, with higher scores indicating more severe functional impairment. We included indicators for use of an assistive device (either a wheelchair, walker, cane, or prosthetic), communication or vision impairment, active delirium, falls in the last 6 months, daily patient-reported pain, and cognitive impairment on the Brief Interview for Mental Status, with scores of 13 or higher classified as no cognitive impairment, scores of 8 to 12 classified as moderate impairment, and scores <8 as severe cognitive impairment.<sup>25,36</sup> We also included indicators for behaviors such as wandering, rejection of care, and indicators of psychosis such as hallucinations or physical or verbal behavioral symptoms directed towards others.<sup>20,37</sup> A large range of active medical diagnoses and clinical treatments coded on the MDS were also included in the models (Suppl. Table). Indicators for active diagnoses were not mutually exclusive on the 2018 MDS; thus, patients could have multiple active diagnoses coded during their SNF stay.<sup>20</sup>

Organizational characteristics included rural or urban county designation<sup>38</sup>; geographic region based on 1 of 10 CMS regional designations<sup>38</sup>; location in a state with a certificate-of-need law or moratorium on opening or

expanding a SNF, which indicate states with higher market competition that attempt to increase quality and reduce SNF utilization,<sup>39–42</sup> an indicator for in-hospital vs freestanding location; ownership status (characterized as for-profit, non-profit, or government); facility size reflected by the number of Medicare-certified beds; and 5-star overall quality measures rating, which is a risk-adjusted metric that encompasses 15 clinical and physical measures to reflect the quality of care provided to SNF residents.<sup>21</sup> Finally, we included multiple characteristics related to staffing. To reflect overall therapy staffing, we included the number of physical therapist and OT paid staffing hours per patient day, which included therapists and assistants. We also adjusted for the utilization of contract vs in-house staff. First, we divided the number of physical therapist and OT contractor staffing hours per patient day by all physical therapist and OT in-house and contract staffing hours per patient day, then categorized the proportion of contract staff as 0% contractors (all-in house staff), 100% contractors, or a mix.<sup>43,44</sup> We included a measure of therapy assistant staffing, calculated as the proportion of OT and physical therapist assistant staffing hours per patient day compared with total physical therapist assistant and OT assistant and therapist staffing.<sup>45</sup> Based on a normal distribution except for many facilities employing no assistants, the proportion of assistants was categorized into quartiles, with an additional group of patients in SNFs employing 0% assistants.

## Analysis

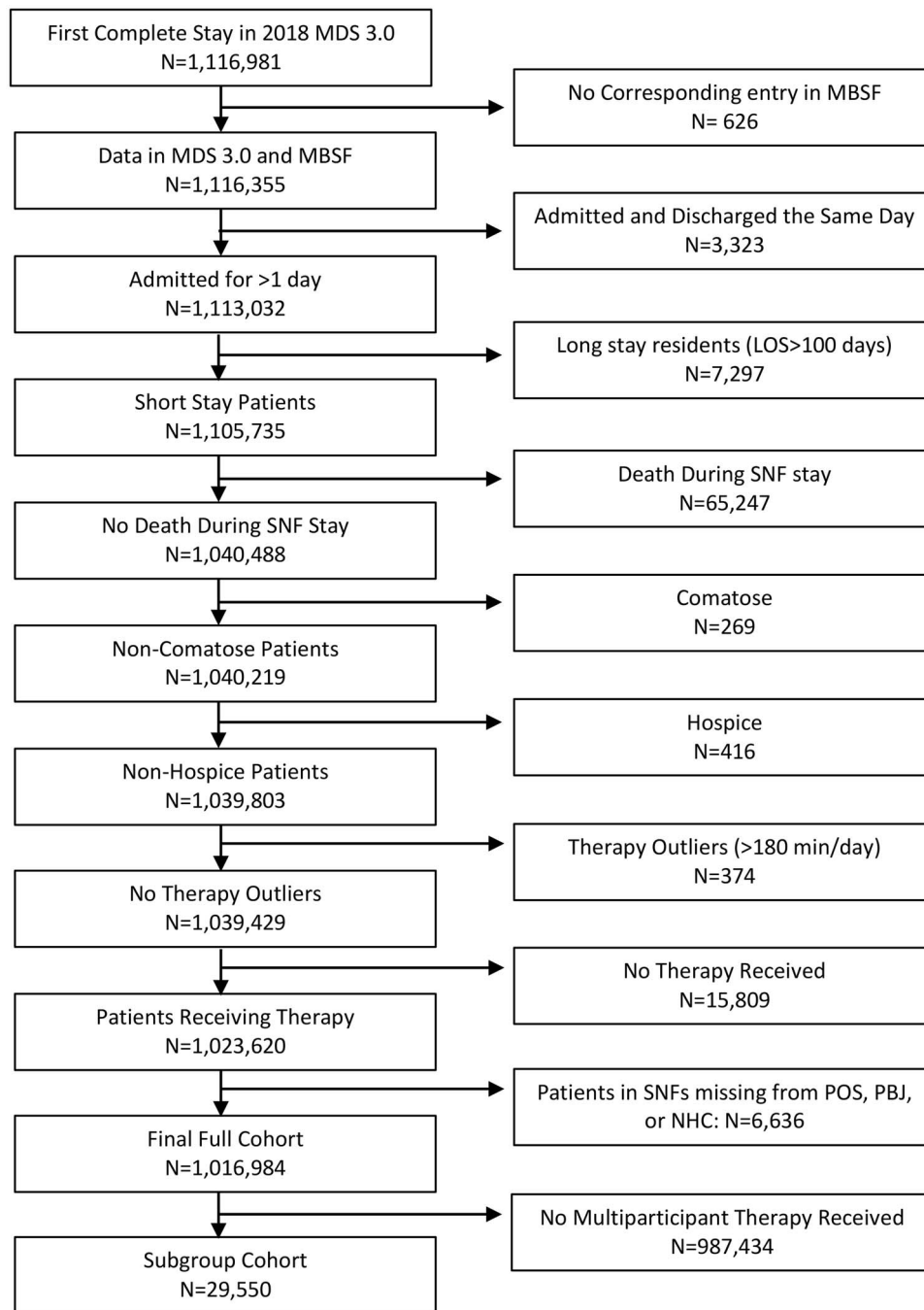
For the full cohort analysis, we calculated descriptive statistics for multiparticipant therapy provision and covariates in our full cohort and for the subgroup of patients who received any multiparticipant therapy. We used generalized mixed effects logistic regression with a random effect for facility to identify predictors of receiving multiparticipant therapy, which included the patient and facility covariates described above. In our subgroup of patients receiving any multiparticipant therapy, we also used generalized mixed effects logistic regression with a random effect for facility to identify patient- and facility-level predictors of receiving 25% or more multiparticipant therapy. Models were tested for multicollinearity by calculating variance inflation factors. Analyses were conducted using statistical software (RStudio version 1.2.5019, R Foundation for Statistical Computing, Vienna, Austria). This study was approved by the University of Washington Institutional Review Board.

## Role of the Funding Source

The funders played no role in the design, conduct, or reporting of this study.

## Results

Out of 1,116,981 complete SNF stays for unique patients in 2018, 1,016,984 patients met the inclusion criteria (91.0% of the original sample; see Figure). Only approximately 3% of patients in our full cohort received any multiparticipant therapy during their SNF stay ( $n = 29,550$ ). Rates of multiparticipant therapy were very small, with multiparticipant therapy making up an average of just 0.22% of total physical therapist and OT minutes. Concurrent therapy accounted for 0.14% of all therapy minutes and group therapy accounted for 0.11%



**Figure.** The selection of short-stay Medicare skilled nursing facility (SNF) stays from the Minimum Data Set (MDS) 3.0 during the calendar year 2018. LOS = length of stay; MBSF = master beneficiary summary file; NHC = nursing home compare provider file; PBJ = payroll based journal; POS = provider of services file.

of all therapy minutes. No significant multicollinearity was detected in either model.

### Full Cohort Analysis

Table 1 shows results of our logistic regression model for predictors of multiparticipant therapy provision in the full cohort. Longer LOS was associated with slightly higher odds of receiving multiparticipant therapy. Rehabilitation RUG group was a predictor of receiving any multiparticipant therapy, with consistently higher odds of receiving multiparticipant therapy as the volume of therapy in each RUG increased. Higher levels of functional impairment with ADLs, cognitive and communication impairments, and behavioral symptoms

were consistently associated with lower odds of multiparticipant therapy. Need for an interpreter, rejection of care, paraplegia or multiple sclerosis, and receiving transfusions or hemodialysis treatment were the patient characteristics associated with a >5% decrease in odds of receiving multiparticipant therapy.

Unlike patient characteristics, almost all organizational factors included in the model were statistically significantly associated with multiparticipant therapy provision, and effect sizes were generally larger compared with patient factors. There was no relationship between higher 5-star quality ratings and odds of receiving any multiparticipant therapy. Additionally, higher overall therapy staffing was associated with lower odds

**Table 1.** Significant Results of Full Cohort Mixed Effects Logistic Regression Model for Patient Odds of Receiving Any Multiparticipant Therapy During Skilled Nursing Facility Stays (n = 1,016,984)<sup>a</sup>

	Odds Ratio	95% CI
Demographics and SNF stay characteristics		
Female sex	1.09	1.06–1.13
Needs interpreter	0.83	0.73–0.94
Length of stay (days)	1.02	1.02–1.02
RUG group		
Non-rehab groups	Reference	
Rehab-low	0.00	0.00–0.00
Rehab-medium	1.56	1.31–1.86
Rehab-high	2.07	1.80–2.39
Rehab-very high	2.19	1.93–2.49
Rehab-ultra high	2.46	2.17–2.80
Function and behavior		
ADL Scale score on admit (0–28)	0.98	0.97–0.98
Communication impairment	0.75	0.69–0.83
Vision impairment	0.94	0.90–0.99
Cognitive impairment		
None (BIMS 13+)	Reference	
Moderate (BIMS 8–12)	0.97	0.93–1.01
Severe (BIMS 0–7)	0.84	0.79–0.89
Use of assistive device	1.31	1.20–1.43
Psychosis or behavioral symptoms	0.82	0.74–0.90
Rejected care	0.70	0.64–0.78
Active diagnoses		
Hip fracture	1.12	1.06–1.19
Major depression	0.93	0.86–0.99
Paraplegia	0.43	0.26–0.65
Multiple sclerosis	0.70	0.56–0.89
Alzheimer disease	0.89	0.81–0.97
Anxiety disorder	0.93	0.89–0.97
Treatments received		
Oxygen	0.92	0.89–0.96
Intravenous medication	0.88	0.82–0.94
Transfusion	0.72	0.53–0.97
Hemodialysis	0.76	0.69–0.85
Organizational factors		
Rural county	0.72	0.60–0.87
SNF moratorium	0.63	0.50–0.79
CMS region (headquarters)		
Region 1 (Boston)	Reference	
Region 2 (New York)	0.26	0.17–0.38
Region 3 (Philadelphia)	0.36	0.25–0.52
Region 4 (Atlanta)	0.21	0.15–0.29
Region 5 (Chicago)	0.23	0.17–0.32
Region 6 (Dallas)	0.09	0.06–0.14
Region 7 (Kansas City)	0.18	0.12–0.27
Region 8 (Denver)	0.33	0.20–0.54
Region 9 (San Francisco)	0.07	0.05–0.11
Region 10 (Seattle)	0.35	0.22–0.57
Ownership		
For-profit	Reference	
Non-profit	0.72	0.60–0.86
Government	1.04	0.74–1.48
Physical therapist and OT minutes/patient-day (15-min increase)	0.92	0.87–0.98
Contractor staffing		
All in-house	Reference	
Mix	1.14	0.91–1.43
All contract	0.74	0.61–0.89
Assistant staffing (percent assistants)		
None- 0%	Reference	
Quartile 1	2.52	1.53–4.16
Quartile 2	3.57	2.16–5.90
Quartile 3	3.27	1.97–5.43
Quartile 4	2.97	1.79–4.92

<sup>a</sup> Models are also adjusted for all covariates included in [Supplementary Table 1](#). ADL = Activities of Daily Living; BIMS = Brief Interview for Mental Status; CI = Confidence Interval; CMS = Centers for Medicare and Medicaid Services; OT = occupational therapy; RUG = Resource Utilization Group; SNF = skilled nursing facility.

**Table 2.** Significant Results of Subgroup Mixed Effects Logistic Regression Model for Patient Odds of Receiving 25% or More Multiparticipant Therapy During Skilled Nursing Facility Stays (n = 29,550)<sup>a</sup>

	Odds Ratio	95% CI
Demographics and SNF stay characteristics		
Needs interpreter	0.47	0.23–0.98
Length of stay (days)	0.99	0.99–0.99
RUG group		
Non-rehab groups	Reference	
Rehab-medium	1.40	0.86–2.28
Rehab-high	0.81	0.53–1.23
Rehab-very high	0.22	0.14–0.33
Rehab-ultra high	0.12	0.08–0.19
Function and behavior		
ADL Scale Score on Admit (0–28)	0.96	0.94–0.98
Psychosis or behavioral symptoms	0.23	0.11–0.48
Active diagnoses		
Anemia	0.82	0.69–0.98
Alzheimer disease	1.57	1.04–2.38
Treatments received		
Hemodialysis	0.17	0.06–0.49
Organizational factors		
CMS region (headquarters)		
Region 1 (Boston)	Reference	
Region 2 (New York)	3.79	1.96–7.36
Region 3 (Philadelphia)	0.90	0.48–1.69
Region 4 (Atlanta)	1.34	0.71–2.53
Region 5 (Chicago)	0.73	0.40–1.32
Region 6 (Dallas)	0.38	0.12–1.15
Region 7 (Kansas City)	0.93	0.35–2.50
Region 8 (Denver)	0.73	0.28–1.88
Region 9 (San Francisco)	1.06	0.42–2.68
Region 10 (Seattle)	2.03	0.90–4.55
Ownership		
For-profit	Reference	
Non-profit	0.56	0.36–0.85
Government	0.84	0.35–2.03
5-star quality of care rating		
1	Reference	
2	0.35	0.13–0.94
3	0.28	0.11–0.68
4	0.26	0.11–0.63
5	0.32	0.14–0.75

<sup>a</sup>Models are also adjusted for all covariates included in [Supplementary Table 1](#). ADL = Activities of Daily Living; BIMS = Brief Interview for Mental Status; CMS = Centers for Medicare and Medicaid Services; OT = occupational therapy; RUG = Resource Utilization Group; SNF = skilled nursing facility.

of multiparticipant therapy, but facilities employing therapy assistants had much higher odds of multiparticipant therapy than SNFs employing no assistants.

Multiple facility characteristics were associated with lower odds of multiparticipant therapy, including location in a rural county. Patients in facilities in states with moratoria on SNF expansion had 37% lower odds of receiving multiparticipant therapy. Compared with CMS Region 1 in the Northeastern United States, all other regions had statistically significantly lower odds of multiparticipant therapy provision, and the effect sizes for regional differences were among the largest in the regression model. Compared with patients in for-profit SNFs, patients receiving care in non-profit facilities had 28% lower odds of receiving multiparticipant therapy. In terms of staffing, use of all contract staff was associated with 26% lower odds of multiparticipant therapy compared with employing all in-house therapists.

### Very High Multiparticipant Therapy

For patients receiving any group or concurrent therapy, the rate of multiparticipant therapy was still modest at an average

of 7.55% of total therapy minutes ([Table 2](#)). We found that only 1250 patients received  $\geq 25\%$  multiparticipant therapy in 2018. Additionally, out of the 14,701 SNFs represented in our full cohort, only 291 facilities,  $< 2\%$  of all SNFs, provided  $\geq 25\%$  multiparticipant therapy to 1 or more patients in 2018. Although the median number of patients per SNF receiving  $\geq 25\%$  multiparticipant therapy was only 1 patient, 8 specific SNFs located primarily in the Northeastern United States contributed 539 (43.12%) of the 1250 patients receiving  $\geq 25\%$  multiparticipant therapy.

Predictors of receiving  $\geq 25\%$  multiparticipant therapy are provided in [Table 2](#). Among patients receiving any multiparticipant therapy, placement in a Rehab-Very High or Rehab-Ultra High RUG were associated with 78% and 88% lower odds of receiving  $\geq 25\%$  multiparticipant therapy, respectively. Compared with the full cohort model, fewer patient medical, functional, and cognitive factors were associated with receiving  $\geq 25\%$  multiparticipant therapy. However, similar to predictors of receiving any multiparticipant therapy, patients requiring an interpreter, patients with higher levels of functional impairment, and patients with psychosis or

behavioral symptoms had lower odds of receiving very high levels of multiparticipant therapy.

Similar to the full cohort model, non-profit SNFs were less likely to provide  $\geq 25\%$  multiparticipant therapy than for-profit SNFs. Unlike the full cohort model, compared with CMS Region 1 (Boston), only patients in Region 2 had statistically significantly different odds of receiving very high levels of multiparticipant therapy (odds ratio = 3.79, 95% CI = 1.96–7.36). Therapy staffing variables and location in a state with a certificate-of-need law or SNF moratorium were not associated with receiving  $\geq 25\%$  multiparticipant therapy. Unlike the full cohort model, 5-star ratings were associated with  $\geq 25\%$  multiparticipant therapy provision, with higher-quality SNFs consistently less likely to provide high levels of multiparticipant therapy.

## Discussion

This is the first study, to our knowledge, in a national cohort of patients to characterize multiparticipant therapy provision in SNFs. New payment policy led to an immediate precipitous increase in multiparticipant therapy in SNFs in the absence of strong evidence of its clinical efficacy prior to the COVID-19 pandemic.<sup>15</sup> As the SNF industry recovers from the pandemic and financial incentives for multiparticipant therapy remain, these results provide a baseline for monitoring shifts in clinical practice during PDPM and the pandemic as well as guidance for targeted monitoring of financially motivated increases in multiparticipant therapy.

Consistent with CMS reports, we found that multiparticipant therapy provision was rare in SNFs prior to PDPM, which is unsurprising given the financial disincentives for multiparticipant therapy under the previous SNF reimbursement system.<sup>5,9</sup> Patient characteristics associated with receiving any multiparticipant therapy in our models are consistent with a previous study of patients in a single SNF by Gustavson et al, which also found slightly higher odds of multiparticipant therapy in patients with better function and cognitive status who had longer LOS and received more therapy overall.<sup>18</sup> Together, these results suggest that individuals with higher levels of functional deficits or diagnoses with significant functional impairment such as paraplegia and multiple sclerosis may require more individualized therapy and support for safety with mobility during treatment sessions, making them less appropriate for multiparticipant therapy provision.<sup>31</sup> Additionally, it may be more challenging for therapists to engage individuals with cognitive impairments and behavioral symptoms such as psychosis or rejection of care in multiparticipant therapy sessions.

Facility characteristics and RUG assignment had larger associations with multiparticipant therapy provision compared with patient characteristics. In our full cohort analysis, RUG categories with higher volumes of therapy had higher odds of multiparticipant therapy provision; however, in our subgroup analysis, high-therapy volume RUGs were associated with much lower odds of receiving  $\geq 25\%$  multiparticipant therapy. This likely reflects the devaluation of multiparticipant therapy minutes in RUG calculations, so SNFs attempting to garner higher reimbursement by placing individuals into the most profitable high-volume rehabilitation RUGs were disincentivized from providing multiparticipant therapy minutes that did not fully contribute to RUG

allocation.<sup>5,46</sup> Additionally, individuals in our study who received any multiparticipant therapy had an average LOS > 3 days longer than individuals receiving no multiparticipant therapy. It is unclear whether longer LOS simply provides more opportunities for multiparticipant therapy sessions or whether individual therapy is considered more effective for achieving discharge goals by SNFs motivated to discharge specific patients in a shorter timeframe.<sup>47</sup>

Multiparticipant therapy varied by geographic factors. Patients in SNFs in states with SNF moratoria, an indicator for higher market competition and more stringent regulatory environments, and SNFs in rural counties were less likely to receive multiparticipant therapy. Because providing higher rates of multiparticipant therapy was not financially beneficial prior to PDPM, this result is consistent with research demonstrating rising SNF Medicare costs in states with more regulation on SNF growth<sup>42</sup> as well as higher rates of profit-maximizing therapy staffing and billing processes in rural SNFs.<sup>44,48</sup> Rates of very high multiparticipant therapy were concentrated mostly in a small number of SNFs located primarily in urban areas in the Northeastern United States, and a small number of SNFs accounted for significant proportions of the individuals who received very high multiparticipant therapy in 2018. These SNFs that were more accustomed to providing high rates of multiparticipant therapy for some individuals in 2018 may have systems in place to easily scale multiparticipant therapy practice to more patients after PDPM implementation.

Individuals in for-profit SNFs had both higher odds of receiving any multiparticipant therapy and very high rates of multiparticipant therapy. Although multiparticipant therapy was not lucrative for SNFs in 2018, lower rates of multiparticipant therapy in non-profit SNFs may reflect more individualized patient-centered care because non-profit SNFs have historically been shown to provide higher quality-services with better patient outcomes.<sup>12,49–53</sup> Additionally, non-profit SNFs tend to have better overall staffing and lower employment of therapy assistants,<sup>12,48,50</sup> factors associated with lower multiparticipant therapy provision in this study.

Individuals in very low-quality SNFs had higher odds of receiving very high levels of multiparticipant therapy in the subgroup analysis. Previous research by Gustavson et al found no relationship between the proportion of multiparticipant therapy and specific functional outcome measures of gait speed and the short physical performance battery; however, this was a small sample size in a single SNF.<sup>18</sup> Although the tendency for low-quality SNFs to provide higher rates of multiparticipant therapy supports the CMS cutoff for 25% multiparticipant therapy under PDPM, the broad nature of quality measures used in the 5-star rating system does not allow for specific conclusions about relationships between multiparticipant therapy and rehabilitation-sensitive outcomes. Thus, more research is needed to determine the impact of multiparticipant therapy on specific patient quality outcomes.

Finally, in terms of staffing, use of all contract therapy staff was associated with lower odds of multiparticipant therapy, which is consistent with research demonstrating that facilities that utilize more contract staff tend to engage in more profit-maximizing behavior in general.<sup>44,48</sup> Facilities that employ therapy assistants were much more likely to provide  $\geq 25\%$  multiparticipant therapy, which may point to reservation of skilled therapists for evaluation and individualized treatment sessions. Multiparticipant therapy sessions run by less skilled

assistants may have quality implications for patients; however, more research is needed to confirm distribution of assistants vs therapists across session type as well as implications of multiparticipant therapy for patient outcomes.<sup>48,54</sup>

### Limitations

This is a descriptive study presenting associations between patient and facility characteristics and multiparticipant therapy prior to PDPM implementation but does not establish directionality of these associations or causal relationships. Due to the very low proportion of multiparticipant therapy, group and concurrent therapy minutes were pooled and logistic regression models rather than linear regression models were selected; thus, we were not able to examine characteristics associated with differences in the magnitude of multiparticipant therapy provided. Future work monitoring increases in multiparticipant therapy after PDPM implementation may benefit from higher rates of multiparticipant therapy that would allow for a comparison of different levels of multiparticipant therapy provision. In addition, future research will need to consider multiparticipant therapy in the context of other responses to PDPM, such as overall declines in therapy provision and staffing of lower-paid assistants. Finally, these results are only generalizable to Medicare beneficiaries who met inclusion criteria and excludes individuals with private or Medicare Advantage insurance plans as well as individuals in a few small facilities that were not included in public use files.

We found that SNF organizational characteristics tended to have stronger associations with multiparticipant therapy provision than patient factors. These preliminary results suggest that changes in patient case-mix, which are expected as the SNF industry recovers from the COVID-19 pandemic,<sup>1</sup> may have less of an impact on multiparticipant therapy provision than organizational factors. Additionally, the sharp rise in multiparticipant therapy that occurred early after PDPM implementation likely reflects organizational profit-maximizing behavior rather than a clinically indicated response to patient needs. In our study, facility-level predictors of providing less multiparticipant therapy when it was not financially beneficial appeared to follow previous trends in which certain SNFs are more responsive to payment incentives.<sup>55,56</sup> Thus, we anticipate that for-profit SNFs in states with moratoria on SNF expansion, SNFs providing high volumes of therapy prior to PDPM, SNFs with high percentages of contract therapy staff, and SNFs employing therapy assistants may be more responsive to PDPM incentives by increasing multiparticipant therapy provision. Additionally, the small number of facilities that previously provided very high levels of multiparticipant therapy to specific patients may be prepared to extend this practice to a larger proportion of patients under PDPM, especially as multiparticipant therapy rates are anticipated to rise again as the SNF industry faces ongoing staffing shortages and isolation requirements are lifted after COVID-19 vaccination efforts.<sup>57,58</sup> Because multiparticipant therapy has not yet been shown to positively impact patient outcomes, quality monitoring will be important to understand the impact on patient outcomes across SNFs with varying levels of multiparticipant therapy.

### Author Contributions

Concept/idea/research design: R.A. Prusynski, T.M. Mroz  
Writing: R.A. Prusynski, S. Pradhan, T.M. Mroz

Data collection: R.A. Prusynski  
Data analysis: R.A. Prusynski, T.M. Mroz  
Project management: R.A. Prusynski  
Consultation (including review of manuscript before submitting):  
S. Pradhan, T.M. Mroz

### Ethics Approval

This study was approved by the University of Washington Institutional Review Board.

### Funding

This work was supported by the University of Washington Department of Rehabilitation Medicine Walter C. and Anita C. Stolov Research Fund and an HPA The Catalyst Research Grant.

### Disclosures

The authors completed the ICMJE Form for Disclosure of Potential Conflicts of Interest and reported no conflicts of interest.

### References

1. Medicare Payment Advisory Commission (MedPAC). *Report to the Congress: Medicare payment policy*. 2021. Accessed April 1, 2021. <https://www.medpac.gov/document/june-2021-report-to-the-congress-medicare-and-the-health-care-delivery-system/>.
2. Grabowski DC, Afendulis CC, McGuire TG. Medicare prospective payment and the volume and intensity of skilled nursing facility services. *J Health Econ*. 2011;30:675–684.
3. Office of the Inspector General. *The Medicare payment system for skilled nursing facilities needs to be reevaluated*. 2015. Accessed February 11, 2022. <https://oig.hhs.gov/oei/reports/oei-02-13-00610.pdf>.
4. Medicare Payment Policy Commission (MedPAC). *Skilled nursing facility services payment system: payment basics*. 2018. Accessed May 30, 2019. [https://www.medpac.gov/document/http-www-medpac-gov-docs-default-source-reports-jun18\\_medpacreporttocongress\\_rev\\_nov2019\\_note\\_sec-pdf/](https://www.medpac.gov/document/http-www-medpac-gov-docs-default-source-reports-jun18_medpacreporttocongress_rev_nov2019_note_sec-pdf/).
5. Department of Health and Human Services. *Medicare Program: prospective payment system and consolidated billing for skilled nursing facilities (snf) final rule for FY 2019*. Vol 83; 2018: 39162–39290.
6. Centers for Medicare and Medicaid Services (CMS). Coverage of extended care (snf) services under hospital insurance. *Medicare Benefit Policy Manual*. 2019. Accessed January 2, 2020. <http://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/Downloads/bp102c07.pdf>.
7. Department of Health and Human Services. *Medicare Program: prospective payment system and consolidated billing for skilled nursing facilities (SNF) proposed rule for FY 2019, SNF Value-Based Purchasing Program, and SNF Quality Reporting Program*. Vol 83; 2018.
8. Centers for Medicare and Medicaid Services (CMS). *Patient-driven payment model: frequently asked questions*. 2019. Accessed December 12, 2019. [https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/SNFPSP/Downloads/PDPM\\_FAQ\\_Final\\_v5.zip](https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/SNFPSP/Downloads/PDPM_FAQ_Final_v5.zip).
9. Medicare Payment Policy Commission (MedPAC). *Payment issues in post-acute care*. 2019. Accessed February 11, 2022. [https://www.medpac.gov/document/http-www-medpac-gov-docs-default-source-reports-jun19\\_ch9\\_medpac\\_reporttocongress\\_sec-pdf/](https://www.medpac.gov/document/http-www-medpac-gov-docs-default-source-reports-jun19_ch9_medpac_reporttocongress_sec-pdf/).
10. Department of Health and Human Services. *Medicare Program: prospective payment system and consolidated billing for skilled nursing facilities; updates to the quality reporting program and value-based purchasing program for federal fiscal year 2022*. 2021.



- Accessed October 17, 2021. <https://www.federalregister.gov/documents/2021/08/04/2021-16309/medicare-program-prospective-payment-system-and-consolidated-billing-for-skilled-nursing-facilities>.
11. Institute of Medicine Board on Health Care Services. *Interim Report of the Committee on Geographic Variation in Health Care Spending and Promotion of High-Value Care: preliminary committee observations*. 2013. Accessed October 24, 2019. <https://www.nap.edu/catalog/18308/interim-report-of-the-committee-on-geographic-variation-in-health-care-spending-and-promotion-of-high-value-care>.
  12. Comondore VR, Devereaux PJ, Zhou Q, et al. Quality of care in for-profit and not-for-profit nursing homes: systematic review and meta-analysis. *BMJ*. 2009;339:381–384.
  13. Harrington C, Carrillo H, Garfield R, Musumeci M, Squires E. *Nursing facilities staffing, residents and facility deficiencies, 2009 through 2016*. 2018. Accessed March 17, 2020. <https://www.kff.org/medicaid/report/nursing-facilities-staffing-residents-and-facility-deficiencies-2009-through-2016/>.
  14. McGarry BE, White EM, Resnik LJ, Rahman M, Grabowski DC. Medicare's new patient driven payment model resulted in reductions in therapy staffing in skilled nursing facilities. *Health Aff*. 2021;40:392–399.
  15. Centers for Medicare and Medicaid Services (CMS). *Fiscal year (FY) 2022 Skilled Nursing Facility Prospective Payment System proposed rule (CMS 1746-P)*. 2022. Accessed April 26, 2021. <https://www.cms.gov/newsroom/fact-sheets/fiscal-year-fy-2022-skilled-nursing-facility-prospective-payment-system-proposed-rule-cms-1746-p>.
  16. Domi M, Leitson M, Gifford D, Sreenivas K. Nursing home resident and staff Covid-19 cases after the first vaccination clinic. In: *The Center for Health Policy Evaluation in Long-Term Care*. Accessed April 27, 2021. <https://www.ahcancal.org/Data-and-Research/Center-for-HPE/Documents/CHPE-Report-Vaccine-Effectiveness-Feb2021.pdf>.
  17. Kooling K, McClung N, Chamberland M, et al. The advisory committee on immunization practices' interim recommendation for allocating initial supplies of COVID-19 vaccine. United States, 2020. *Morb Mortal Wkly Rep*. 2020;69:1857–1859.
  18. Gustavson AM, Forster JE, LeDoux CV, Stevens-Lapsley JE. Multiparticipant rehabilitation in skilled nursing facilities: an observational comparison study. *J Am Med Dir Assoc*. 2020;21:1920–1925.
  19. Saliba D, Buchanan J. *Development and validation of a revised nursing home assessment tool: MDS 3.0*. 2008. Accessed July 17, 2019. <https://www.cms.gov/medicare/quality-initiatives-patient-assessment-instruments/nursinghomequalityinits/downloads/mds30finalreport.pdf>.
  20. Centers for Medicare and Medicaid Services (CMS). *Long-term care facility resident assessment instrument user's manual version 1.15*. 2017. Accessed May 22, 2018. <https://downloads.cms.gov/files/mds-30-rai-manual-v115-october-2017.pdf>.
  21. Centers for Medicare and Medicaid Services (CMS). *Design for nursing home compare five-star quality rating system: technical users' guide*. 2020. Accessed November 11, 2021. <https://www.hhs.gov/guidance/document/design-nursing-home-compare-five-star-quality-rating-system>.
  22. Geng F, Stevenson DG, Grabowski DC. Daily nursing home staffing levels highly variable, often below CMS expectations. *Health Aff*. 2019;38:1095–1100.
  23. Centers for Medicare and Medicaid Services (CMS). *Payroll-Based Journal Public Use Files: technical specifications*. 2019. Accessed July 17, 2021. <https://data.cms.gov/resources/payroll-based-journal-methodology>.
  24. Vittinghoff E, Glidden D V, Shiboski SC, McCulloch CE. *Regression Methods In Biostatistics: Linear, Logistic, Survival, and Repeated Measures Models*. 2nd ed. Springer; 2012. <http://www.springer.com/series/2848>.
  25. Wysocki A, Thomas KS, Mor V. Functional improvement among short-stay nursing home residents in the MDS 3.0. *J Am Med Dir Assoc*. 2015;16:470–474.
  26. Unruh MA, Grabowski DC, Trivedi AN, Mor V. Medicaid bed-hold policies and hospitalization of long-stay nursing home residents. *Health Serv Res*. 2013;48:1617–1633.
  27. Jung H-Y, Trivedi AN, Grabowski DC, Mor V. Does more therapy in skilled nursing facilities lead to better outcomes in patients with hip fracture? *Phys Ther*. 2016;96:81–89.
  28. O'Brien SR, Zhang N. Association between therapy intensity and discharge outcomes in aged Medicare skilled nursing facilities admissions. *Arch Phys Med Rehabil*. 2018;99:107–115.
  29. Jette DU, Warren RL, Wirtalla C. Rehabilitation in skilled nursing facilities: effect of nursing staff level and therapy intensity on outcomes. *Am J Phys Med Rehabil*. 2004;83:704–712.
  30. Jette DU, Warren RL, Wirtalla C. The relation between therapy intensity and outcomes of rehabilitation in skilled nursing facilities. *Arch Phys Med Rehabil*. 2005;86:373–379.
  31. Loomer L, Downer B, Thomas KS. Relationship between functional improvement and cognition in short-stay nursing home residents. *J Am Geriatr Soc*. 2019;67:553–557.
  32. Centers for Medicare and Medicaid Services (CMS). *Nursing home compare claims-based quality measure technical specifications*; 2016. Accessed September 19, 2018. <https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/CertificationandCompliance/Downloads/New-Measures-Technical-Specifications-DRAFT-04-05-16-.pdf>.
  33. Centers for Medicare and Medicaid Services (CMS). *MDS 3.0 Quality Measures User's Manual V13.0*; 2020. Accessed January 24, 2021. <https://www.cms.gov/medicare/quality-initiatives-patient-assessment-instruments/nursinghomequalityinits/nhqqualitymeasures>.
  34. Morris JN, Pries B, Morris S. Scaling ADLs within the MDS. *J Gerontol Med Sci*. 1999;54A:546–553.
  35. Carpenter GI, Hastie CL, Morris JN, Fries BE, Ankri J. Measuring change in activities of daily living in nursing home residents with moderate to severe cognitive impairment. *BMC Geriatr*. 2006;6:1–8.
  36. Saliba D, Buchanan J, Edelen MO, et al. MDS 3.0: brief interview for mental status. *J Am Med Dir Assoc*. 2012;13:611–617.
  37. Centers for Medicare and Medicaid Services (CMS). *Nursing home compare quality measure technical specifications final*. 2016. Accessed December 4, 2019. <https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/CertificationandCompliance/Downloads/Nursing-Home-Compare-Claims-based-Measures-Technical-Specifications.pdf>.
  38. Centers for Medicare and Medicaid Services (CMS). *Provider of services current files*. 2020. Accessed October 29, 2020. <https://www.cms.gov/Research-Statistics-Data-and-Systems/Downloadable-Public-Use-Files/Provider-of-Services>.
  39. National Conference of State Legislatures. *CON-Certificate of need laws*. 2021. Accessed February 8, 2021. <https://www.ncsl.org/research/health/con-certificate-of-need-state-laws.aspx#4>.
  40. Fayissa B, Alsaif S, Mansour F, Leonce TE, Mixon FG. Certificate-of-need regulation and healthcare service quality: evidence from the nursing home industry. *Dent Health*. 2020;8:423.
  41. Paul JA, Ni H, Bagchi A. Does certificate of need law enhance competition in inpatient care market? An empirical analysis. *Health Econ Policy Law*. 2019;14:400–420.
  42. Rahman M, Galarraga O, Zinn JS, Grabowski DC, Mor V. The impact of certificate-of-need Laws on nursing home and home health care expenditures. *Med Care Res Rev*. 2016;73:85–105.
  43. Mroz TM, Meadow A, Colantuoni E, Leff B, Wolff JL. Home health agency characteristics and quality outcomes for Medicare beneficiaries with rehabilitation-sensitive conditions. *Arch Phys Med Rehabil*. 2018;99:1090–1098.e4.
  44. Prusynski RA, Frogner BK, Dahal A, Skillman S, Mroz TM. Skilled nursing facility characteristics associated with financially

- motivated therapy and relation to quality. *J Am Med Dir Assoc.* 2020;21:1944–1950.e3.
45. Mroz T, Dahal A, Prusynski RA, Skillman SM, Frogner BK. Variation in employment of therapy assistants in skilled nursing facilities based on organizational factors. *Med Care Res Rev.* 2020;78:40S–46S.
  46. Centers for Medicare and Medicaid Services (CMS). *fact sheet: concurrent and group therapy limit.* 2019. Accessed June 5, 2020. <https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/SNFPPS/PDPM>.
  47. Prusynski RA, Gustavson AM, Shrivastav SR, Mroz TM. Rehabilitation intensity and patient outcomes in skilled nursing facilities in the United States: a systematic review [in press]. *Phys Ther.* 2021;101:pzza230.
  48. Mroz TM, Dahal AD, Prusynski RA, Skillman SM, Frogner BK. Variation in employment of therapy assistants in skilled nursing facilities based on organizational factors. *Med Care Res Rev In Press.* 2021;78:40S–46S.
  49. Simning A, Orth J, Temkin-Greener H, Li Y. Patients discharged from higher-quality skilled nursing facilities spend more days at home. *Health Serv Res.* 2021;56:102–111.
  50. Bos A, Boselie P, Trappenburg M. Financial performance, employee well-being, and client well-being in for-profit and not-for-profit nursing homes: a systematic review. *Health Care Manag Rev.* 2017;42:352–368.
  51. Cary MP, Pan W, Sloane R, et al. Self-care and mobility following postacute rehabilitation for older adults with hip fracture: a multilevel analysis. *Arch Phys Med Rehabil.* 2016;97:760–771.
  52. Grabowski DC, Feng Z, Hirth R, Rahman M, Mor V. Effect of nursing home ownership on the quality of post-acute care: an instrumental variables approach. *J Health Econ.* 2013;32:12–21.
  53. Hillmer MP, Wodchis WP, Gill SS, Anderson GM, Rochon PA. Nursing home profit status and quality of care: is there any evidence of an association? *Med Care Res Rev.* 2005;62:139–166.
  54. US Department of Labor Bureau of Labor Statistics. *Occupational employment statistics: entries for physical therapists, occupational therapists, physical therapist assistants, occupational therapy assistants.* 2019. Accessed January 6, 2020. <https://www.bls.gov/oes/home.htm>.
  55. Murray PK, Love TE, Dawson NV, Thomas CL, Cebul RD. Rehabilitation services after the implementation of the nursing home prospective payment system: differences related to patient and nursing home characteristics. *Med Care.* 2005;43:1109–1115.
  56. White C. Rehabilitation therapy in skilled nursing facilities: effects of Medicare's new prospective payment system. *Health Aff.* 2003;22:214–223.
  57. Denny-Brown N, Stone D, Hays B., et al. *COVID-19 intensifies nursing home workforce challenges;* 2020. Accessed November 5, 2020. <https://aspe.hhs.gov/basic-report/covid-19-intensifies-nursing-home-workforce-challenges>.
  58. Kosar CM, White EM, Feifer RA, et al. Covid-19 mortality rates among nursing home residents declined from march to November 2020. *Health Aff.* 2021;40:655–663.