THE MILBANK QUARTERLY
A MULTIDISCIPLINARY JOURNAL OF POPULATION HEALTH AND HEALTH POLICY

Original Scholarship

CMS Initiative to Reduce Potentially Avoidable Hospitalizations Among Long-Stay Nursing Facility Residents: Lessons Learned

DENISE A. TYLER,* ZHANLIAN FENG,* DAVID C. GRABOWSKI,† LAWREN BERCAW,* MICAH SEGELMAN,* GALINA KHATUTSKY,* JOYCE WANG,* ANGELA GASDASKA,* and MELVIN J. INGBER*

*RTI International; †Harvard Medical School

Policy Points:

- Misaligned incentives between Medicare and Medicaid may result in avoidable hospitalizations among long-stay nursing home residents.
- Providing nursing homes with clinical staff, such as nurse practitioners, was more effective in reducing resident hospitalizations than providing Medicare incentive payments alone.

Context: In 2012, the Centers for Medicare and Medicaid Services implemented the Initiative to Reduce Avoidable Hospitalizations Among Nursing Facility Residents. In Phase 1 (2012 to 2016), clinical or education-based interventions (Clinical-Only) aimed to reduce hospitalizations among long-stay nursing home residents. In Phase 2 (2016 to 2020), the Initiative also included a Medicare payment incentive for treating residents with certain conditions within the nursing home. Nursing homes participating in Phase 1 continued their previous interventions and received the incentive (Clinical + Payment) and others received the incentive only (Payment-Only).

Methods: Mixed methods were used to determine the effectiveness of the Initiative and explore facilitators of and barriers to implementation that participating nursing homes experienced. We used telephone and in-person interviews to investigate aspects of implementation and a difference-in-differences regression model framework comparing residents in participating and nonparticipating

The Milbank Quarterly, Vol. 100, No. 4, 2022 (pp. 1243-1278)

nursing homes to determine the effect of the Initiative on measures of utilization, expenditures, and quality.

Findings: Three key components were necessary for successful implementation of the Initiative—staff retention and leadership stability, leadership and staff support, and provider engagement and support. Nursing homes that lacked one or more of these three components experienced greater challenges. The Clinical-Only intervention in Phase 1 was successful in reducing hospitalizations. We did not find evidence that the Clinical + Payment or Payment-Only interventions were successful in reducing hospitalizations.

Conclusions: Reducing hospitalizations among nursing home residents hinges upon the availability and support of clinical staff who can provide ongoing education to direct-care staff in the nursing home, as well as hands-on care. Use of Medicare payment incentives alone to encourage on-site treatment of residents was insufficient to reduce hospitalizations. Unless nursing homes are adequately staffed to treat residents with acute care needs, further reductions in hospitalizations will be difficult to achieve.

Keywords: nursing homes, long-term care, hospitalizations, Medicare, Medicaid, nurse practitioners.

SINCE AT LEAST THE 1980S, POLICYMAKERS AND CLINICIANS have been concerned with the rate of hospitalizations among nursing home residents.[1–3] Hospitalization in this population may cause physical and psychological stress, including delirium and disorientation. Potential complications of hospitalizations range from unnecessary tests and procedures to hospital-acquired infections, adverse drug events, and functional decline.[4] Hospitalizations of nursing home residents also result in substantial Medicare expenses.[2] The most recent federal report available indicates that in 2011 a quarter of all nursing home residents were hospitalized, costing Medicare nearly $15 billion.[5] Previous research has found that many hospitalizations from nursing homes are potentially avoidable[4,6–8] and that reducing these avoidable hospitalizations would yield significant savings to Medicare.[9]

Most nursing homes have two distinct populations: long-stay residents and short-stay residents. Long-stay residents are those who reside in the nursing home due to functional and cognitive challenges and receive support and assistance with activities of daily living. These long-stay residents will likely live out the rest of their lives there. These residents sometimes pay privately for their care, but most care for this

population is covered by Medicaid. Most long-stay residents are also covered by Medicare Part A for inpatient care and Medicare Part B for outpatient care. This Medicare-Medicaid eligible population is often referred to as "dual-eligible." Short-stay residents are those who are in the nursing home to receive rehabilitation or skilled nursing care with the goal of returning to the community setting where they resided previously, although some also transition to become long-stay residents. Most of this care is covered by Medicare Part A. Throughout this article we use the term "nursing home" for skilled nursing facilities that have long-stay residents and, in some cases simply use the word "home" for brevity.

While much research and federal policy, such as the Skilled Nursing Facility Value Based Purchasing (SNF VBP) program and the Hospital Readmissions Reduction program, have attempted to reduce rehospitalizations among short-stay residents, scant research and policy has addressed hospitalizations among long-stay residents. Misaligned incentives between the Medicare and Medicaid programs are thought to contribute to high hospitalization rates among long-stay residents, especially among those who are dual-eligible.[10] Because Medicare pays for medical services (e.g., acute care in a hospital) and Medicaid pays separately for long-term care, no single provider or other entity is accountable for overall spending and quality. As a result, little incentive exists to encourage care in a less costly setting or to coordinate care across settings. In this article, we consider physicians, nurse practitioners, and physician assistants to be providers.

These misaligned incentives in the care of long-stay nursing home residents covered by Medicaid arise before, during, and after hospitalization and oftentimes do not take into account the best outcomes for residents. Because Medicaid is not at financial risk for the bulk of hospital spending, the program has less incentive to reimburse nursing homes to invest in clinical infrastructure to avoid hospitalization. During hospitalization, most Medicaid programs offer a "bed-hold" payment to the nursing home to hold the empty bed. This provides income to facilities to offset the costs of staffing a bed that otherwise would not receive Medicaid payments. Previous research found greater odds of hospitalizations among similar residents in states with bed-hold policies than in states without, suggesting that these policies create an incentive (or remove any disincentive) for the nursing home to hospitalize residents.[11] Other research has also found higher odds of hospitalization among Medicaid residents compared with private-pay residents in the same facility.[12]

Following hospitalization, the nursing home also may benefit by receiving a higher payment from Medicare for short-term rehabilitative care.

Research has shown that many hospitalizations of long-stay nursing home residents could be avoided with increased clinical investment by nursing homes, such as increased presence of physicians,[13] nurse practitioners,[14] licensed nurses[15] and telemedicine.[16] Yet, many nursing homes lack this clinical infrastructure, with very few homes employing sufficient clinicians or nurses or investing in telemedicine.[17,18] The reason for this underinvestment relates to the misaligned incentives for Medicaid as the dominant payer of nursing home services. Medicaid pays for roughly half of all nursing home expenditures, but generally does not pay nursing homes to invest in these types of clinical infrastructure. Medicaid's failure to provide higher rates for clinical infrastructure can be explained by the disconnect in payer source across hospitals and nursing homes. When Medicaid covers the cost of clinical infrastructure in the nursing home, Medicare or Accountable Care Organizations or payer-providers in some VBP programs reap the savings from reduced hospital transfers. Medicare and Medicaid policies, therefore, establish a context for acute transfer decisions made by medical providers, nursing homes, residents and families, and hospitals. The Initiative described below sought to influence some of those decisions by providing alternative incentives.

Initiative to Reduce Avoidable Hospitalizations in Nursing Homes

In 2012, the Centers for Medicare and Medicaid Services (CMS) implemented the Initiative to Reduce Avoidable Hospitalizations Among Nursing Facility Residents to address these misaligned incentives and reduce hospitalizations. Under Medicare auspices, convening organizations (known as Enhanced Care and Coordination Providers or ECCPs), which usually were focused on an individual state, developed an intervention, either clinical or education-based, aimed at reducing hospitalizations among long-stay nursing home residents. ECCPs applied to participate in the intervention and were selected by CMS, with each working directly with participating nursing homes in their state. In its second phase, begun in 2016, the intervention also included a Medicare payment incentive to nursing homes for treating residents with certain conditions within the nursing home.

In Phase 1 (NFI 1), which took place from 2012 to 2016, ECCPs placed salaried nurse practitioners or RNs in participating homes and developed other interventions to reduce potentially avoidable hospitalizations (PAHs) in nursing homes (Clinical-Only homes). PAHs are those that, based on expert clinician input, are more likely to be preventable or able to be managed on-site without a transfer to the hospital.[19,20] Required elements of the interventions included hiring on-site staff to focus on medication management, improving communication, and enhancing coordination among nursing home staff, residents' physicians, pharmacies, and hospitals. Availability of other elements, such as a focus on health information technology tools, telemedicine, dental care, or leadership education varied by ECCP. All ECCPs included training on advance directives and end of life and palliative care, which would be expected to reduce hospitalizations. ECCP nurses provided clinical care to Initiative-eligible residents or served as advisers to home staff. In five ECCPs, the nurses provided a mix of hands-on care and resident oversight, as well as education to nursing home staff. In the remaining two, the ECCP nurses did not provide clinical care, instead serving as advisers using a train-the-trainer model to educate nursing home staff. NFI 1 focused exclusively on these clinical and educational interventions to reduce potentially avoidable hospitalizations, with no payment incentive provided to participating nursing homes or clinical care providers.

Phase 2 (NFI 2), which took place from 2016 to 2020, added a payment incentive to the Initiative, providing both participating homes and providers (e.g., physicians, nurse practitioners, physician assistants) with financial motivation to further reduce PAHs. NFI 2 also narrowed its focus from preventing all types of PAHs to providing on-site treatment for and avoiding hospitalizations specific to six qualifying conditions responsible for a large proportion of the hospitalizations in this population: pneumonia, congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD)/asthma, fluid/electrolyte disorder or dehydration, skin infection, and urinary tract infections (UTI).

For NFI 2, ECCPs enrolled an additional cohort of nursing homes, creating two distinct intervention arms. This new group (Payment-Only homes) received access to the new payment incentive but not the original clinical/educational interventions from NFI 1. Nursing Homes that had participated in NFI 1 continued to receive these original interventions in addition to the new payment incentive (Clinical + Payment homes). ECCPs and Clinical + Payment facilities varied in whether they

continued to include a focus on advance directives and end of life care, but in most cases these elements were greatly reduced. Few Payment-Only facilities included these elements. At the end of NFI 1, there were 143 participating Clinical-Only homes working with ECCPs in Alabama, Indiana, Missouri, Nebraska, Nevada, New York, and Pennsylvania.[18] For NFI 2, there were 112 Clinical + Payment homes in 2017, and 111 in 2018-2019 working with ECCPs in six states (Alabama, Indiana, Missouri, Nevada, New York, and Pennsylvania). There were 148 Payment-Only homes from six states (Alabama, Colorado, Indiana, Missouri, New York, and Pennsylvania) in 2017-2019.[20,21]

Under the payment incentive, homes and providers could bill Medicare for on-site treatment for the six conditions using three types of payments: (1) per diem payments to the home under Medicare Part B for treatment of the qualifying conditions, and (2) increased provider payments under Medicare Part B for the diagnosis, certification, and treatment of qualifying conditions on-site at the home. A third provider payment for care coordination and caregiver engagement was dropped from the Initiative in January 2019 because similar care coordination Medicare billing codes already existed; participating physicians reported that the existing codes were more convenient to bill than the new NFI 2 care coordination codes, so the NFI 2 codes were dropped by CMS owing to low utilization.

We conducted a mixed methods evaluation of the Initiative that sought to address the following research questions:

- What facilitators and barriers did participating nursing homes encounter during implementation?
- What is the effect of the Initiative on Medicare utilization and expenditures overall and for hospital-related services?
- What is the effect of the Initiative on quality of care?

Methods

A mixed methods evaluation of the Initiative was designed to ascertain its effectiveness toward (a) reducing avoidable hospitalizations among long-stay residents, (b) improving resident health outcomes, and (c) reducing overall health care spending, while also exploring facilitators of

and barriers to implementation that participating nursing homes experienced. Our qualitative and quantitative methods are described below.

Qualitative Data Collection and Analyses

We collected qualitative data annually from 2013 to 2020 from participating nursing homes to examine implementation processes, perceived successes and challenges, and evolution of the Initiative over time. These data served two key functions: (a) to provide firsthand implementation accounts from participating nursing home staff, leadership, and practitioners, and (b) to offer real-world context for framing the quantitative results. Data were collected annually during site visits with the ECCPs and with personnel at selected nursing homes. Telephone interviews were conducted with most of the remaining nursing homes.

Each year, we conducted telephone interviews in most nursing homes (N = up to 40 homes/year/ECCP) followed by site visits to selected nursing homes (N = 4 to 9 homes/year/ECCP). Each telephone interview lasted approximately 30 minutes and covered a range of topics including staff training and engagement, provider engagement, resident and family response, changes in hospitalization rates, and experience with specific aspects of the Initiative. Although not all nursing homes were interviewed every year, we reached thresholds annually for a host of criteria within each ECCP, including nursing home size, ownership type, urban/rural location, quality rating, and resident minority status.

Site visits were conducted in person with different nursing homes after telephone interviews were complete and lasted 5–10 days, including at least one day spent interviewing the ECCP leadership team. Interview questions for the ECCP leaders included ongoing nursing home relationships, provider engagement, statewide policy changes that might affect the Initiative, and macro-level trends observed across participating homes. These ECCP interviews included one-on-one conversations with all members of ECCP leadership and key support staff; each interview lasted between 45 and 90 minutes. Nursing home interviews typically lasted 15-45 minutes each and included individual interviews with administrators, directors of nursing, assistant directors of nursing, billing office managers, physicians, nurse practitioners, charge nurses, direct-care staff, social services, and residents and families. The

same protocol was used for site visits as had been used for telephone interviews, though additional probes were used during the site visits.

All telephone interviews and site visits were documented with typed verbatim notes. These notes were entered into NVivo for coding. A standardized codebook was established across project years to compare findings over time, and all coders underwent the same codebook training and reached the same interrater reliability standard ($K \geq 0.75$). Both raw notes and coded output were used to summarize key themes within and across ECCPs.

Quantitative Data Analysis

Three separate interventions were tested over two time periods, Clinical-Only in NFI 1, and Payment-Only and Clinical + Payment in NFI 2, Although CMS paid the same payment incentives across states, ECCPs provided different levels of billing-related support to nursing homes. Moreover, there were important differences between ECCPs in how the clinical and educational interventions were applied.[19,20] For these reasons, we evaluated each arm of the Initiative both separately for each ECCP and by combining the ECCPs within each arm.

We evaluated the impact of the Initiative on measures of utilization, expenditures, and quality relative to a comparison group using a difference-in-differences regression model framework. Our quantitative analyses sought to address these questions:

1. (NFI 1: Clinical-Only homes) What impact did the clinical and educational interventions have on utilization, expenditure, and quality outcomes of interest during the period 2014-2016?
2. (NFI 2: Clinical + Payment homes) What was the impact of supplementing the NFI 1 clinical and educational interventions with the addition of the NFI 2 payment incentive during 2017-2019?
3. (NFI 2: Payment-Only homes) What impact did the payment incentive alone have on a new group of homes not previously involved with NFI 1 during 2017-2019?

To address these questions, we used the nursing home Minimum Data Set (MDS) and Medicare claims and administrative data to identify the eligible fee-for-service (FFS) long-stay study populations and

comparison groups, as well as to measure the outcomes. The Initiative set different resident eligibility criteria for NFI 1 and NFI 2 (see Table 1).

To evaluate the three Initiative interventions, we used different comparison group strategies. For the NFI 1 Clinical-Only intervention, we created a comparison group for each ECCP by using propensity score matching to select within-state comparison nursing homes and then selected the long-stay residents enrolled in Medicare FFS that met all eligibility criteria and resided in the comparison nursing homes as the comparison group (a within-state comparison group). For the two interventions involving the NFI 2 payment incentive, we selected Medicare FFS long-stay residents in non-Initiative states that met Initiative eligibility criteria and then used resident-level propensity scores to exclude any residents that were very different from eligible residents in Initiative homes to obtain a single national comparison group. We chose a national comparison group because the ECCPs had gone beyond working with their recruited nursing homes and promoted their interventions throughout their states, which raised the concern that the within-state comparison group would no longer provide a valid counterfactual. However, as a sensitivity analysis, we also used a within-state comparison group and briefly summarize results.

We measured all outcomes at the resident-year level: residents could be observed in multiple years and were counted separately in each year. We estimated a single per resident per year intervention effect for 2014-2016 in the case of NFI 1, and for 2017-2019 in the case of NFI 2 and report the Initiative impact on the probability of inpatient hospitalizations and outpatient emergency department (ED) visits, as well as associated expenditures and total Medicare expenditures. We also summarize the Initiative impact on MDS-based quality measures. We consider both all-cause hospitalizations and ED visits, as well as PAHs and potentially avoidable ED visits. For the interventions involving NFI 2 that focused on the six conditions, we additionally present the impact of the intervention on hospitalizations and ED visits for the six conditions. We identified potentially avoidable events and events for the six conditions specifically based on the principal diagnosis ICD-9 or ICD-10 code, and, in some cases, based on combinations of principal and secondary diagnoses.

We employed different strategies in choosing a baseline period for the difference-in-differences analysis between NFI 1 and NFI 2. For the NFI

Table 1. **NFI 1 and NFI 2 Evaluation Methods**

Methodological Consideration	NFI 1	NFI 2	
	Clinical Only	Clinical + Payment	Payment Only
Definition of long-stay residents	101 days or an MDS assessment indicating no discharge plan	101 days and only eligible after reaching 101 days and no hospice enrollment	
Size of intervention group (for utilization analyses)	2014-2016: 64,913	2017-2019: 32,267	2017-2019: 36,164
Intervention group consists of participating nursing homes in these states	AL, IN, MO, NE, NV, NY, PA	AL, IN, MO, NV, NY, PA	AL, CO, IN, MO, NY, PA

Continued

Table 1. (Continued)

Methodological Consideration	NFI 1	NFI 2	
	Clinical Only	Clinical + Payment	Payment Only
Comparison group	Long-stay residents in in-state nursing homes that were matched using propensity scores to Initiative nursing homes	Long-stay residents in nursing homes in other states; propensity scores used at the resident level to achieve common support	
Comparison group size	2014-2016: 113,665	2017-2019: 1,865,055	
Intervention years	2013-2016	2017-2020	
Evaluation years	2014-2016	2017-2019 (2020 not included due to COVID-19 pandemic)	
Baseline year(s)	2012	2014-2016 with linear trend	

Continued

Table 1. (Continued)

Methodological Consideration	NFI 1	NFI 2	
	Clinical Only	Clinical + Payment	Payment Only
Statistical methods - probability	GEE model with a binomial distribution and logit link; exchangeable working correlation structure to account for nursing home clustering	Logistic regression with standard errors clustered at nursing home level	
Expenditure outcomes	Not annualized (per resident per year for the length of time they were observed)	Annualized (per resident-year)	
Statistical methods - expenditures	Used GLM with log link and gamma distribution for total expenditures; two-part model (logistic to predict whether having nonzero expenditures [yes/no] and then GLM to predict amount) for the other expenditure measures. Adjusted standard errors to account for nursing home-level clustering		

1 Clinical-Only intervention evaluation we used a single baseline year (2012). To evaluate the NFI 2 interventions, we used three years (2014-2016). We found different trends between the intervention and comparison groups during the 2014–2016 baseline period, where some of the outcomes of interest improved in the intervention group relative to the comparison group, largely due to the impact of NFI 1.[21] Difference-in differences models assume parallel trends would exist without the intervention. To adjust for the non-parallel trends, we included a time trend term in the model capturing the trend difference projecting it into the first Initiative year (2017). We did not project further as the improving trend of the participant group would not be expected to continue indefinitely. We identified the effect of the NFI 2 intervention as the difference between the change in the intervention group relative to its baseline trend and the change in the comparison group relative to its baseline trend. All models incorporated comprehensive resident-level risk adjustment for demographics, dementia diagnosis, functional impairment, and comorbidities based on hierarchical condition categories (HCCs). The model included nursing home-level variables such as profit status. In our modeling, we also accounted for resident exposure time, and included state-level dummy variables to account for state policies and other factors at the state level which could impact the outcome.

We ran a sensitivity analysis where we evaluated all three interventions based on a common (national) comparison group and a common baseline year (2012). We briefly summarize these results below.

Using the estimated coefficients from the regression model, we calculated the estimated impact of participation in the Initiative on each given outcome (the marginal effect). For example, for every Initiative resident, we calculated the predicted probability of an inpatient hospitalization based on the estimated coefficients and the actual values of the variables for that specific resident. We did this twice—once with the Initiative effect term "turned on" and once with it "turned off." The difference is the marginal effect of the Initiative on the probability of inpatient hospitalization for each Initiative resident. We then computed the average of the marginal effects for the population. We followed this process for all of the outcomes presented in this paper. Instead of presenting the marginal effects in absolute terms, we present them relative to the anticipated mean level in the absence of the intervention (the relative effect).

We provide additional information and summarize our evaluation methods in Table 1. Further details about evaluation methods, including eligibility criteria, comparison group selection, statistical methods, and model covariates, other differences between the approaches to evaluate the different interventions, and additional sensitivity analyses are detailed in the full evaluation reports.[19,20]

What Facilitators and Barriers Did Participating Nursing Homes Encounter During Implementation?

Our qualitative analysis found that three key components were necessary for establishing and maintaining the Initiative in nursing homes: staff retention and leadership stability, leadership and staff support, and provider engagement and support. Nursing homes that lacked one or more of these three components experienced greater challenges in early identification and treatment of resident changes in condition, reducing avoidable hospitalizations, and submitting claims to earn payment incentives under NFI 2.

Nursing Home Staff Retention and Leadership Stability

Interviewees across ECCPs consistently reported that staff retention and leadership stability were key: high rates of staff turnover disrupted Initiative implementation and required constant retraining on the Initiative components. Throughout NFI, and especially in the Clinical-Only and Clinical + Payment homes, ECCP leadership focused on improving communication between nursing staff and providers, and training staff to implement new processes and tools (i.e., INTERACT[21]) for both sharing and documenting resident status. As one administrator shared, "With turnover, it's hard to get people caught up on the [Initiative] process." With high turnover rates, team continuity suffered, disrupting newly established practices and lines of communication.

Nursing Home Leadership and Staff Support

The Initiative was predicated on teamwork and communication: direct-care and clinical staff working together to identify resident changes in

condition and partnering with providers to treat those conditions before they exacerbate. Nursing home interviewees noted that effective communication starts with strong support from nursing home leadership who engender staff buy-in throughout the home. Nursing homes with commitment to the Initiative by the administrator, director of nursing, and other key staff encouraged greater Initiative engagement among employees at all levels. As one administrator noted, "I appreciate the interprofessional collaboration it [the Initiative] forces the facility to do… I think it improves the inter-professional communication system." Conversely, in nursing homes with poor leadership and staff engagement, the Initiative tended not to be a staff priority. An administrator shared, "To be honest, I don't really think it's changing much because it goes back to the idea that you need the nurses to really buy into it. If they're not [buying in]… it's not going to make much of a difference." These varying degrees of staff engagement created substantial differences between nursing homes in Initiative implementation and billing for on-site care in NFI 2 across nursing homes.

Provider Engagement and Support

Since the NFI 2 financial component was added to encourage greater Initiative buy-in for nursing homes and providers, the evaluation sought to understand how this incentive functioned and whether providers felt it was effective. Although NFI 2 interview findings indicated that adoption of the Initiative billing codes was low and few providers submitted their own claims, most were supportive of the Initiative goals to avoid PAHs and treat residents in-house as much as possible. This provider support enabled nursing homes to submit NFI 2 claims and receive reimbursement. Numerous interviewees also noted that having provider support strengthened overall staff engagement; communication tools and focus on specific changes in resident condition helped create stronger partnerships between nursing staff and providers. When nursing home relationships with providers were weaker, they faced Initiative implementation challenges. As one administrator noted, "We've had people qualify [for the Initiative billing] and all the paperwork and documentation was done, but we could not submit without the physician." Since Initiative claims submissions required in-person physician confirmation, nursing homes with unengaged practitioners were unable to benefit of the Initiative's financial incentive.

Participating nursing homes appreciated having ECCP nurses, particularly nurse practitioners, and acknowledged the value they bring by providing education, clinical assessment and care, and NFI implementation support. One nurse highlighted the importance of these providers, noting that the greatest success of the Initiative is "having [a nurse practitioner] in the building every day." Acknowledging the benefits from the ECCP nurse presence, several nursing homes reported plans to hire their own nurse practitioners post-Initiative to sustain Initiative components and support early identification and treatment of changes in condition, even without the payment incentive.

Nursing home interviewees who reported Initiative implementation challenges as a result of staff turnover, low staff and leadership buy-in, or low practitioner engagement, noted that future Initiatives might be better served by anticipating and targeting these difficult issues early. In particular, physical provider presence in the home may be among the most critical components necessary to effect change in nursing homes. Providers, including physicians, nurse practitioners, and physician assistants, seemed to contribute most to the Initiative when visiting the residents often to deliver care. Several nursing homes reported their providers increasing the average number of hours they spend in nursing homes each week, and some nursing homes contracted with their own nurse practitioners to increase their presence. Many other nursing homes struggled to hire on-site nurse practitioners or other clinicians to provide full-time coverage, finding the cost of funding these positions prohibitive.

What Was the Effect of the Initiative on Medicare Utilization and Expenditures Overall and For Hospital-Related Services?

Impact of Clinical-Only Intervention on Utilization and Expenditures

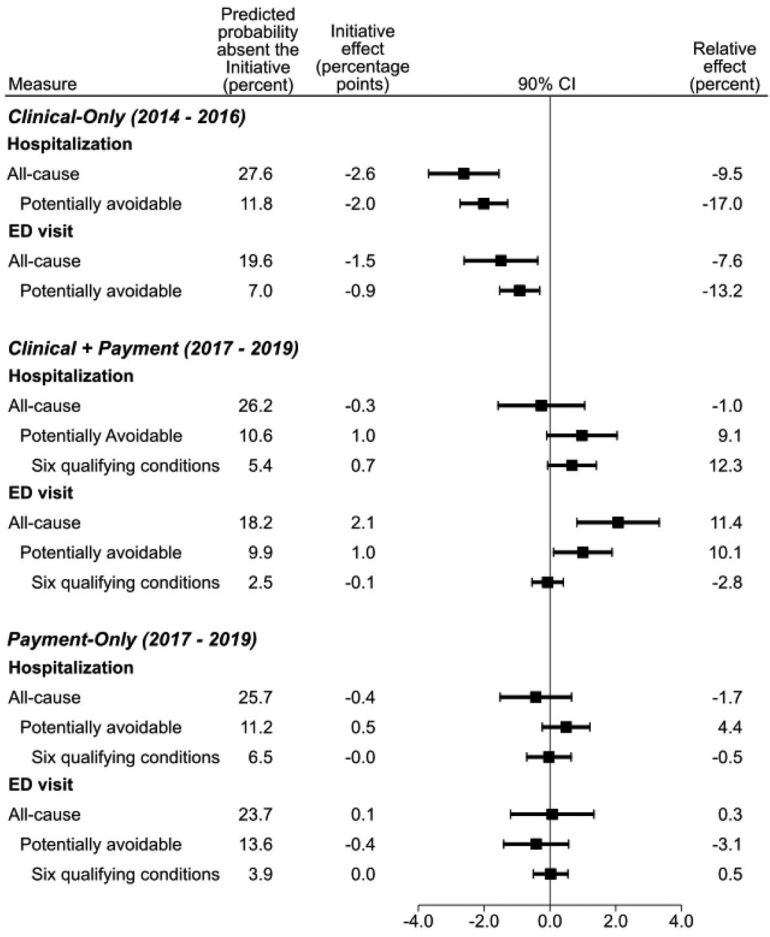
Based on the utilization and expenditure measures, the Clinical-Only intervention in NFI 1 was successful in reducing hospitalizations for long-stay nursing home residents. The Clinical-Only intervention was

associated with favorable consistent reductions in hospitalizations, PAHs, ED visits, potentially avoidable ED visits, and related Medicare expenditures. Many of the effects were statistically significant. When all ECCPs were combined in a single model together, all effects were in the favorable direction (reductions) and most were statistically significant (Figures 1 and 2). For example, participation in the intervention was associated with a statistically significant 2.6 percentage point drop in all-cause hospitalizations, which represents a relative decrease of 9.5% (see Figure 1). When analyzing ECCPs separately (Table 2), the reductions were largest and all were statistically significant in Missouri. There were consistent reductions, often statistically significant in Alabama, Indiana, and Pennsylvania (although there were a couple of non-significant increases in Alabama). There were consistent reductions, mostly non-significant in New York, and the effects were mixed in Nebraska and Nevada.

Impact of Clinical + Payment on Utilization and Expenditures

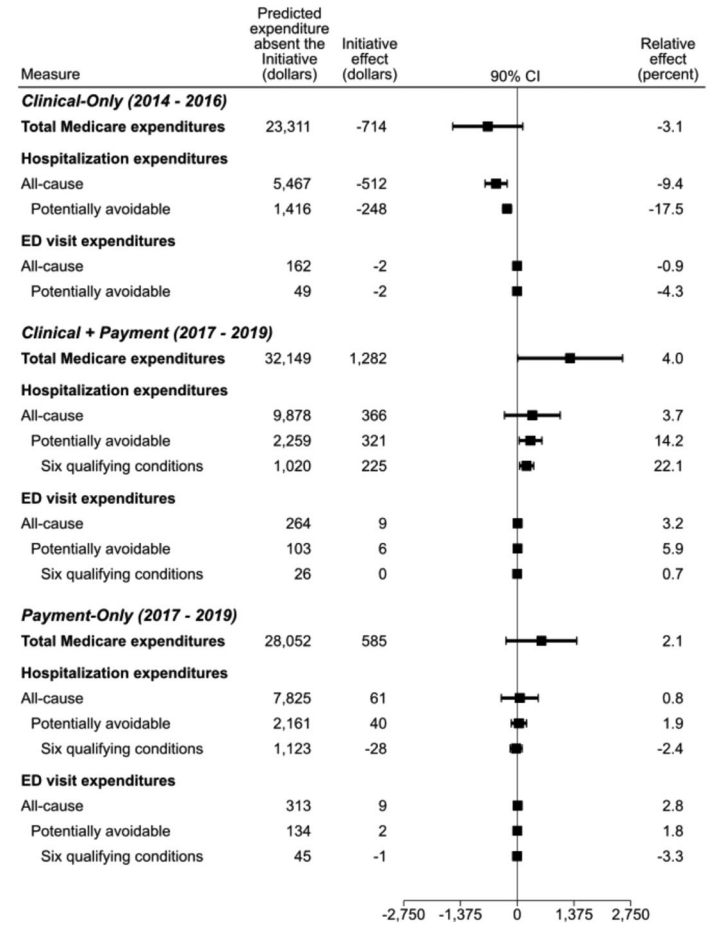
Based on all ECCPs combined, the addition of the payment incentive to the existing clinical interventions did not result in consistent reductions for residents in any of the hospital-related utilization outcomes or expenditures, beyond what was achieved with the clinical interventions during NFI 1 and expected based on the baseline trend over the years 2014–2016 (Figures 1 and 2). On the contrary, we observed a pattern of unfavorable increases in these outcomes when combining all ECCPs together, some of which were statistically significant. For example, participation in the intervention was associated with a statistically significant 2.1 percentage point increase in all-cause ED visits, which represented a relative increase of 11.4% (Figure 1). When considering each ECCP separately (Table 3), there were no statistically significant changes in Alabama or New York. In the other states, we observed a pattern of unfavorable increases, some of them statistically significant, with the pattern of increases strongest in Missouri and Pennsylvania. We describe elsewhere[20] that the findings of unfavorable increases can be attributed at least partially to statistical modeling choices. However, our finding that there was no evidence for favorable reductions is robust to modeling strategy.

Figure 1. Intervention effect on probability of any utilization, per resident per year, during intervention period, all ECCPs combined



Note: The *predicted probability absent the Initiative* is the mean of the predicted probabilities of experiencing the event during their respective exposure period, for the residents in the intervention group, under the scenario that the intervention did not occur. The *Initiative effect* is calculated based on a difference-in-differences regression model with a national comparison group and adjusted for resident-level and facility-level characteristics. It is the difference between the predicted probabilities of the event with and without the intervention.

Figure 2. Intervention effect on Medicare expenditures, per resident per year, during intervention period, all ECCPs combined



Notes: The *predicted expenditure absent the Initiative* is the mean of the predicted expenditures, for the resident in the intervention group, under the scenario that the intervention did not occur. Predicted expenditures for 2017-2019 are based on a resident being eligible for the Initiative for the entire year (365 days). The Initiative effect is calculated based on a difference-in-differences regression model with a nationally selected comparison group and adjusted for resident-level and facility-level characteristics. It is the difference between the predicted expenditures with and without the intervention.

Table 2. Intervention Effect on Probability of Any Utilization and on Medicare Expenditures, Per Resident Per Year, During Intervention Period, Clinical-Only, 2014-2016, Relative Effect (% Mean)

Probability of Having at Least One	All States	Alabama	Indiana	Missouri	Nebraska	Nevada	New York	Pennsylvania
All-cause hospitalization	-9.5***	-3.2	-19.3***	-27.4***	-8.6	-20.0***	-10.0**	-12.6*
Potentially avoidable hospitalization	-17.0***	-10.0*	-32.6***	-45.3***	-15.4	-18.2	-12.5*	-19.6
All-cause ED visit	-7.6**	-19.1***	-3.9	-32.1***	5.3	3.8	-5.0	-5.0
Potentially avoidable ED visit	-13.2**	-25.4***	-15.9	-43.9***	8.6	12.7	-15.0	-28.2**
Expenditures								
Total	-3.1	0.7	-6.9*	-6.3*	-7.7	-20.8**	-1.9	-12.3***
All-cause hospitalizations	-9.4***	2.5	-21.6***	-28.6***	-20.1**	-27.3***	-7.3	-27.6***
Potentially avoidable hospitalizations	-17.5***	-4.7	-24.9*	-40.2***	-20.8	-28.0*	-13.3	-35.3***
All-cause ED visits	-0.9	-21.3***	-8.7	-36.3***	32.4*	25.7*	-8.7	-20.5*
Potentially avoidable ED visits	-4.3	-19.9*	-24.1	-42.8***	40.9	56.9*	-9.8	-39.9***

*/**/*** = significantly different from zero based on a p-value cutoff of 0.1/0.05/0.01

Table 3. Intervention Effect on Probability of Any Utilization and on Medicare Expenditures, Per Resident Per Year, During Intervention Period, Clinical + Payment, 2017–2019, Relative Effect (% Mean)

	All States	Alabama	Indiana	Missouri	Nevada	New York	Pennsylvania
Probability of Having at Least One							
All-cause hospitalization	-1.0	-9.6	-0.7	14.0**	-7.2	-1.3	7.2
Potentially avoidable hospitalization	9.1	3.9	0.7	15.6	27.7***	0.5	31.3*
Potentially avoidable hospitalization (6 conditions)	12.3	11.7	4.3	21.8	27.6**	-14.0	76.4***
All-cause ED visit	11.4***	8.8	-6.7	28.2**	12.8	10.1	24.8**
Potentially avoidable ED visit	10.1*	5.9	-1.4	27.2*	20.6	8.0	18.2
Potentially avoidable ED visit (6 conditions)	-2.8	-21.3	8.5	66.2*	-21.1	-7.9	19.1
Expenditures							
Total Medicare Expenditures	4.0*	-0.4	-1.2	8.7**	1.3	4.4	9.4*
All-cause hospitalization	3.7	-2.3	1.7	19.5***	-15.5	2.4	16.9*

Continued

Table 3. (Continued)

Probability of Having at Least One	All States	Alabama	Indiana	Missouri	Nevada	New York	Pennsylvania
Potentially avoidable hospitalization	14.2*	5.8	1.1	3.5	29.3*	14.3	47.2**
Potentially avoidable hospitalization (6 conditions)	22.1**	19.4	37.9*	-13.6	40.7	1.5	109.2***
All-cause ED visit	3.2	5.2	-13.8	14.6	9.9	-4.7	26.8
Potentially avoidable ED visit	5.9	10.5	-12.3	21.2	19.3	0.3	5.6
Potentially avoidable ED visit (6 conditions)	0.7	-5.1	24.4	20.3	81.4	-27.3	-2.3

*/**/*** = significantly different from zero based on a p-value cutoff of 0.1/0.05/0.01

Impact of Payment-Only Intervention on Utilization and Expenditures

We did not find evidence that the payment incentive was successful in improving resident outcomes when we analyzed Payment-Only pooled data from all ECCPs. There was no evidence for consistent impacts on hospital-related utilization or expenditures in either a favorable or unfavorable direction, and none of the changes were statistically significant (Figures 1 and 2). There were a handful of statistically significant changes in the individual ECCPs, but no patterns that appeared meaningful. There was at least one statistically significant unfavorable increase in Alabama, Colorado, Missouri, and Indiana, and at least one statistically significant favorable decrease in Colorado and Pennsylvania (Table 4).

Impact of Clinical-Only, Clinical + Payment, and Payment-Only Interventions Based on Sensitivity Analyses

Our sensitivity analysis, where we simultaneously assessed the Clinical-Only, Clinical + Payment, and Payment-Only interventions, using a common national comparison group and baseline year (2012), confirmed our previous findings. The Clinical-Only intervention during NFI 1 was associated with favorable reductions in hospital-related utilization and expenditure measures. We did not find consistent evidence of favorable reductions due to the introduction of payment incentives in either the Clinical + Payment or Payment-Only groups. Although patterns were slightly more favorable, we also did not find consistent evidence for favorable reductions associated with the Clinical + Payment and Payment-Only interventions based on running a sensitivity analysis using a within-state comparison group. Full results from the sensitivity analyses are reported elsewhere.[20]

What Was the Effect of the Initiative on Resident Quality of Care?

The NFI evaluation also examined the impact of the intervention on resident quality of care measures, including falls with injury, self-reported moderate to severe pain, pressure ulcers, UTI, catheter inserted and left

Table 4. Intervention Effect on Probability of Any Utilization and on Medicare Expenditures, Per Resident Per Year, During Intervention Period, Payment-Only, 2017-2019, Relative Effect (% Mean)

Probability of Having at Least One							
	All States	**Alabama**	**Indiana**	**Missouri**	**Colorado**	**New York**	**Pennsylvania**
All-cause hospitalization	-1.7	2.9	0.1	0.8	3.7	-5.6	-6.2
Potentially avoidable hospitalization	4.4	21.7*	3.8	-1.5	1.7	7.0	-9.7
Potentially avoidable hospitalization (6 conditions)	-0.5	14.5	-1.5	-7.6	-8.6	-0.9	-3.1
All-cause ED visit	0.3	1.6	8.8	6.7	-4.2	-3.4	-10.2
Potentially avoidable ED visit	-3.1	-3.3	-2.1	4.8	-6.5	-8.0	-4.8
Potentially avoidable ED visit (6 conditions)	0.5	-0.9	1.9	31.7*	-28.1**	0.4	-10.5
Expenditures							
Total Medicare Expenditures	2.1	4.0	-4.0	3.8	13.6**	4.4	-6.5
All-cause hospitalization	0.8	5.8	-4.0	5.1	2.1	4.5	-13.8

Continued

Table 4. (Continued)

Probability of Having at Least One							
	All States	Alabama	Indiana	Missouri	Colorado	New York	Pennsylvania
Potentially avoidable hospitalization	1.9	23.8*	-6.6	11.9	-10.7	5.0	-23.0*
Potentially avoidable hospitalization (6 conditions)	-2.4	37.6**	-21.8	-7.0	-18.8	6.3	-19.7
All-cause ED visit	2.8	-1.9	27.6**	10.3	-17.4	5.3	-15.4
Potentially avoidable ED visit	1.8	8.9	24.9*	9.5	-36.2**	-2.8	7.2
Potentially avoidable ED visit (6 conditions)	-3.3	-14.9	3.2	21.3	-41.2**	11.8	8.2

*/**/*** = significantly different from zero based on a p-value cutoff of 0.1/0.05/0.01

in bladder, decline in activities of daily living, and antipsychotic medication use. With all ECCPs combined, there was no clear evidence of any effect on quality measures for the NFI 1 Clinical-Only intervention over 2014-2016. For the two NFI 2 interventions, there was some evidence of an effect. Relative to the national comparison group, there was evidence for worsening of several quality measures associated with the NFI 2 Payment-Only intervention and worsening of one of the quality measures associated with the Clinical + Payment intervention, over 2017-2019. We note that this was a relative and not absolute worsening. The unadjusted rate of these undesirable events tended to stay the same or decrease in the intervention groups, while there were decreases in these undesirable events in the comparison group. Full results are reported elsewhere.[19,20]

Discussion

Avoidable hospitalizations among long-term nursing home residents have been of concern to clinicians and policymakers for some time. Misaligned incentives between Medicare and Medicaid are one possible reason for high rates of potentially avoidable hospitalizations. The Initiative evaluated in this study sought to reduce potentially avoidable hospitalizations, first through the introduction of clinical interventions in NFI 1, and then through Medicare payment incentives to both participating nursing homes and providers in NFI 2. Evaluation results showed reductions in hospitalizations associated with the clinical interventions in NFI 1 but did not show reductions associated with the addition of the payment incentives in NFI 2. Therefore, it appears that the introduction of on-site support in the Clinical-Only homes from specially trained RNs and nurse practitioners was more effective in reducing hospitalizations than was the payment incentive.

It is possible that the reductions achieved during NFI 1 were all that could be achieved realistically and, therefore, introduction of the payment incentive was unable to produce additional reductions. However, failure of the payment incentive to consistently result in reduced hospitalizations among Payment-Only homes that had not participated in the clinical interventions in NFI 1 suggest this was not the case. This result fits with earlier evidence from a CMS demonstration that

nursing home payment incentives alone did not reduce hospitalizations or improve other quality measures.[23]

From a structural perspective, the financial incentives were not effective in changing care practices. Clinical care interviewees described the process of submitting NFI 2 claims as labor-intensive and financially insufficient to warrant the extra effort. Nursing home interviewees also described the burden of NFI 2 claims, with some facilities having more urgent needs (e.g., clinical staff shortages) that superseded facility attention to NFI 2. Other nursing homes already had established practices prior to NFI 2 to identify and treat resident conditions on site, meaning they received the NFI 2 financial incentives for preexisting care practices. ECCPs encouraged participation through regular reports to facilities and providers about their successes in reducing avoidable hospitalizations and missed opportunities to submit NFI 2 claims, but even these reports were largely ineffective at encouraging increased use of claims and associated financial incentives. Some nursing homes also reported that preventive care processes put in place during NFI 1 kept residents from becoming acutely ill and reduced their ability to receive the payment incentive in NFI 2. However, our quantitative results would suggest this was not often the case since hospitalization rates were not reduced and other quality outcomes did not improve. In fact, these results could suggest that a narrow focus on a specific set of acute conditions may have resulted in reactive clinical management of a narrow set of factors contributing to hospitalizations rather than preventive care to mitigate against these acute conditions arising in the first place.

Interviewed facility staff and providers underscored the benefit of additional clinical staff, describing them as the silver bullet for reducing avoidable hospitalizations. Availability of these additional clinical staff in Clinical-Only homes was the direct result of federal funds supporting the Initiative and the support of the ECCPs that oversaw the Initiative in each state. This raises the important question about whether an intervention of this type is sustainable or reproducible outside the auspices of a specially funded initiative. However, these findings also underscore the important role that nurse practitioners and other providers may play in improving care quality in nursing homes, including reducing hospitalizations.

As the Initiative unfolded across all ECCPs, Clinical + Payment homes lauded the presence of the ECCP nurses and nurse practitioners.

Interviewees described ECCP nurses as an "extra set of hands," providing additional staff support and clinical care for residents in a setting that is chronically plagued by understaffing, staff turnover, and provider shortages. Unlike hospitals staffed primarily by providers and registered or licensed nurses, certified nursing assistants are the largest employee group in most nursing homes. These staff have completed the requirements to achieve the aide certificate, but they do not have the training or state licensure needed to perform formal resident assessments. Accordingly, the ECCP-provided nurses and nurse practitioners brought valuable skills to participating nursing homes, all of which noted their need for this type of additional on-site clinical staff. In particular, interviewees from nursing homes with on-site nurse practitioners praised not only the presence of additional clinical staff but also the fact that these staff could assess residents and write orders for tests and treatments. Many interviewees attributed resident hospitalizations to hard-to-reach providers who made infrequent visits to the nursing home and who were challenging to access by telephone. On-site, full-time nurse practitioners resolved these concerns; they could assess residents, order tests, and prescribe treatments immediately, thus reducing the chance of exacerbation and resultant hospitalization.

Clinical Staffing in Nursing Homes

Inclusion of nurse practitioners and physician assistants among nursing home clinical staff has been consistently associated with lower rates of hospitalization.[14,24] Ouslander and colleagues found that 90% of nursing homes with low rates of hospitalizations included nurse practitioners and physician assistants among their staff, and only 60% of nursing homes with high rates did. Furthermore, they found that 50% of low hospitalization nursing homes had a daily presence of a physician, nurse practitioner, or physician assistant, while none of the high hospitalization nursing homes did.[9]

Nurse practitioner presence in nursing homes has been steadily increasing in the past two decades.[25,26] However, their ability to practice in nursing homes may be limited by state scope of practice regulations.[27] Recent changes in state scope of practice regulations have been toward increasing nurse practitioner autonomy (i.e., reduced requirements for physician oversight) and also increasing barriers to entry into the field

through higher educational requirements.[26] Despite these increased educational requirements, there has been a recent surge in nurse practitioners in the United States,[28] and this could result in their greater use in the nursing home setting. An important caveat is that previous research has found a relationship between state Medicaid rates for nursing home care and the employment of nurse practitioners by nursing homes. Nursing homes in states in the upper quartile of Medicaid reimbursement are 10% more likely to employ nurse practitioners or physician assistants.[26] Many nursing homes participating in NFI 2 reported using the extra Medicare funds they received to hire or increase hours for nurse practitioners. Others described a desire to hire full-time nurse practitioners but lacked sufficient funding to do so.

Seminal research on Medicaid and nursing home quality found that nursing homes serving a high proportion of residents covered by Medicaid have lower staffing and poorer quality, which suggests that Medicare payments are used by nursing homes to subsidize the care of Medicaid residents.[29] Private pay residents likely do the same as the average Medicaid payment is only 70% of the average private pay rate.[30] Though the Initiative included private pay residents, who in 2014 made up about 17% of all nursing home residents,[31] their effect on the results was not ascertained. However, it is possible that participating nursing homes with higher proportions of private pay residents had better clinical infrastructure.

Like the Initiative, the Institutional Special Needs Plans (I-SNP) model also relies heavily on nurse practitioners in the care of nursing home residents. I-SNPs are Medicare Advantage plans limited to Medicare beneficiaries who are long-stay nursing home residents or certified as needing nursing home-level care. I-SNPs use nurse practitioners or physician assistants to provide coordinated care in the nursing home. Research has found the clinical care provided by I-SNPs to be associated with fewer hospitalizations.[32] This provides additional support for the relationship between increased nurse practitioner presence in nursing homes and decreased hospitalizations.

Acuity Among Nursing Home Residents

Efforts to reduce hospitalizations among long-stay nursing home residents exist within a larger policy context with aims of better integrating

Medicare and Medicaid for all dual-eligibles (not just those in nursing homes), as well as policies aimed at allowing more people to remain in their homes and communities as they age. For example, the Program of All-inclusive Care for the Elderly (PACE) provides comprehensive medical and social services to community-dwelling older adults who would otherwise be eligible for nursing home placement. Primarily through Medicaid waiver programs, states have also greatly increased the availability of home- and community-based services (HCBS) over the past two decades. The proportion of Medicaid long-term services and supports spending on HCBS increased from 27% in 2000 to 55% in 2015.[33]

Both PACE and state Medicaid waiver programs have been found to delay institutionalization and result in higher acuity among residents upon admission into a nursing home.[34,35] For example, Hahn and colleagues found that greater spending on HCBS resulted in a lower proportion of nursing home residents who were considered "low care."[36] This increased acuity among residents may affect nursing homes' ability to reduce hospitalizations, especially because increased acuity has not been accompanied by increases in direct-care staffing.[37] Consistent with these studies, many Initiative interviewees noted that nursing home resident acuity has increased in recent years.

Limitations

Our study included a few limitations. First, nursing homes (or their corporations) volunteered to participate in the Initiative. These nursing homes may have been different in some systematic way from those that did not volunteer to participate. For example, they might have been more motivated to change than other nursing homes that were in the comparison group or other nursing homes in general, or more responsive to policies designed to reduce avoidable hospitalizations. This limits the generalizability of our evaluation findings. Another related limitation is the possibility that there were state-specific reasons why the Initiative either did, or did not, succeed in particular states.

Second, the Initiative-eligible population was limited to FFS beneficiaries. Therefore, our analysis could have been affected by selection bias if Medicare Advantage (MA) penetration increased at different rates in the intervention and comparison groups, and if the FFS and MA populations were systematically different in ways not completely captured

by the medical conditions included in our models. Indeed, the NFI 2 evaluation analyses did find a steeper increase in MA penetration in Payment-Only homes compared to the national comparison group.[38]

Third, given the misaligned incentives in Medicare and Medicaid payment policies for nursing homes, it would be instructive to understand the cost implications of hospitalizations and ED visits in the long-stay resident population for both the Medicare and Medicaid programs. We were unable to evaluate the Initiative effect on Medicaid expenditures because of the significant lag in Medicaid data availability. We did evaluate the Initiative effect on Medicare expenditures, particularly expenditures associated with the utilization of hospital services, given that Medicare is the primary payer for those services, supplemented by Medicaid payment in the form of cost sharing for those dually eligible for both programs. If NFI 2 was successful in reducing hospitalizations, as was the case under NFI 1, it would mean more Medicaid-covered days in the nursing home and, accordingly, more costs to Medicaid. However, because NFI 2 was associated with an increase in hospitalizations, it would mean fewer Medicaid-covered days in the nursing home. Therefore, the cost impact on Medicaid would depend on whether the state has a bed-hold policy in place and on how much Medicaid pays the home for an empty bed while the resident is hospitalized. These considerations should be addressed in future research.

Fourth, the Initiative did not include short-stay residents receiving post-acute care under Medicare. Therefore, the experiences and outcomes of these patients were outside the scope of our evaluation. However, there may have been synergies or spillover effects between care of long-stay residents and short-stay residents because these populations cannot be easily separated within nursing homes. For example, most long-stay residents begin as post-acute admissions. Moreover, when long-stay residents become hospitalized, they are likely to re-enter the nursing home with a post-acute Medicare stay. They would thus factor into financial penalties for the nursing home. From a payer's perspective the post-acute and long-stay populations may be different entities. However, functionally it is difficult to separate the long-stay and short-stay because they are being cared for in a single home, with an overlap of staff and other resources, and with interrelated financial management. Nursing homes that already had better clinical infrastructure in place to care for post-acute short-stay residents may have been in a better position to respond to the Initiative and experience better results. However, our evaluation did not

explore this possibility. Finally, despite the profound effect that hospitalizations can have on nursing home residents and their families in terms of both finances and health consequences, gaining the perspectives of these important stakeholders was outside the scope of this evaluation, in part because they were largely unaware of the financial incentive structure of NFI 2. Future research or interventions aimed at reducing hospitalizations among nursing home residents should be designed to prioritize residents and families as change-agents and subsequently gather their important perspectives.

Conclusion

Despite longstanding efforts aimed at reducing avoidable hospitalizations from nursing homes and associated costs to Medicare, the results have been less than optimal. Among long-stay nursing home residents, the rates of hospitalization and ED visits remain high, and many of these events are potentially avoidable.[39] The misaligned financial incentives built into Medicare and Medicaid payment policies for nursing home care contribute to this problem, compounded by the fact that the long-stay nursing home resident population has become sicker and frailer over time, requiring more acute care.[40]

Two lessons may be drawn from the CMS Initiative to Reduce Avoidable Hospitalizations Among Nursing Facility Residents. First, the key to effective reduction in hospital transfers of long-stay nursing home residents hinges upon the availability of clinical staff, such as nurse practitioners, who can provide ongoing education to direct-care staff in the nursing home, as well as hands-on care in monitoring, assessing, and managing changes in resident condition. These clinical staff are responsible for making decisions or influencing physician decisions regarding whether to treat residents on site or transfer to a hospital for care. This intervention with increased clinical care was implemented in NFI 1 and was found to be effective in reducing avoidable hospitalizations. Second, the use of Medicare payment incentives alone to encourage on-site acute care treatment of residents with a limited set of conditions without an increase in provider or nursing staff is insufficient to reduce avoidable hospitalizations. This was the intervention implemented among the Payment-Only homes in NFI 2. The addition of Medicare payment incentives among Clinical + Payment homes in NFI 2, on top of the

clinical staff previously offered during NFI 1, also did not further reduce hospitalizations. Revamping the Medicare and Medicaid payment systems in ways that allow for nursing homes to attract, pay, and retain additional clinical staff, including nurse practitioners, may prove more effective as a long-term strategy. Unless nursing homes are adequately staffed and equipped to treat residents with acute care needs on-site and safely, further reduction in avoidable hospitalizations will be difficult to achieve.

References

1. Zimmer JG, Eggert, GM, Treat A, et al. Nursing homes as acute care providers a pilot study of incentives to reduce hospitalizations. *J Am Geriatr Soc*. 1988;36(2):124-129.
2. Ouslander JG, Weinberg AD, Phillips V. Inappropriate hospitalization of nursing facility residents: a symptom of a sick system of care for frail older people. *J Am Geriatr Soc*. 2000;48(2):230-231.
3. Brownell J, Wang J, Smith A, et al. Trends in emergency department visits for ambulatory care sensitive conditions by elderly nursing home residents, 2001 to 2010. *JAMA Intern Med*. 2014;174(1):156-158.
4. Xing J, Mukamel DB, Temkin-Greener H. Hospitalizations of nursing home residents in the last year of life: nursing home characteristics and variation in potentially avoidable hospitalizations. *J Am Geriatr Soc*. 2013;61(11):1900-1908.
5. Office of Inspector General. Medicare nursing home resident hospitalization rates merit additional monitoring. 2013; OEI-06-11-00040.
6. Saliba D, Kington R, Buchanan J, et al. Appropriateness of the decision to transfer nursing facility residents to the hospital. *J Am Geriatr Soc*. 2000;48(2):154-163.
7. Walsh EG, Wiener JM, Haber S, et al. Potentially avoidable hospitalizations of dually eligible Medicare and Medicaid beneficiaries from nursing facility and home-and community-based services waiver programs. *J Am Geriatr Soc*. 2012;60(5):821-829.
8. Spector WD, Limcangco R, Williams C, et al. Potentially avoidable hospitalizations for elderly long-stay residents in nursing homes. *Med Care*. 2013;51(8):673-681.
9. Ouslander JG, Lamb G, Perloe M, et al. Potentially avoidable hospitalizations of nursing home residents: frequency, causes, and costs [See editorial comments by Drs. Jean F. Wyman and William R. Hazzard, pp 760-761]. *J Am Geriatr Soc*. 2010;58(4):627-635.

10. Grabowski DC. Medicare and Medicaid: conflicting incentives for long-term care. *Milbank Q*. 2007;85(4):579-610.
11. Intrator O, Grabowski DC, Zinn J, et al. Hospitalization of nursing home residents: the effects of states' Medicaid payment and bed-hold policies. *Health Serv Res*. 2007;42(4):1651-1671.
12. Cai S, Miller SC, Nelson DL, Mukamel DB. The impact of Medicaid payer status on hospitalizations in nursing homes. *Med Care*. 2015 Jul;53(7):574.
13. Intrator O, Castle NG, Mor V. Facility characteristics associated with hospitalization of nursing home residents: results of a national study. *Med Care*. 1999;37(3):228-237.
14. Intrator O, Zinn J, Mor V. Nursing home characteristics and potentially preventable hospitalizations of long-stay residents. *J Am Geriatr Soc*. 2004;52(10):1730-1736.
15. Grabowski DC, Stewart KA, Broderick SM, et al. Predictors of nursing home hospitalization: a review of the literature. *Med Care Res Rev*. 2008;65(1):3-39.
16. Grabowski DC, O'Malley AJ. Use of telemedicine can reduce hospitalizations of nursing home residents and generate savings for Medicare. *Health Aff (Millwood)*, 2014;33(2):244-250.
17. Dellefield ME, Castle NG, McGilton KS et al. The relationship between registered nurses and nursing home quality: an integrative review (2008-2014). *Nurs Econ*. 2015;33(2):95-108.
18. Driessen J, Castle NG, Handler SM. Perceived benefits, barriers, and drivers of telemedicine from the perspective of skilled nursing facility administrative staff stakeholders. *J Appl Gerontol*. 2018;37(1):110-120.
19. Ingber M. Feng Z. Khatutsky G. et al. Evaluation of the Initiative to Reduce Avoidable Hospitalizations among Nursing Facility Residents: final report. 2017. Centers for Medicare & Medicaid Services website. https://www.cms.gov/Medicare-Medicaid-Coordination/Medicare-and-Medicaid-Coordination/Medicare-Medicaid-Coordination-Office/Downloads/NFPAHFinalReport092017.pdf. Accessed March 20, 2021.
20. RTI International. *Evaluation of the Initiative to Reduce Avoidable Hospitalizations among Nursing Facility Residents—Payment Reform: Final Report*. Centers for Medicare & Medicaid Services; 2020. https://innovation.cms.gov/data-and-reports/2022/nfi2-final-report. Accessed March 1, 2022.
21. Ingber M, Feng Z, Khatutsky G, et al. *Evaluation of the Initiative to Reduce Avoidable Hospitalizations among Nursing Facility Residents—Payment Reform: Second Annual Report*. Centers for Medicare &

Medicaid Services; 2019. https://downloads.cms.gov/files/cmmi/rahnfr-phasetwo-secondannrpt.pdf. Accessed March 20, 2021.

22. Ouslander JG, Lamb G, Tappen R, et al. Interventions to reduce hospitalizations from nursing homes: evaluation of the INTER-ACT II collaborative quality improvement project. *J Am Geriatr Soc*. 2011;59(4):745-753.
23. Grabowski DC, Stevenson DG, Caudry DJ, et al. The impact of nursing home pay-for-performance on quality and Medicare spending: results from the Nursing Home Value-Based Purchasing Demonstration. *Health Serv Res*. 2017;52(4):1387-1408.
24. Christian R, Baker K. Effectiveness of nurse practitioners in nursing homes: a systematic review. *JBI Libr Syst Rev*. 2009;7(30):1333-1352.
25. Intrator O, Feng Z, Mor V, et al. The employment of nurse practitioners and physician assistants in U.S. nursing homes. *Gerontologist*. 2005;45:486-495.
26. Gadbois EA, Miller EA, Tyler D, et al. Trends in state regulation of nurse practitioners and physician assistants, 2001 to 2010. *Med Care Res Rev*. 2015;72(2):200-219.
27. Intrator O, Miller EA, Gadbois E, et al. Trends in nurse practitioner and physician assistant practice in nursing homes, 2000–2010. *Health Serv Res*. 2015;50(6):1772-1786.
28. Auerbach DI, Buerhaus PI, Staiger DO. (2020). Implications of the rapid growth of the nurse practitioner workforce in the US. *Health Aff (Millwood)*. 2020;39(2):273-279.
29. Mor V, Zinn J, Angelelli J, Teno JM, Miller SC. Driven to tiers: socioeconomic and racial disparities in the quality of nursing home care. *Milbank Q*. 2004 Jun;82(2):227-256.
30. Werner RM, Konetzka RT. Reimagining financing and payment of long-term care. *Journal of the American Medical Directors Association*. 2022 Feb 1;23(2):220-224.
31. Silver BC, Grabowski DC, Gozalo PL, Dosa D, Thomas KS. Increasing prevalence of assisted living as a substitute for private-pay long-term nursing care. *Health Services Research*. 2018 Dec;53(6):4906-20.
32. McGarry BE, Grabowski DC. Managed care for long-stay nursing home residents: an evaluation of Institutional Special Needs Plans. *Am J Manag Care*. 2019;25:438-43.
33. Xu H, Intrator O. Medicaid long-term care policies and rates of nursing home successful discharge to community. *J Am Med Dir Assoc*. 2020;21(2):248-253.
34. Segelman M, Cai X, van Reenen C, et al. Transitioning from community-based to institutional long-term care: comparing

1915(c) waiver and PACE enrollees. *Gerontologist*. 2017;57(2):300-308.

35. Segelman M, Intrator O, Li Y, et al. HCBS spending and nursing home admissions for 1915(c) waiver enrollees. *J Aging Soc Policy*. 2017;29(5):395-412.
36. Hahn EA, Thomas KS, Hyer K, et al. Predictors of low-care prevalence in Florida nursing homes: the role of Medicaid waiver programs. *Gerontologist*. 2011;51(4):495-503.
37. Geng F, Stevenson DG, Grabowski DC. Daily nursing home staffing levels highly variable, often below CMS expectations. *Health Aff (Millwood)*. 2019;38:1095-1100.
38. Ingber MJ, Feng Z, Khatutsky G, et al. *Evaluation of the Initiative to Reduce Avoidable Hospitalizations among Nursing Facility Residents—Payment Reform: Third Annual Report*. Centers for Medicare & Medicaid Services; 2019. https://downloads.cms.gov/files/rahnfr-phasetwo-thirdannrpt.pdf. Accessed March 20, 2021.
39. McCarthy EP, Ogarek JA, Loomer L, et al. Hospital transfer rates among US nursing home residents with advanced illness before and after initiatives to reduce hospitalizations. *JAMA Intern Med*. 2020;180(3):385-394.
40. Fashaw SA, Thomas KS, McCreedy E, et al. Thirty-year trends in nursing home composition and quality since the passage of the Omnibus Reconciliation Act. *J Am Med Dir Assoc*. 2020;21(2):233-239.

Funding/Support: US Department of Health and Human Services, Centers for Medicare and Medicaid Services (HHSM-500-2014-000371).

Address Correspondence To: Denise A. Tyler, PhD, RTI International, 307 Waverley Oaks Rd,Waltham, MA 02452 (Email: dtyler@rti.org).