Washington State Health Services Research Project
Research brief No. 111

Adverse outcomes related to skilled nursing facility stays following hospital discharge in Washington, 2015-2018

By Dennis McDermot *June 2023*

Overview

In this study, we use the Washington All-Payer Claims Database (WA-WPCD) to examine the relationships among:

- Skilled nursing facility (SNF) characteristics. We examine facility ownership (for-profit, government, or non-profit), the number of certified beds, and its overall rating.
- Adverse (or Negative) outcomes during a patient's SNF stay. We focus on selected patient outcomes that should be at least *partially preventable* with proper care and infection control. We consider pressure sores, falls, injury, and medical or prescription mistakes as 'preventable events.' We consider influenza, *Clostridium difficile* (C-diff.) Tuberculosis (TB) and Hepatitis-A (Hep-A) as 'infectious conditions.'
- Adverse patient outcomes within one year of a patient's SNF stay:
    - Readmission to the hospital during their first 30 days or 365 days after discharge from SNF.
    - Diagnosis with pneumonia that was not present while in a SNF.
    - New onset of dementia, depression, and adjustment disorder or reactions to stress (including post-traumatic stress disorder (PTSD)). These must not have been present during their SNF stay, hospital stay, or during a 1-year lookback period before their hospital admission discharge.
- See Technical details and Appendix, Table 1 for full definitions.

Key Findings

- Adverse outcomes in SNF were strongly associated with longer length of stay, and with pre-existing chronic conditions.

- Preventable outcomes were weakly associated with larger SNF size. We found no other associations between SNF characteristics and adverse outcomes while in SNF.
- Patients experiencing adverse conditions in SNF were more likely to be readmitted to hospital, more likely to develop pneumonia and more likely to experience initial onset of depression, dementia, or severe reactions to stress (including PTSD) in the year following discharge from SNF.
- Patients with longer SNF length of stay were less likely to be readmitted to hospital within 30 days of SNF discharge.
- Post-acute SNF care was associated with an average of $23,500 insurance paid and out of pocket excess medical cost compared with similar hospital patients who did not require SNF rehabilitation.

Background

A skilled nursing facility (SNF) is a facility with staff and equipment to provide daily skilled nursing or rehabilitation services to patients. These services include physical, speech, or occupational therapy. Hospital patients who still need daily care upon discharge may be discharged directly to a SNF.

Medicare pays for SNF services for up to 100 days and covers the full cost of SNF service for up to 21 days. After 21 days, Medicare charges the patient a coinsurance fee. In 2023, coinsurance for SNF services after 21 days was $200 per day.

SNF care differs from custodial care. Custodial care involves assistance with activities of daily living such as bathing, toileting, and dressing. While nursing facilities might provide this care, a need for custodial care alone does not qualify for Medicare coverage. However, if a patient qualifies for SNF coverage based on their need for SNF services, then all services — including custodial care — are covered for the duration of coverage.[1]

SNF care following hospitalization is costly and is a major contributor to rising health care cost[2,3]. However, we've seen growing concern about poor quality care and adverse outcomes for patients at SNF facilities.[3, 4, 5] Since SNF patients are likely to be older, frail, or seriously ill, they often can't effectively advocate for themselves. Therefore, issues of SNF quality of care require close monitoring and independent oversight. Oversight takes place at both the state and federal level.

[1] Medicare Coverage of Skilled Nursing Facilities. Centers for Medicare and Medicaid Services. https://www.medicare.gov/Pubs/pdf/10153-Medicare-Skilled-Nursing-Facility-Care.pdf accessed 4/19/2023.
[2] Acharya Y, Schilling AL, Hollenbeak CS (2019) Readmissions attributable to skilled nursing facility use after a colectomy: Evidence using propensity scores matching. PLoS ONE 14(4):e0215245. https://doi.org/10.1371/journal. pone.0215245
[3] 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. https://doi.org/10.1111/1475-6773.13543
[4] Jan P. Clement, Gloria J. Bazzoli, and Mei Zhao, (2012) Nursing Home Price and Public Quality Information. *HSR: Health Services Research*. 47:1. DOI: 10.1111/j.1475-6773.2011.01306.x
[5] Riester MR, Bosco E, Silva JBB,Ba rdenheier BH, Goyal P, O'Neil ET, et al. (2022) Causes and timing of 30-day rehospitalization from skilled nursing facilities after a hospital admission for pneumonia or sepsis. PLoS ONE 17(1): e0260664. https://doi.org/10.1371/journal. pone.0260664

A variety of metrics are used to assess and monitor SNF quality of care,[6] such as Medicare's online Nursing Home Compare[7] site. This tool combines health inspections, staffing, and certain quality measures to rate each SNF on multiple dimensions of care using a five-star rating system. Studies have found higher SNF quality ratings are associated with more favorable patient outcomes, such as lower mortality and shorter length of stay.[3]

Results

The study population was mostly (87%) age 65 and older, and almost entirely (97%) used Medicare as their primary insurance. The population was 62% female, 38% male. Three fourths (75%) of the study population had at least one chronic condition before they were hospitalized, and 22% had three or more conditions (Table 1). A majority of members were cared for at for-profit SNF facilities (78%) with 22% at non-profit, and less than 1% at government facilities. A majority of patients (62%) were at facilities with 100 or more beds, with 4% of patients at larger facilities with 200 or more beds. Most patients (64%) were at facilities with an overall rating of 4 or 5 (Table 3).

8.6% of patients experienced a preventable adverse outcome (pressure sore, injury, fall, or medical mistake) during their SNF stay, with the most common adverse outcome being injury (5.6%). 1.7% of patients contracted an infectious condition (flu, D-diff, TB, or Hep-A) during their SNF stay, and 9.7% experienced either a preventable outcome, infectious condition, or both (Table 4). Additionally, 3.3% were diagnosed with pneumonia while in SNF, and 2.0 % were diagnosed with PTSD or reaction to stress.

Following discharge from SNF (Table 5), 6% of patients were readmitted to an acute-care hospital within 30 days of discharge, and 39% were readmitted within 365 days. 18% had a new pneumonia diagnosis in the year after their SNF discharge, a diagnosis that was not present during their SNF stay. 19% had a first-time diagnosis of depression, 6% had a first-time diagnosis of PTSD or reaction to stress, and 15% had a first-time dementia diagnosis in the year after their SNF stay that was not present before admission.

To compare costs, we looked at post-discharge outcomes among patients who had an acute-care hospitalization but were not discharged to a SNF. We randomly selected the comparison group to match the study population on age, sex, primary payer, and number of pre-existing chronic conditions. Note, however, the comparison group is not a true control. This group merely provides a context we can use to assess medical costs in the study population. The comparison group had a lower incidence of all post-discharge adverse outcomes except PTSD (Table 4). Post-discharge incidence of PTSD was the same in the study population and comparison group, though the broader diagnosis of reaction to severe stress was more common in the SNF study population.

Post-acute SNF care is associated with very high medical cost, before, during, and in the year following the SNF stay (Table 6). Median total cost (including insurance paid and out-of-pocket cost) in the year prior to hospitalization was about 50% higher in the SNF study population than the comparison group, even though the comparison group matched the study population in age, sex, payer, and in the number

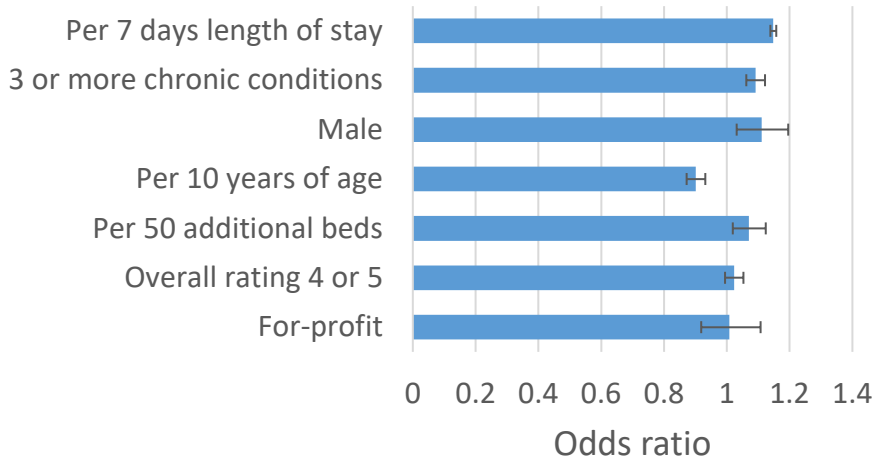
[6] Castle, N. G. and Ferguson J. C. (2010) What is nursing home quality and how is it measured? *The Gerontologist*. Vol. 50, No. 4, 426–442. doi:10.1093/geront/gnq052

[7] Centers for Medicare and Medicaid Services. Nursing Home Compare. https://www.medicare.gov/care-compare/

of chronic conditions. The median total cost of hospitalization in the SNF study population was about twice that of the comparison group, and median total cost in the year following discharge was about 80% higher in the study population. Taking it all together, the median total cost, from hospital admission through one-year post discharge was $44,047 in 2018 for the SNF study population, $19,820 for the comparison group. (Cost differences in 2016 and 2017 were similar to 2018). On average, post-acute SNF care was associated with $23,500 in additional medical costs compared with similar patients who were hospitalized but did not require SNF rehabilitation.

We used logistic regression[8] to examine the associations between SNF characteristics (ownership, number of beds, and overall quality rating) and preventable or infectious outcomes (Figures 1, 2, Appendix Table 6). Regression models controlled for patient age, sex, multiple (3 or more) pre-existing chronic conditions, and SNF length of stay. Patient length of stay was by far the strongest predictor of both preventable and infectious outcomes with an odds ratio[9] of 1.15 per 7 days for preventable and 1.17 per 7 days for infectious events (Figure 1). Multiple chronic conditions was also a significant predictor of both preventable (odds ratio 1.09) and infectious (odds ratio 1.09) outcomes. Larger SNF size was weakly but statistically significantly associated with preventable adverse outcomes (odds ratio 1.07 per 50 beds). There was no association between SNF ownership (for profit versus non-profit or government) or rating (4 or 5 versus 3 or lower) and preventable outcomes, and no SNF characteristics were significantly associated with infectious outcomes (Figure 2). An association of adverse outcomes with patient length of stay and pre-existing conditions is to be expected. Even if adverse events or infectious events occur randomly, a longer length of stay means more time for such events to occur.

Figure 1. Factors associated with preventable adverse conditions (pressure sores, injury, medical mistakes) in SNF.

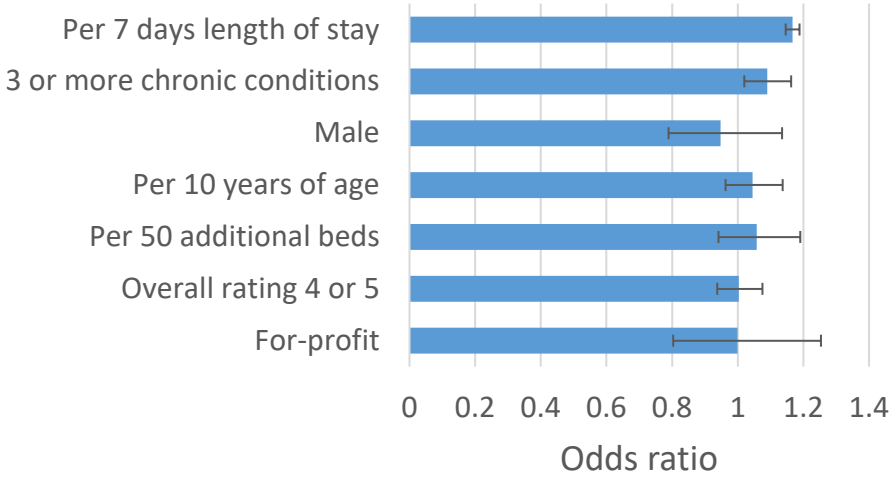


[8] Logistic regression measures the statistical odds of a single, binary (yes-no) response variable (e.g., a preventable outcome) in relation to one or more predictors (e.g., length of stay), while controlling for factors such age, sex, and so on.

[9] The odds ratio indicates the ratio of the statistical odds of the outcome with or without the factor of interest. Odds ratios greater than 1 indicate increased odds of the outcome. Odds ratio less than one indicates reduced odds.

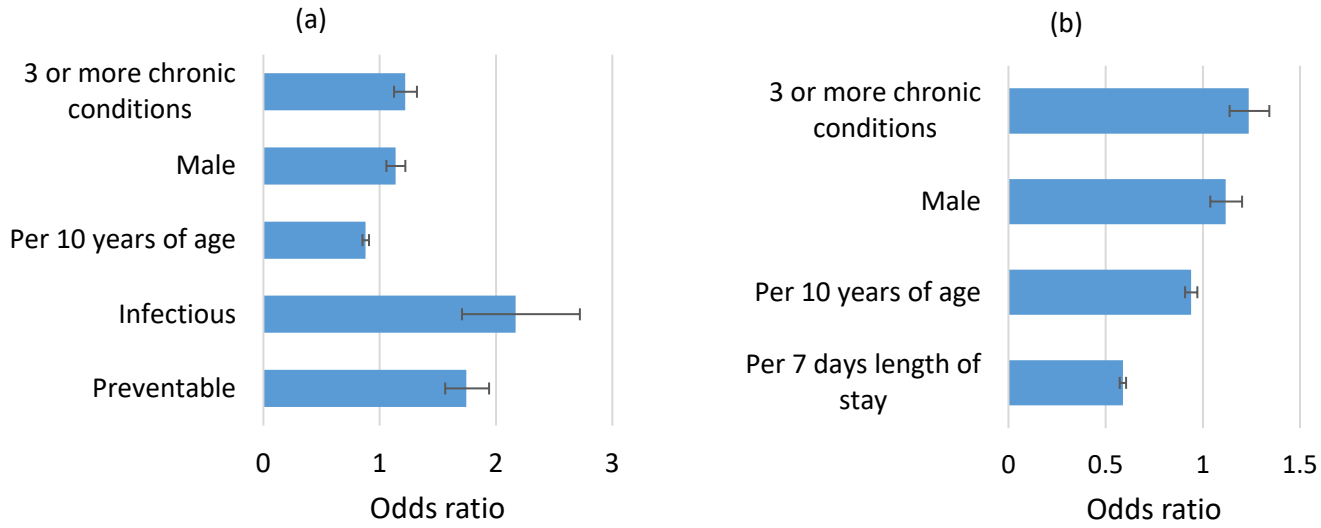
We also used logistic regression to examine associations between preventable or infectious adverse experiences (Appendix Table 7) and length of stay in SNF (Appendix Table 8) with adverse occurrences in the year following SNF discharge (hospital readmission, pneumonia, onset of depression, onset of reactions to severe stress including PTSD, and onset of dementia). Analyses controlled for patient age, sex, and pre-existing multiple chronic conditions. Because of strong confounding between length of stay and preventable adverse events, we ran analyses with length of stay separately from preventable and infectious conditions.

Figure 2. Factors associated with SNF acquired infectious conditions (Flu, C-diff, TB, HepA)



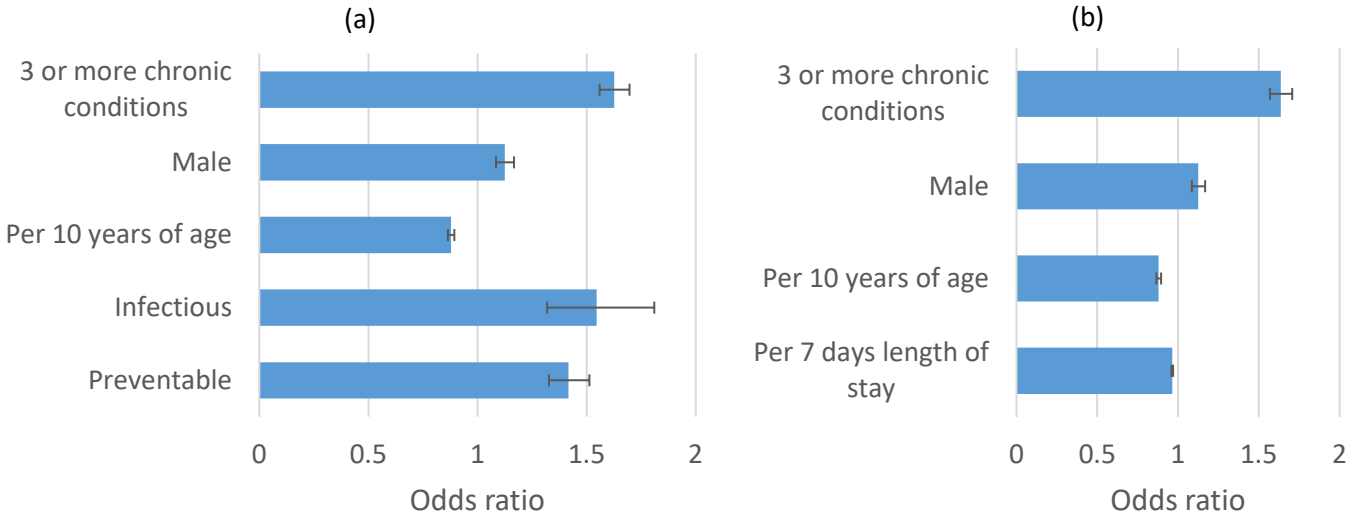
Adverse experiences in SNF were strong predictors of 30-day hospital readmission (Figure 3), with odds ratios of 2.2 for infectious conditions, and 1.7 for preventable outcomes. Multiple preexisting chronic conditions was also associated with 30-day readmission with odds ratio 1.2. Males had slightly higher odds of readmission, while older patients had lower odds of readmission. We found a similar pattern of associations with 365-day readmission (Figure 4), but a stronger association with pre-existing conditions (odds ratio 1.6) and weaker associations for preventable (odds ratio 1.4) and infectious (odds ratio 1.5) conditions. Patients with longer length of stay had lower odds of readmission, with an odds ratio of 0.59 per 7 additional days length of stay.

Figure 3. Factors associated with 30-day hospital readmission following SNF discharge. (a) Model with infectious and preventable SNF outcomes. (b) Model with SNF length of stay.



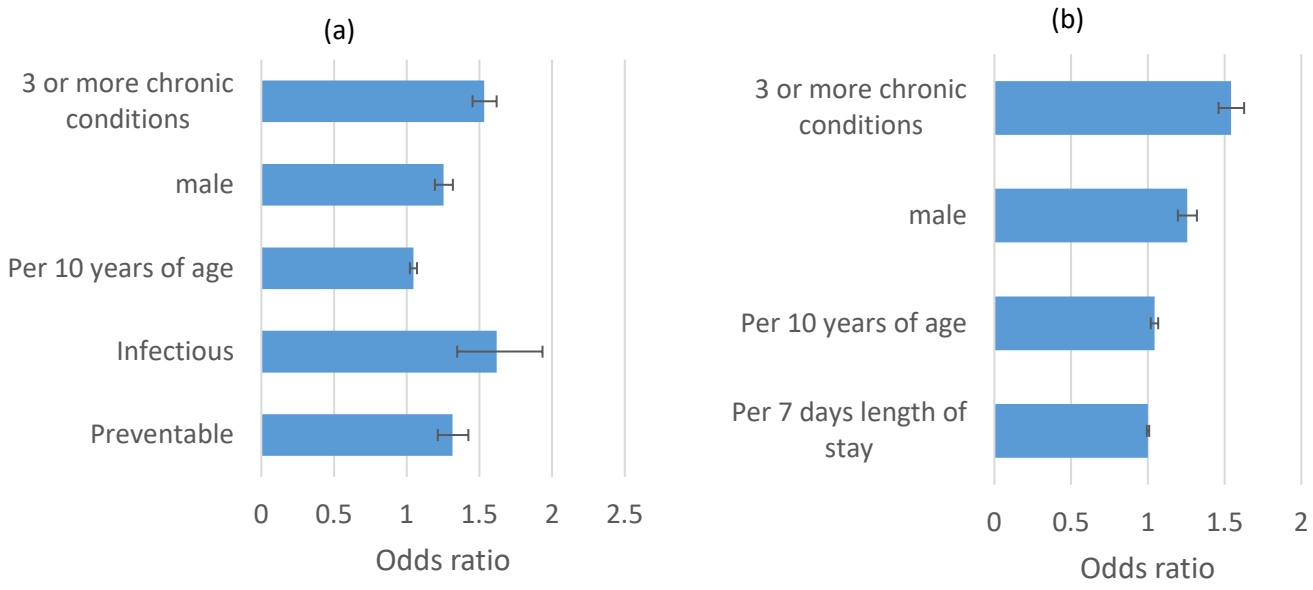
It is tempting with results like this to assume that the association is causal – that patients' experience in SNF made them more likely to be readmitted. We should emphasize, however, that we cannot infer causality from observational analyses such as this. While there may well be a causal relationship, other explanations are always possible. For example, readmission may not be directly connected to adverse SNF outcomes, but to something we did not account for in patients' condition that makes both adverse outcome in SNF and hospital readmission more likely. We recommend applying a similar caution to all the associations we give in this report.

Figure 4. Factors associated with 365-day hospital readmission following SNF discharge. (a) Model with infectious and preventable SNF outcomes. (b) Model with SNF length of stay.



The apparent protective association with advanced age is difficult to explain. Perhaps the case mix of among older patients has a higher proportion of initial admissions for conditions with a lower base risk of readmission such as joint replacement or injury, while younger patients have a higher proportion initially admitted for complications of chronic disease, with a higher base risk of readmission. Or perhaps there are hidden associations with other factors that we failed to control for. Because death records are not linked to the APCD, we do not know which patients may have died during the post-SNF year. Our requirement that members have continuous medical coverage for the post-SNF period could have introduced a survivorship bias that we have no way to assess.

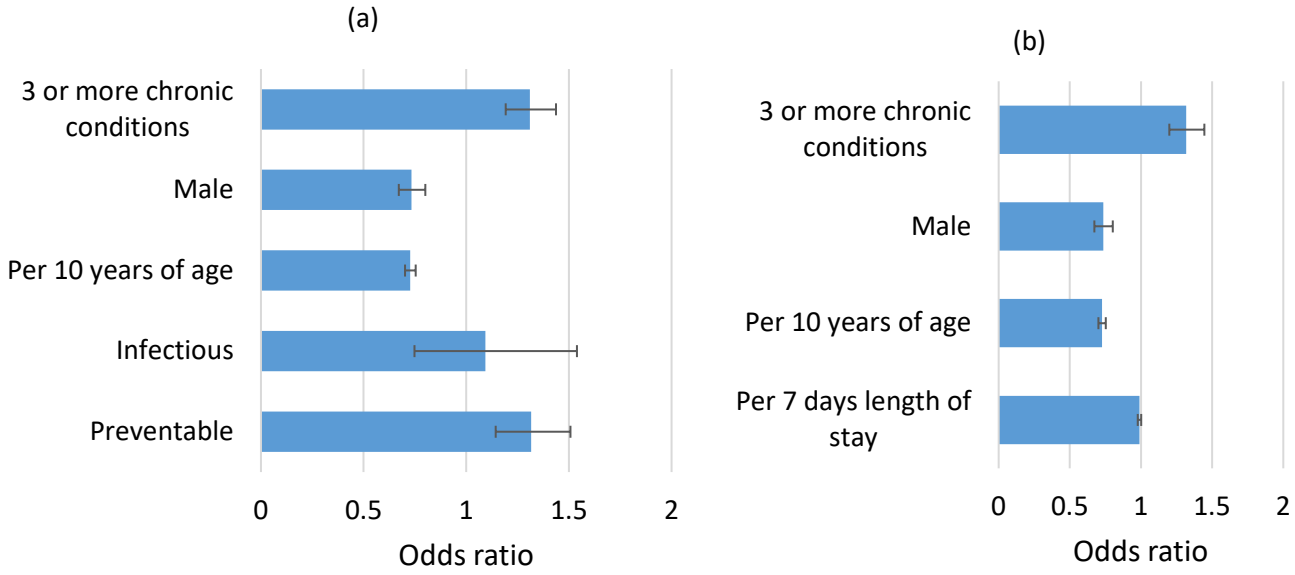
Figure 5. Factors associated with pneumonia diagnosed after discharge from SNF. (a) Model with infectious and preventable SNF outcomes. (b) Model with SNF length of stay.



Pneumonia onset after discharge from SNF (Figure 5), was associated with infectious conditions during SNF stay (odds ratio 1.6), pre-existing chronic conditions (odds ratio 1.5) and with preventable outcomes (odds ratio 1.3. Males and older patients were also more likely to be diagnosed with pneumonia during the follow-up year. Post-discharge pneumonia was not associated with SNF length of stay.

Because of the relatively low incidence of PTSD (Table 4), we used the broader category of reactions to severe stress or adjustment disorder (Table 1) that we will refer to simply as “distress.” Onset of distress during the year after a patient’s SNF discharge (Figure 6) was associated with preventable adverse outcomes in SNF (odds ratio 1.3) and multiple pre-existing chronic conditions (odds ratio 1.3). Post-SNF distress was not associated with SNF length of stay.

Figure 6. Factors associated with a first-time diagnosis of reaction to severe stress, including PTSD, following discharge from SNF. (a) Model with infectious and preventable SNF outcomes. (b) Model with SNF length of stay.



Onset of depression (Figure 7) was associated with both preventable (odds ratio 1.2) and infectious (odds ratio 1.3) SNF outcomes. Patients with pre-existing chronic conditions were less likely to have onset of depression during or after their SNF stay. Males and older patients were also less likely to be diagnosed with onset of both depression and distress. The seemingly protective effects of age and chronic conditions appears paradoxical, but in this case, there is a likely explanation. We were looking specifically for the initial onset of these conditions, with no diagnoses prior to SNF admission. Older members and members with pre-existing conditions would be more likely to have previous diagnoses, and so less likely to have an *initial* onset during the SNF or post-SNF time period. There was a small but significant relationship with length of stay (odds ratio 1.04 per 7 days stay). However, it is impossible to say whether SNF length of stay or SNF preventable outcomes were of greater effect due to confounding between the two.

Figure 7. Factors associated with first-time diagnosis of depression following SNF discharge. (a) Model with infectious and preventable SNF outcomes. (b) Model with SNF length of stay.

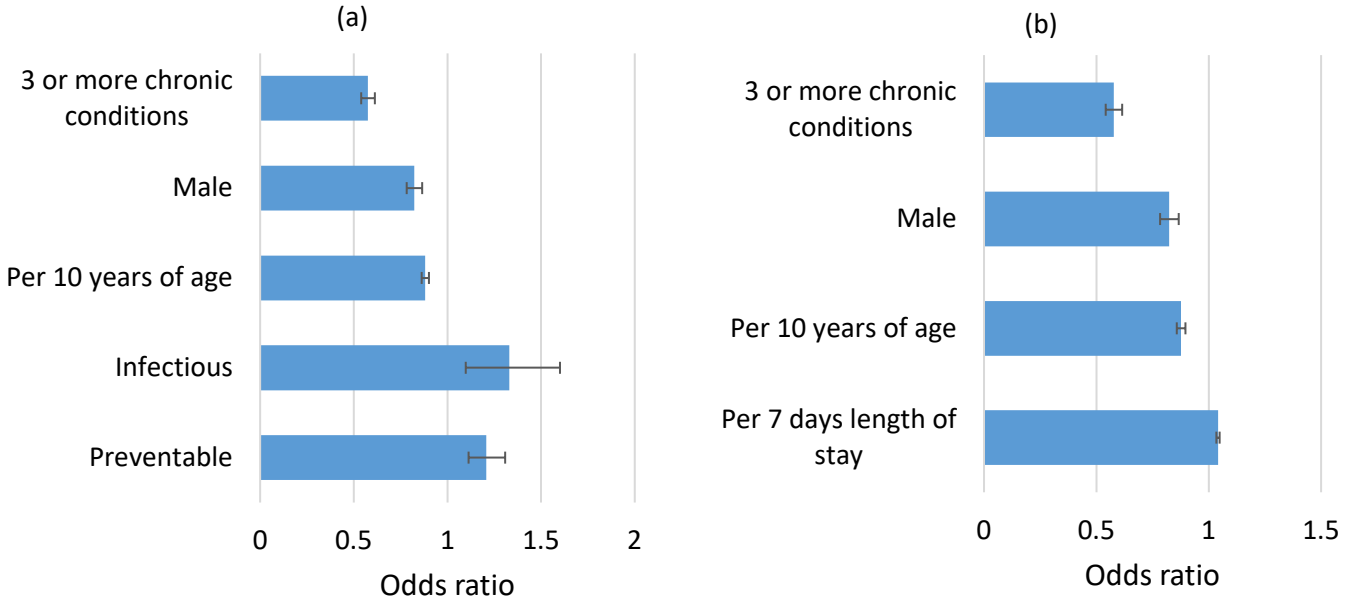
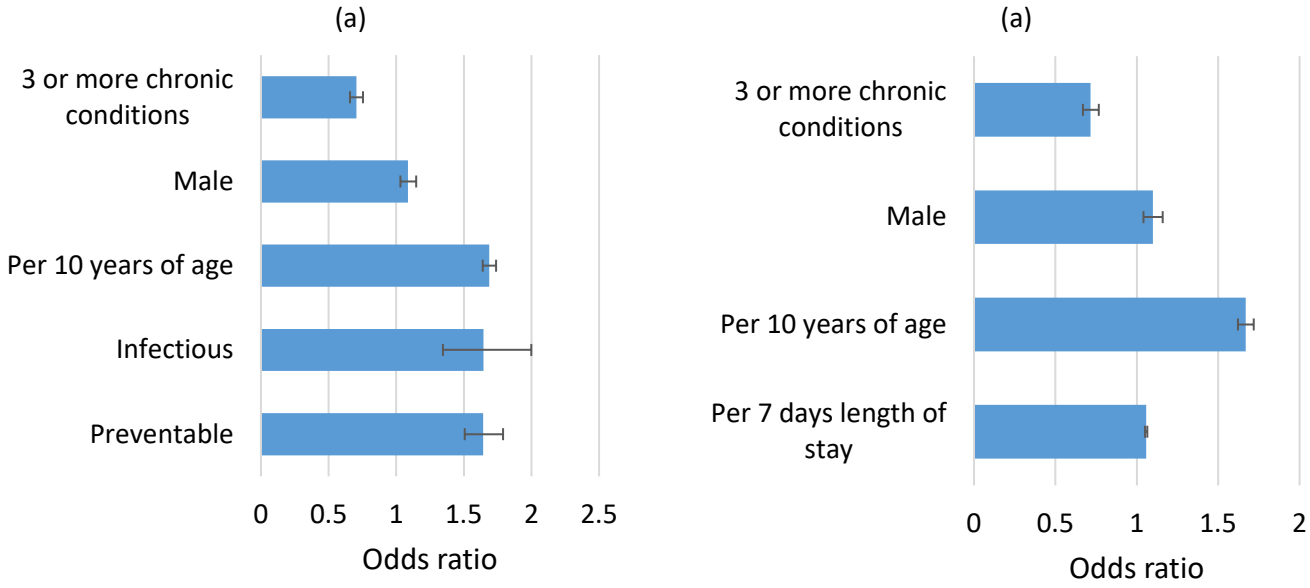


Figure 8. Factors associated with a first-time diagnosis of dementia following SNF discharge. (a) Model with infectious and preventable SNF outcomes. (b) Model with SNF length of stay.



Initial diagnosis of dementia during the post SNF period (Figure 8) was most strongly associated with age, with an odds ratio of 1.7 per 10 years of age. Preventable outcomes (odds ratio 1.6) and infectious outcomes (odds ratio 1.6) were also associated with onset of dementia. Longer length of stay in SNF was also associated with post-SNF onset of dementia (odds ratio 1.06 per 7 days). However, these associations are probably indirect. Adverse outcomes were associated with long length of stay, and dementia can be associated with stroke and heart attack – events that are likely to have long rehabilitation periods. Pre-existing chronic conditions were associated with lower odds of dementia onset, again because members with multiple chronic conditions are more likely to have been previously diagnosed with dementia, and so less likely to have an initial diagnosis at this time.

Discussion

Rehabilitation in SNF following hospitalization can be costly in financial and in human terms. Not only is the rehabilitation process itself often long and difficult, but many patients continue to experience poor health outcomes after discharge. The adverse experiences in SNF that we examined in this report were not comprehensive of all possible conditions a SNF patient may encounter. Rather, they were selected as an indicator set of adverse events that could be minimized through quality care and infection control. Similarly, the post-SNF outcomes we studied included just some of the possible mental and physical challenges patients may encounter. Our chief interest was to explore the connections between a patient's experience in SNF and their experiences after discharge.

Adverse experiences in SNF were not rare, and about 10% of the study population experienced them. Th likelihood increased for patients with extremely long SNF length of stay, and for patients with pre-existing health conditions. These same patients were, in turn, more likely to encounter further health challenges after discharge. Longer SNF length of stay in itself was also associated with some, but not all, post-SNF adverse experiences. Adverse events and length of stay were confounded in our statistical models. However, for reaction to severe stress and pneumonia, we observed strong associations with adverse experiences in SNF, but no significant association with length of stay. In these cases, we may safely consider the associations to be with the adverse experience in particular, not with the SNF experience in general.

In general, we cannot infer cause and effect from the observational associations we reported in this study. However, for new onset of depression, and particularly for new onset of PTSD/reaction to stress, there are plausible causal mechanisms connecting the two. So, while we cannot say that the experience in SNF was the direct cause of the subsequent post-SNF experience, we might consider the possibility that adverse experiences in SNF could be a contributing factor.

SNF patients were more likely to experience physical and mental health challenges after discharged than similar hospital patients who did not require SNF. In addition, patients with particularly long or difficult SNF experiences were at even greater risk. For these patients, coordinating care and post-discharge follow-up is particularly important.

Limitations

At present, death data are not available in the Washington All-Payer Health Care Claims database – the source for claims data in this study – so we can't identify which members might have died during the follow-up year.

This is a major limitation for two reasons: First, death is perhaps the most significant adverse outcome possible. Our inability to include death as an outcome greatly reduces the scope and utility of this report. Second, not being able to identify members who died introduces a potential survivorship bias into all our analyses. We restricted the population to members continuously enrolled through the follow-up year to avoid bias due to members losing coverage or moving out of state. But in doing so, we necessarily also exclude members who died, and bias our sample in favor of survivors. Since our study population is predominately covered by Medicare, loss of coverage once eligible is unlikely. Members who drop out of the dataset would either have died or moved out of state. But it is impossible to know how many were excluded due to death.

Other limitations arise due to the nature of claims data. First, as we discussed, the study design is observational and does not allow for causal inferences. Second, the purpose of claims is tied to reimbursement, not research. Diagnosis codes that do not translate to additional reimbursement may simply be omitted. Worse still, patient conditions are sometimes artificially made to appear more severe than they are – a fraudulent practice known as "upcoding[10]" – to enhance payment.

[10] Silverman, E and J. Skinner, Medicare upcoding and hospital ownership. Journal of Health Economics 23 (2004) 369–389.

Technical details

For this study, we used data from the Washington All-Payer Claims Database (WA-APCD). As a study population, we selected WA-APCD members with a hospital inpatient discharge to SNF and no SNF prior to inpatient stay. We included members with continuous medical coverage for a one-year lookback prior to their hospital admission and a one-1 year follow-up after their SNF discharge. We included SNF discharge dates 2016-2018, to include Medicare fee-for-service in follow-up and lookback time periods, and to avoid pandemic years.

We obtained data on SNF facilities from the Centers for Medicare and Medicaid Services (CMS) Provider Data Catalog[11]. We merged SNF characteristics – number of certified beds, overall rating, and ownership (for-profit, non-profit, government) – based on the rendering provider National Provider Index (NPI) code. For patients with multiple SNF providers after their hospital discharge, we chose the one with the longest length of stay.

We identified members with pre-existing chronic conditions during the lookback period following the methods of CMS Chronic Conditions Warehouse.[12] We defined multiple chronic conditions as having three of more of diabetes, ischemic heart disease, hypertension, depression, cancer, or dementia.

We identified adverse outcomes during patients' SNF stay and in the year after discharge from SNF based on International Classification of Disease version 10 (ICD-10) codes on medical claims. For SNF adverse events, we identified members having a medical claim with service date any time between their SNF admission and SNF discharge, and with a diagnosis of pressure sores, injury, fall, medical mistake, poisoning by prescription mistake (preventable), influenza, *C. diff*., TB, or Hep A, (infectious).

For post-SNF outcomes, we identified members having a medical claim with service date any time between seven and 365 days after their SNF discharge, and with a diagnosis of dementia, depression, PTSD, or adjustment disorder / reaction to severe stress. We provided a 7-day buffer following discharge to ensure we identified new-onset of conditions rather than a continuation of conditions they encountered while in SNF. For post-SNF pneumonia, we further specified that the member had no diagnosis of pneumonia during their SNF stay. For depression, dementia, PTSD, and adjustment disorder / reaction to stress, we stipulated that patients had no previous diagnoses either in SNF or during the year before their hospital admission. We identified 30-day and 365-day post SNF re-admissions as members with an acute-care hospital inpatient claim for any diagnosis, and admission date up to 365 days after discharge from SNF.

ICD codes for SNF and post-SNF diagnose are provided in Table 6.

We calculated total insurance paid medical cost during lookback, IP, SNF, and follow-up periods.

[11] Centers for Medicare and Medicaid Services, Provider Data Catalog https://data.cms.gov/provider-data/.
[12] Centers for Medicare and Medicaid Services, Chronic Conditions Warehouse https://www2.ccwdata.org/web/guest/home/

As a cost-comparison (no SNF) group, we selected randomly from a pool of members with inpatient hospital discharge, discharged not to SNF, and continuously enrolled for lookback and follow-up. We determined selection probabilities to match the study population on age, sex, and number of chronic conditions.

We tabulated all the above variables to get base counts. We selected a final set of factors and outcomes for regression modelling based on which combinations had sufficient sample size to be worth looking at. For SNF outcomes, we decided to combine preventable SNF adverse outcomes (pressure sores, falls, injury, or medical mistake) and SNF-acquired infectious diseases (Flu, TB, C-diff, HepA). Due to a small sample for PTSD, we considered only the larger category, reaction to severe stress and adjustment disorder, which, for brevity, we refer to simply as "distress."

We used logistic regression to examine predictors of SNF outcomes, and associations of SNF outcomes with follow-up outcomes. Our preliminary analysis revealed strong confounding between preventable SNF outcomes and SNF length of stay, and moderate confounding between infectious SNF events and SNF length of stay. Therefore, we ran two separate analyses for each post-SNF dependent variable – one with preventable and infectious SNF events as independent variables, and one with SNF length of stay as an independent variable.

We ran three series of models:

1. (SNF outcome) = for profit + overall rating 4 or 5 + beds + age + male + 3 or more chronic conditions + length of stay
2. (Post-SNF outcome) = preventable + infectious + age + male + 3 or more chronic conditions
3. (Post-SNF outcome) = length of stay + age + male + 3 or more chronic conditions

Where SNF outcomes included preventable and infectious outcomes, and post-SNF outcomes included 30-day readmission, 365-day readmission, pneumonia, distress, depression, and dementia. We dichotomized SNF ownership as for-profit versus non-profit or government, and we dichotomized overall rating as rating 4 or 5 versus rating 3 or less. To reduce the impact of outliers, we truncated SNF length of stay at 100 days. We performed the regression using RStudio, v 2022.12.0. Note that SNF characteristics data were missing for 8,971 members, so Model 1 was run on a reduced sample.

Appendix

Table 1. ICD-10 diagnosis codes used to identify patient conditions and outcomes.

Outcome	ICD-10 diagnosis codes
Reaction to severe stress and adjustment disorder	F43 (F431 = PTSD)
Depression	F314, F315, F321-F325, F329-F333, F338, F3130-F3132, F3160-F3164, F3175-F3178, F3181, F3340-F3342, F4321, F4323
Dementia	F04, F05, G94, R54, G300, G301, G308, G309, G138, F061, F068, G300, G301, G308, G309, G311, G312
Pneumonia	J12-J18
Pressure ulcer (bedsore)	L89
Injury	S00-T14
Fall	W03-W07, W181, W182
Medical mistake	Y62-Y70, Y80
Poisoning due to prescription mistake	T36-T50
Influenza	J09-J11
C-diff	A047
Tuberculosis	A15-A19
Hepatitis A	B15

Table 2. Study population demographics.

	Member count	Percent
Total	52616	100
Age < 45	617	1.2
Age 45-64	6175	11.9
Age 65-74	13222	25.4
Age 75-84	17573	33.8
Age 85+	15029	28.9
Female	32862	62.5
Male	19754	37.5
COMMERCIAL	3594	7.3
MEDICAID	1729	3.5
MEDICARE	47292	96.5
No chronic conditions	13067	24.8
1 condition	14850	28.2
2 conditions	11548	21.9
3 or more conditions	11379	21.6

Table 2. SNF characteristics

	Member count	Percent
Ownership		
For-profit	34038	78.0
Government	129	0.3
Non-profit	9478	21.7
No data	8971	
Beds		
Less than 100	16497	37.8
100_199	25425	58.3
200+	1723	3.9
No data	8971	
Overall rating		
1	2119	4.9
2	7610	17.5
3	6114	14.1
4	11633	26.7
5	16024	36.8
No data	9116	

Table 3. Adverse outcomes during SNF stay

	Member count	Per 1000
Preventable outcomes		
Bedsore	1153	24.8
Injury	2620	56.3
Fall	319	6.9
Medical or prescription mistake	242	5.2
Any	4004	86.1
Infectious		
Flu	240	5.2
C-diff	378	8.1
TB	20	0.4
Hep-A	< 10	0.0
Any	637	13.7
Other Adverse outcomes		
Infectious or Preventable	4532	97.5
Pneumonia	1518	32.6
Reaction to severe stress	897	19.3
PTSD	91	2.0

Table 4. Onset of adverse outcomes within 365 days following discharge from SNF.

	SNF		No SNF	
	Member count	Percent	Member count	Percent
Total	52616	100	48379	100
30-day readmission	3378	6.4	2334	4.8
Pneumonia	8167	17.6	3933	8.1
Depression	8576	18.5	5445	11.3
Reaction to stress	2363	5.1	1912	4.0
PTSD	545	1.2	571	1.2
Dementia	7007	15.4	3138	6.5

Table 6. Factors associated with preventable (pressure sores, injury, medical mistakes) and infectious (influenza, C. diff, TB, and Hep A) outcomes in SNF. Odds ratios with 95% confidence intervals.

	Preventable outcomes		Infectious outcomes	
	Odds ratio	95% Confidence interval	Odds ratio	95% Confidence interval
For-profit	1.01	[0.92-1.11]	1.00	[0.80-1.25]
Overall rating 4 or 5	1.02	[0.99-1.05]	1.00	[1.96-1.06]
Per 50 additional beds	1.07	[1.02-1.12]	0.94	[0.94-0.95]
Per 10 years of age	0.90	[0.87-0.93]	1.05	[0.96-1.14]
Male	1.11	[1.03-1.20]	0.95	[0.79-1.14]
3 or more chronic conditions	1.09	[1.06-1.12]	1.09	[1.02-1.16]

Table 5. Total medical costs before, during, and after hospitalization and SNF stay

	SNF	No SNF
Discharge year	Median total cost	
Pre-admission year		
2016	9360	8022
2017	9200	6179
2018	10369	6321
Inpatient stay		
2016	20810	9827
2017	20875	10354
2018	21278	10437
SNF stay		
2016	5823	
2017	5422	
2018	5288	
Post-discharge year		
2016	16551	10703
2017	17272	9601
2018	17481	9383

Table 7. Factors associated with adverse outcomes in the year following SNF discharge – Model including infectious and preventable SNF outcomes.

	30-day readmission		365-day readmission	
	Odds ratio	95% Confidence interval	Odds ratio	95% Confidence interval
Preventable	1.74	[1.56-1.94]	1.42	[1.33-1.51]
Infectious	2.17	[1.71-2.72]	1.55	[1.32-1.81]
Per 10 years of age	0.88	[0.85-0.91]	0.88	[0.86-0.90]
Male	1.14	[1.06-1.22]	1.13	[1.08-1.18]
3 or more chronic conditions	1.22	[1.12-1.32]	1.63	[1.56-1.70]
	Pneumonia		Distress	
Preventable	1.32	[1.21-1.42]	1.32	[1.14-1.51]
Infectious	1.62	[1.35-1.93]	1.09	[0.75-1.54]
Per 10 years of age	1.05	[1.02-1.07]	0.73	[0.70-0.75]
Male	1.25	[1.19-1.32]	0.73	[0.67-0.80]
3 or more chronic conditions	1.53	[1.45-1.62]	1.31	[1.19-1.43]
	Dementia		Depression	
Preventable	1.64	[1.51-1.79]	1.21	[1.11-1.31]
Infectious	1.65	[1.35-2.00]	1.33	[1.10-1.60]
Per 10 years of age	1.69	[1.64-1.74]	0.88	[0.86-0.90]
Male	1.09	[1.03-1.15]	0.82	[0.78-0.86]
3 or more chronic conditions	0.70	[0.66-0.75]	0.57	[0.54-0.60]

Table 8. Factors associated with adverse outcomes in the year following SNF – Model including SNF length of stay.

	30-day readmission		365-day readmission	
	Odds ratio	95% Confidence interval	Odds ratio	95% Confidence interval
Per 7 days length of stay	0.59	[0.57-0.61]	0.61	[0.96-0.96]
Per 10 years of age	0.94	[0.91-0.97]	0.97	[0.88-0.87]
Male	1.12	[1.04-1.20]	1.20	[1.13-1.08]
3 or more chronic conditions	1.24	[1.14-1.34]	1.34	[1.64-1.57]
	Pneumonia		Distress	
Per 7 days length of stay	1.00	[0.99-1.01]	1.01	[0.99-0.98]
Per 10 years of age	1.04	[1.02-1.07]	1.07	[0.73-0.70]
Male	1.26	[1.20-1.32]	1.32	[0.73-0.67]
3 or more chronic conditions	1.54	[1.46-1.63]	1.63	[1.32-1.20]
	Dementia		Depression	
Per 7 days length of stay	1.06	[1.05-1.06]	1.06	[1.04-1.03]
Per 10 years of age	1.67	[1.62-1.72]	1.72	[0.88-0.86]
Male	1.10	[1.04-1.16]	1.16	[0.82-0.78]
3 or more chronic conditions	0.72	[0.67-0.77]	0.77	[0.58-0.54]