

Supplementary Online Content

Burke RE, Xu Y, Rose L. Skilled nursing facility performance and readmission rates under value-based purchasing. *JAMA Netw Open.* 2022;5(2):e220721. doi:10.1001/jamanetworkopen.2022.0721

eAppendix. Brief Description of SNF VBP Program

eTable 1. Data Sources Used in the Analysis

eTable 2. Characteristics of SNF Achiever and Improver Groups

eTable 3. Characteristics of SNF Achiever and Improver Groups by Quartile of Baseline Score

This supplementary material has been provided by the authors to give readers additional information about their work.

eAppendix. Brief Description of SNF VBP Program

The SNF VBP Program was created under Protecting Access to Medicare Act of 2014 to improve the quality of care in skilled nursing facilities. Like other CMS value-base purchasing programs, CMS withholds a portion of Part A fee-for-service payments; for SNF VBP this is 2 percent. The program then awards incentive payments by redistributing 60 percent of these withheld funds, with the remaining 40 percent kept by CMS.

Facilities are assessed on an all-cause, all-condition risk-adjusted readmission measure. SNFs are scored on achievement score and an improvement score. The achievement score represents a SNF's readmission rate in the baseline year relative to other facilities (FY2015 for the first year of the program). The improvement score represents the within-facility improvement two years after the achievement score year (FY2017 for the first year of the program). The SNF is then given the higher of the two scores for incentive payments. The lowest 40 percent of SNFs earn less than the 2 percent withheld by CMS. The remaining SNFs can earn the exact amount withheld (also given to facilities with very low numbers of patients and readmissions) or more than the amount withheld.

All SNFs that are reimbursed under the CMS SNF prospective payment system are subject to the program. The first award incentives affected FY19 payments.

eTable 1. Data Sources Used in the Analysis

Data Source	Description	Variables used in the analysis
Skilled nursing facility value-based purchasing program performance data	Data regarding all-cause readmission rates and performance under the SNF VBP program at a facility level for the baseline and performance periods	All-cause, risk-standardized readmission rates, improvement scores, achievement scores, performance scores, incentive multipliers
CMS Provider of Services file and LTCFocus	Provides data regarding skilled nursing facility characteristics (CMS provider of services) and patient characteristics (LTCFocus) at a facility level	Facility characteristics listed in Table 1 (CMS Provider of Services), Patient characteristics listed in Table 1 (LTCFocus) other than star ratings and net operating margin. In addition, the location of nursing homes in the Provider of Services file was used to calculate a Hefindahl-Hirschman index.
Nursing Home Compare	Data regarding SNF quality as reflected in aggregate star ratings	Overall star rating, as well as component parts (quality star rating, survey star rating, staffing star rating, and registered nursing staffing in particular)
SNF cost reports	Data regarding SNF revenues, operating costs, and operating margin	Net operating margin
2015 US Census residential population estimates	Data regarding county-level characteristics	Proportion of Medicare beneficiaries of different races/ethnicities. These data also are used to calculate the Area Deprivation Index which was aggregated to the county level.
Medicare Advantage enrollment	Medicare Advantage enrollment data at the county level	Proportion of Medicare Advantage enrollees at the county level
Post-acute care and hospice provider utilization and payment public use files	Data regarding total Medicare payments to SNF	Total Medicare payments were used to estimate the size of the financial penalty for each SNF

eTable 2. Characteristics of SNF Achiever and Improver Groups

Characteristic	Achiever group mean/% N=13,110	Improver group mean/% N=1,839	Standardized difference
SNF VBP performance			
Baseline readmission rate	0.19 (0.01)	0.22 (0.01)	-2.499
Performance readmission rate	0.19 (0.02)	0.20 (0.01)	-0.191
Achievement Score	33.57 (28.40)	25.00 (23.29)	0.308
Improvement Score	11.64 (23.23)	37.77 (21.46)	-1.135
Performance Score	33.57 (28.40)	37.77 (21.46)	-0.152
Incentive Payment Multiplier	0.99 (0.01)	0.99 (0.01)	-0.086
Facility characteristics			
Multi-facility	7,376 (60.87%)	1,007 (57.74%)	0.064
Hospital-based	397 (3.28%)	39 (2.24%)	0.060
For-profit	9,109 (70.69%)	1,443 (78.94%)	-0.183
Government-owned	724 (5.62%)	74 (4.05%)	0.069
# Changes in ownership	1.67 (2.06)	1.82 (2.08)	-0.073
# of Beds	108.06 (59.00)	118.59 (59.33)	-0.178
# of Admissions/Bed	2.30 (2.27)	2.61 (2.44)	-0.135
% Occupancy	79.80 (14.84)	80.50 (14.31)	-0.047
Urban location	9,334 (72.44%)	1,411 (77.19%)	-0.107
Net operating margin	-0.76 (13.90)	-0.38 (12.97)	-0.028
Overall star rating	3.35 (1.32)	3.15 (1.30)	0.154
Quality star rating	4.01 (1.09)	3.85 (1.15)	0.151
Survey star rating	2.82 (1.26)	2.69 (1.24)	0.097
Staffing star rating	3.10 (1.06)	2.96 (0.99)	0.134
RN Staffing Rating	3.30 (1.15)	3.08 (1.09)	0.187
Patient characteristics in facility			
Age, mean (years)	79.29 (6.03)	78.30 (6.19)	78.48 (10.41)
% White, facility-level	79.15 (22.18)	74.57 (23.42)	0.205
Long ADL	16.82 (2.10)	17.17 (1.99)	-0.168
% Medicaid	59.53 (23.19)	59.97 (22.80)	-0.019
Case-mix index	1.18 (0.17)	1.18 (0.13)	-0.033
Median length of stay, days	36.33 (23.96)	33.30 (20.16)	0.129
County characteristics			
% White, county-level	80.43 (14.59)	76.68 (15.54)	0.255
% Black, county-level	11.57 (12.72)	15.48 (14.50)	-0.302
% Hispanic, county-level	13.75 (15.25)	14.56 (15.17)	-0.053
ADI score	5.72 (1.67)	5.66 (1.63)	0.037
Hirschman-Herfindahl Index	0.21 (0.24)	0.19 (0.24)	0.060
% MA enrollment (county)	0.31 (0.14)	0.32 (0.13)	-0.071

Source: Author analysis of CMS data. Notes: Means (for binary variables) and proportions (for categorical variables) of key SNF characteristics for the achiever and improver groups.

eTable 3. Characteristics of SNF Achiever and Improver Groups by Quartile of Baseline Score

Characteristic	Quartile 1			Quartile 2			Quartile 3			Quartile 4		
	A N=3256	I N=573	p- value	A N=3215	I N=508	p- value	A N=3130	I N=390	p- value	A N=3509	I N=306	p- value
SNF VBP performance												
Baseline readmission rate	0.19 (0.02)	0.23 (0.01)	-2.23	0.19 (0.01)	0.22 (0.01)	-2.89	0.18 (0.01)	0.22 (0.01)	-2.81	0.18 (0.02)	0.22 (0.01)	-2.56
Performance readmission rate	0.22 (0.01)	0.21 (0.01)	0.38	0.20 (0.00)	0.20 (0.00)	-0.13	0.19 (0.00)	0.19 (0.00)	0.04	0.17 (0.01)	0.18 (0.00)	-0.50
Achievement Score	0.18 (1.00)	0.33 (1.33)	-0.14	19.24 (7.08)	18.32 (7.08)	0.13	40.62 (5.95)	40.84 (5.85)	-0.04	71.37 (15.46)	63.67 (9.82)	0.51
Improvement Score	0.00 (0.00)	17.12 (12.74)	-3.44	1.84 (5.12)	33.02 (12.02)	-4.67	8.36 (13.05)	50.61 (8.34)	-3.35	34.12 (33.19)	69.06 (9.27)	-1.10
Performance Score	0.18 (1.00)	17.12 (12.74)	-3.38	19.24 (7.08)	33.02 (12.02)	-1.72	40.62 (5.95)	50.61 (8.34)	-1.60	71.37 (15.46)	69.06 (9.27)	0.15
Incentive Payment Multiplier	0.98 (0.00)	0.98 (0.00)	-1.53	0.98 (0.00)	0.99 (0.01)	-1.99	0.99 (0.00)	1.00 (0.01)	-1.69	1.01 (0.01)	1.01 (0.00)	-0.12
Facility characteristics												
Multi-facility	1,873 (62.23%)	281 (52.33%)	0.20	1,811 (61.02%)	321 (59.33%)	0.03	1,717 (60.12%)	231 (62.10%)	-0.04	1,975 (60.16%)	174 (59.18%)	0.02
Hospital-based	73 (2.43%)	12 (2.23%)	0.01	77 (2.59%)	10 (1.85%)	0.05	110 (3.85%)	9 (2.42%)	0.08	137 (4.17%)	8 (2.72%)	0.07
For-profit	2,459 (76.77%)	463 (81.23%)	-0.11	2,249 (71.46%)	463 (81.37%)	-0.22	2,125 (69.42%)	286 (74.29%)	-0.11	2,276 (65.52%)	231 (75.99%)	-0.22
Government-owned	109 (3.40%)	20 (3.51%)	<- 0.01	182 (5.78%)	17 (2.99%)	0.12	198 (6.47%)	25 (6.49%)	<- 0.01	235 (6.76%)	12 (3.95%)	0.11
# Changes in ownership	1.72 (2.04)	1.76 (2.01)	-0.02	1.69 (2.08)	1.84 (2.08)	-0.07	1.67 (2.10)	1.95 (2.21)	-0.13	1.60 (2.04)	1.74 (2.07)	-0.07
# of Beds	115.31 (53.49)	120.02 (54.58)	-0.09	101.84 (56.20)	117.62 (54.67)	-0.28	101.54 (56.80)	119.52 (72.76)	-0.31	112.72 (66.52)	116.58 (57.16)	-0.06
# of Admissions/Bed	2.64 (2.40)	2.93 (2.67)	-0.12	1.99 (1.94)	2.55 (2.55)	-0.27	1.98 (2.05)	2.39 (2.11)	-0.20	2.55 (2.51)	2.43 (2.12)	0.05
% Occupancy	79.66 (14.62)	81.92 (13.40)	-0.16	79.34 (15.13)	79.80 (14.56)	-0.03	79.39 (15.02)	79.73 (14.46)	-0.02	80.70 (14.57)	80.18 (15.12)	0.04
Urban location	2,472 (77.18%)	453 (79.47%)	-0.06	2,217 (70.45%)	457 (80.32%)	-0.22	2,117 (69.14%)	283 (73.51%)	-0.10	2,528 (72.77%)	218 (71.71%)	0.02
Net operating margin	-0.77 (13.53)	-0.87 (14.68)	0.01	-1.23 (12.38)	-0.64 (11.33)	-0.05	-0.68 (16.60)	-0.58 (10.69)	-0.01	-0.41 (12.89)	1.32 (14.78)	-0.13
Overall star rating	3.18 (1.32)	3.18 (1.28)	<- 0.01	3.29 (1.31)	3.04 (1.33)	0.19	3.31 (1.33)	3.15 (1.29)	0.12	3.62 (1.28)	3.30 (1.31)	0.24
Quality star rating	3.81 (1.15)	3.81 (1.17)	<0.0 1	3.96 (1.11)	3.72 (1.16)	0.22	3.99 (1.10)	3.96 (1.13)	0.03	4.26 (0.96)	4.01 (1.08)	0.26
Survey star rating	2.74 (1.25)	2.72 (1.22)	0.01	2.78 (1.26)	2.64 (1.28)	0.11	2.78 (1.27)	2.62 (1.20)	0.12	2.96 (1.26)	2.83 (1.25)	0.10
Staffing star rating	2.98 (1.04)	3.02 (0.95)	-0.04	3.07 (1.05)	2.92 (1.02)	0.14	3.09 (1.07)	2.97 (1.01)	0.11	3.27 (1.04)	2.93 (1.02)	0.32

RN Staffing Rating	3.12 (1.14)	3.05 (1.10)	0.06	3.26 (1.15)	3.08 (1.08)	0.16	3.30 (1.16)	3.12 (1.09)	0.16	3.49 (1.10)	3.10 (1.13)	0.35
Patient characteristics in facility												
Age, mean (years)	78.86 (5.90)	79.01 (5.12)	-0.03	78.81 (6.90)	78.33 (5.55)	0.07	79.20 (6.50)	78.69 (5.66)	0.08	80.19 (5.94)	79.22 (5.68)	0.16
% White, facility-level	75.15 (23.61)	74.43 (22.89)	0.03	79.75 (21.70)	73.18 (24.47)	0.30	80.14 (21.62)	75.33 (22.37)	0.22	81.41 (21.23)	76.39 (23.62)	0.23
Long ADL	17.14 (1.97)	17.33 (1.94)	-0.10	16.67 (2.32)	17.10 (2.01)	-0.19	16.63 (2.17)	17.09 (2.01)	-0.21	16.82 (1.92)	17.14 (1.99)	-0.16
% Medicaid	59.17 (22.93)	58.19 (22.45)	0.04	61.74 (22.82)	61.40 (23.40)	0.02	61.15 (22.51)	60.96 (22.22)	0.01	56.44 (23.97)	59.34 (22.92)	-0.12
Case-mix index	1.19 (0.15)	1.19 (0.13)	0.02	1.17 (0.18)	1.18 (0.13)	-0.08	1.17 (0.18)	1.18 (0.13)	-0.08	1.19 (0.15)	1.18 (0.12)	0.05
Median length of stay, days	33.02 (20.28)	31.69 (18.03)	0.07	39.54 (27.09)	34.36 (21.71)	0.20	39.22 (26.14)	34.43 (21.46)	0.19	33.97 (21.27)	32.86 (19.04)	0.05
County characteristics												
% White, county-level	77.94 (14.48)	74.75 (15.57)	0.22	80.96 (14.36)	77.38 (15.24)	0.25	81.53 (14.68)	77.35 (15.81)	0.28	81.30 (14.56)	78.14 (15.47)	0.22
% Black, county-level	13.96 (13.25)	17.22 (14.81)	-0.24	11.34 (12.61)	14.68 (13.82)	-0.26	10.84 (12.64)	15.05 (14.86)	-0.33	10.21 (12.09)	14.29 (14.45)	-0.33
% Hispanic, county-level	15.34 (16.49)	15.17 (15.21)	0.01	13.01 (14.96)	13.99 (15.02)	-0.07	13.19 (15.23)	14.91 (16.11)	-0.11	13.44 (14.19)	14.08 (14.11)	-0.05
ADI score	5.70 (1.66)	5.55 (1.56)	0.09	5.78 (1.66)	5.65 (1.64)	0.08	5.77 (1.66)	5.69 (1.60)	0.04	5.64 (1.70)	5.84 (1.78)	-0.11
Hirschman-Herfindahl Index	0.18 (0.22)	0.18 (0.24)	0.02	0.22 (0.25)	0.18 (0.23)	0.16	0.23 (0.25)	0.21 (0.26)	0.07	0.20 (0.23)	0.22 (0.25)	-0.08
% MA enrollment (county)	0.31 (0.13)	0.33 (0.13)	-0.10	0.31 (0.14)	0.32 (0.13)	-0.06	0.31 (0.14)	0.31 (0.14)	-0.04	0.30 (0.14)	0.31 (0.13)	-0.04

Source: Author analysis of CMS data. Notes: Means (for binary variables) and proportions (for categorical variables) of key SNF characteristics for the achiever (“A”) and improver (“I”) groups within each quartile of achievement (baseline) score. The final columns give the standardized mean difference between the achiever and improver groups. Facilities without a baseline score are dropped.