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POST-HOSPITAL NURSING HOME UTILIZATION AND QUALITY INDICATORS AMONG MEDICARE BENEFICIARIES IN PUERTO RICO: COMPARISON WITH THE UNITED STATES

Maricruz Rivera-Hernandez, PhD[1,*], **Amilcar Matos-Moreno, MPH**[2], **Nasim Ferdows, PhD**[3], **Amit Kumar, PhD**[4]

[1]Center for Gerontology and Healthcare Research at Brown University School of Public Health

[2]Center for Social epidemiology and Population Health, University of Michigan

[3]Department of Health Administration and Policy, Hudson College of Public Health, The University of Oklahoma Health Sciences Center

[4]Department of Physical Therapy at Northern Arizona University

Abstract

Objectives: The purpose of the study is to contribute to the literature regarding post-acute nursing home utilization and quality indicators among Medicare beneficiaries in Puerto Rico compared with the United States (US) mainland.

Design: Medicare data from 2015–2017 was used to identify new discharges to skilled nursing facilities (SNFs) using the Minimum Data Set and the Medicare Provider Analysis and Review.

Setting and Participants: Post-acute care patients admitted to SNFs in Puerto Rico and the US

Methods: Our final cohort included 4,732,222 beneficiaries from Puerto Rico and the US enrolled in Medicare fee-for-service or Medicare Advantage programs admitted to a SNF (N=15,197) following an acute hospital stay. We compared demographic, clinical and facility-level characteristics among patients in Puerto Rico and the US. We also described two quality indicators among these groups: a) 30-day rehospitalization rates; and b) successful discharge from the facility to the community.

Results: Medicare patients in Puerto Rico were physically and cognitively healthier than patients in the US. Puerto Ricans were also more likely to be admitted to lower quality nursing homes than US patients (2.5 vs. 3.4). Finally, Puerto Ricans had higher rates of successful discharge to the

[*]Corresponding authors: Maricruz Rivera-Hernandez, 121 (6) South Main Providence RI, 02912; T: 401-863-1606; maricruz_rivera-Hernandez@brown.edu.
Maricruz Rivera-Hernandez PhD: 121 (6) South Main Providence RI, 02912; T: 401-863-1606;
Amilcar Matos-Moreno Mph; School of Public Health 1415 Washington Heights Ann Arbor, MI 48109-2029; T: 734-764-5425;
Nasim B. Ferdows PhD: Hudson College of Public Health, 801 N.E. 13th Street, Oklahoma City, OK 73104; T: 405.271.8001;
Amit Kumar PhD: Northern Arizona University, PO Box 15105, Flagstaff, AZ 86011; T: 602-827-2832;

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community (17.6, 95% CI 13.0 – 22.3), but higher 30-day rehospitalization rates compared to US patients (11.2, 95% CI, 6.2 – 16.3). These differences were consistent even when comparing these quality outcomes among Puerto Ricans to US Hispanics only.

Conclusions and implications: SNFs in the US and Puerto Rico are now receiving financial penalties for high readmission rates. Currently, Medicare does not measure readmission rates for Medicare Advantage patients—even though some states, including Puerto Rico, have a high proportion of Medicare Advantage beneficiaries. As Medicare Advantage enrollment continues to increase, our results highlight the importance of measuring performance among Medicare Advantage patients and assessing disparities in quality of post-acute care among patients in Puerto Rico and the US.

Summary:

Medicare patients in Puerto Rico were admitted to lower-quality skilled nursing facilities and had over 8 percentage points higher 30-day rehospitalization rates than patients in the US mainland.

Keywords

Medicare beneficiaries in Puerto Rico; post-acute care in Puerto Rico; Medicare Advantage beneficiaries; post-ace care among Medicare Advantage beneficiaries

INTRODUCTION

Puerto Rico has experienced both economic and natural disasters, putting additional strain on its long-underfunded health care system, and exacerbating healthcare disparities.[1] Recently, the Centers for Medicare and Medicaid (CMS) initiated several efforts to increase quality of post-acute care and reduce skilled nursing facility (SNF) spending, which may impact minority populations in the US and Puerto Rico differently.[2] Yet there is no literature regarding utilization of SNF care among Medicare beneficiaries in Puerto Rico and whether differences in the quality of post-acute care among Puerto Ricans and patients in the US Mainland exist.

There are several reasons why we should study disparities in access and quality of post-acute care among older adults in Puerto Rico. First, the population of Puerto Rico is older compared to other countries in the region.[3] In fact, Puerto Rico has a higher proportion of adults 65 years and older compared to the United States (11.4% vs. 8.6%).[5] In addition, Puerto Rico has almost twice the rates of disability compared to the US (21.6% vs. 12.7%), including visual, hearing, ambulatory, cognitive and self-care.[6] Finally, approximately 92% of people in Puerto Rico have health insurance, with the majority of people receiving coverage through the public health care system (58%),[7] including Veterans Affairs, Medicare, Medicaid and insurance for public employees. Yet, the Puerto Rican health care system faces multiple challenges[8] such as differences in funding rates and shortage of health care professionals and facilities.[9] Puerto Rico has the lowest Medicaid ($1,571 compared to $5,790) and Medicare ($5,208 compared to $8,700) annual spending per beneficiary in the United States,[10] whereas the cost of living is comparable to the US.[11] Finally, health care

providers are fleeing the island. From 2004–2007 there were 9,865 physicians in Puerto Rico compared to 9,424 from 2007–2010, accounting for approximately 5% reduction.[7]

Therefore, the purpose of this brief report is to describe sociodemographic, clinical and facility characteristics of Medicare beneficiaries in Puerto Rico and the US who are discharged from the hospital and admitted to SNFs for post-acute care. We also describe the quality of post-acute care received by these groups as measured by 30-day rehospitalization rates and successful discharge to the community.

METHODS

Data

We linked individual-level characteristics using 2015–2017 patient assessment data from the Minimum Data Set (MDS 3.0),[12] the Medicare Provider Analysis and Review (MEDPAR), and the Medicare Master Beneficiary Summary File (MBSF).[13] In addition, facility characteristics and Five-Star Ratings were obtained from the Long-Term Care: Facts on Care in the US (LTCFocus)[14] and Nursing Home Compare (NHC) databases respectively (See Table A1 for a description of the datasets).[15] We identified patients who were newly admitted to a SNF (no SNF admissions in the prior year) and had MDS admission dates within three days of hospital discharge dates. Of note, about 20% of discharges in the US went to SNFs compared to 2% in Puerto Rico. Our final cohort included 4,732,222 new SNF admissions with a valid facility ID matching with the LTC focus and NHC data.

Variables

Patient characteristics—We report individual-level characteristics, including age; sex; enrollment in Medicare Advantage (MA)/fee-for-service; marital status; dementia diagnosis; and activities of daily living score. In order to capture case-mix severity from hospital discharge status (using MEDPAR), we determined the most frequent Medicare Severity Diagnosis Related Groups (MS-DRGs) and reported the proportion of patients in the top three common major diagnostic categories including, MDC 01 (Diseases/Disorders of the Nervous System), MDC 05 (Diseases/Disorders of the Circulatory System) and MDC 08 (Diseases/Disorders of the Musculoskeletal System & Connective Tissue); we also reported the patient's resource utilization groups (low vs. moderate vs. high nursing therapy) and observed length of stay from the MDS.

Facility characteristics—We reported information about the total number of beds; admissions per bed; average age of residents; proportion of residents under 65; proportion of residents supported by Medicaid, Medicare or other; proportion of resident enrolled in MA; whether the facilities are for profit; residents acuity index; average ADLs score; percent of residents who are low care; percent of residents with intact/mild impairment; and CMS overall star rating.

Post-acute care quality measures—We calculated *30-day rehospitalization rates* utilizing the American Health Care Association (AHCA) risk-adjusted readmission model.[16] *Discharge to the community* was based on the AHCA's definition as discharge to the

community within 100 days of admission from the hospital and remaining in the community for at least 30 days (See Table A2 in the Appendix for a description of the covariates included in the models).

Analysis—Unadjusted means were used to compare patient and facility characteristics among patients from Puerto Rico and the US. Since 99% of patients in Puerto Rico classified themselves as Hispanics, we also repeated the analyses by comparing patients in Puerto Rico to US Hispanics. Similarly, we used linear regression models to examine whether 30-day risk-adjusted rehospitalization rates and risk-adjusted discharge to the community differ between patients in Puerto Rico and the US or patients in Puerto Rico and US Hispanics. Based on the approach used by AHCA/LTC focus, missing values on the covariates were mean imputed.[14] The models included individual-level covariates, facility, and year fixed-effects. The standard errors are clustered at the patient and the facility level. Sensitivity analysis was performed using complete data (See Table A3 in the Appendix). Analysis was performed using 15.1 (StataCorp). The study protocol was approved by the University's Human Research Protections Office and the CMS Privacy Board.

RESULTS

Puerto Ricans were more likely to be female, married, and enrolled in MA compared to either all patients or Hispanics accepted to SNFs in the US (See Table 1). The rate of dementia diagnosis was over four times higher among patients in the US compared to patients in Puerto Rico (4.7% for Puerto Ricans vs. 17.5% for all patients in the US vs. 18.3% for Hispanic patients in the US). Puerto Ricans had less functional impairment at admission, and about 50 percentage points more likely to be discharged from the hospital with an MDC of "musculoskeletal system and connective tissue" (MDC 08). Similarly, they were over 15 percentage points more likely to be classified as requiring low nursing care. Table 1 also described facility characteristics where these patients were admitted. Puerto Ricans were admitted to a higher proportion of SNFs with fewer number of beds but with over four times the number of admissions per bed. In addition, Puerto Ricans were admitted to facilities with a higher proportion of younger patients, residents with lower acuity index and ADL needs, as well as residents whose primary support was Medicare. Finally, patients in Puerto Rico were more likely to be admitted to facilities with lower overall star ratings (2.5 in Puerto Rico vs. 3.4 in the US). All these differences were significant at P<.001.

Table 2 shows rates of discharge to the community and 30-day rehospitalization among patients in Puerto Rico and the US. Puerto Ricans were more likely to be successfully discharged to the community compared to either all patients in the US (17.6, 95% CI 13.0 – 22.3) or Hispanics in the US (18.9%, 95% CI 14.1 – 23.6). However, patients in Puerto Rico had higher 30-day rehospitalization rates when compared to either all patients in the US (11.2, 95% CI, 6.2 – 16.3) or Hispanics only (8.6, 95% CI, 3.3 – 13.9). Sensitivity analysis results using complete data showed similar results (See Table A3 in the Appendix).

DISCUSSION

The results of our study show that Medicare beneficiaries using post-acute care in Puerto Rico are physically and cognitively healthier than either all patients or Hispanics in the mainland US, even though Puerto Rico has higher levels of disability than the US, including ambulatory, cognitive and independent living disabilities (12.1%, 9.7%, 11.4% in Puerto Rico vs. 6.8%, 5.1%, 5.6% in the US, respectively).[6] Another important result is that Hispanics in Puerto Rico were over 35% more likely to have MA. In addition, patients in Puerto Rico have higher rates of successful discharge to the community, but over 8 percentage points higher 30-day rehospitalization rates. Finally, they were more likely to be admitted to lower quality rated facilities.

Contrary to what one would expect, SNFs in Puerto Rico appear to serve a higher proportion of low-care residents, which may explain shorter lengths-of-stay. This may be related to a number of factors, including the lower fraction of hospital discharges going to SNFs (20% in the US vs. 2% in Puerto Rico) compared to the higher fraction discharged home to self-care (46% discharges in the US vs. 82% in Puerto Rico, as shown from our data) and the higher 30-day risk-standardized rate for all-cause mortality among hospitalized patients,[17] which may indicate that sicker patients may not make it to SNFs. In addition, older adults in Puerto Rico may be relying on informal caregivers to live independently and keep them out of the hospitals and/or long-term care facilities, especially since long-term care coverage is limited in Puerto Rico.[18] One in eight older adults have provided care to family members or friends, and about half of Alzheimer's and dementia caregivers provide care for about two years.[19,20] Finally, sicker patients may be leaving the island and moving to the US to receive post-acute care or long-term care.

The high proportion of SNF patients enrolled in MA in Puerto Rico is consistent with reports from CMS, which shows Puerto Rico as the state/territory with the highest MA penetration rate in the US (91% in Puerto Rico vs. 41% in the US).[21] This is partially related to the high levels of poverty in Puerto Rico. The per capita income in Puerto Rico is $12,451 (2018 dollars) and the poverty rate is 43%.[22] MA is popular among low-income beneficiaries due to the availability of plans with lower or zero premiums and more generous benefits than traditional Medicare.[23]

Second, due to limitations in Medicaid, Supplemental Security Income and Part D low income subsidy funding, the Puerto Rican government has looked for strategies to improve access and quality of care among high-cost and high-need residents. In 2006, the government integrated Medicare/Medicaid under the *Medicare Platino* program (comparable to MA Dual Eligible Special Needs Plans) for dually eligible beneficiaries to address cost and coordinated care.[24] Unfortunately, MA beneficiaries in Puerto Rico receive worse quality of care than those in the US.[25]

Our findings have important implications for policy and research. At the beginning of 2019, all the SNFs in Puerto Rico and over 70% of SNFs in the US were penalized due to poor performance in avoidable rehospitalizations.[26] Currently, Medicare does not measure/report readmission rates for MA patients through CMS Nursing Home Compare—even though MA

continues to increase and MA penetration rate is high in a few states, including Puerto Rico.[27] Our results suggest the importance of measuring performance among MA patients to provide a more complete picture of SNF quality for all patients, families and providers. In addition, future research may be needed to explore whether the inclusion of patients enrolled in MA plans would have financial consequences for readmission penalties for SNFs that serve a higher proportion of MA patients. The inclusion of MA patients may incentivize SNFs to focus efforts to prevent or to be aware of readmissions for all patients.[28]

Our study has some limitations. First, we were unable to control for potential selection bias in social risk factors in our analyses such as information related to caregivers/family support or other patient preferences since these variables are not captured in our data. In addition, the MDS does not identify Hispanic subgroups in the US. However, we found that Medicare patients admitted to SNFs in Puerto Rico were much healthier compared to Hispanics in the US. Finally, our findings may not be generalizable to other post-acute care quality measures. Yet, a strength of this study is that we compared quality of care by using overall facility ratings, as well as 30-day readmission rates and successful discharge to the community among both MA and fee-for-service beneficiaries in Puerto Rico and the US.

Puerto Ricans admitted to SNFs for post-acute care in Puerto Rico were much healthier and have higher rates of successful discharge to the community compared to all patients or Hispanic patients in the US. However, patients in Puerto Rico had higher hospitalization rates and lower star ratings than those in the US. Further research regarding Medicare beneficiaries enrolled in the MA program in Puerto Rico is needed to understand quality of care and outcomes among this often-ignored population.

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APPENDIX

TABLE A1:

DATASETS

The Medicare Master Beneficiary Summary File (MBSF).[1]	The MBSF contains demographics and Medicare enrollment information. Hispanic ethnicity was based on the Research Triangle Institute mutually-exclusive race/ethnicity variable, which has high sensitivity and specificity for whites, blacks and Hispanics.
The Medicare Provider Analysis and Review (MEDPAR)[1]	The MEDPAR file contains claims for inpatient stays and includes information about diagnoses and hospital length of stay.
The patient assessment data from the Minimum Data Set (MDS 3.0)[3]	The MDS assessment instrument includes information regarding clinical characteristics and treatments. The assessments are reported for both traditional Medicare and MA enrollees. Reliability of the MDS scales has been previously reported.[4,5]
The Long-Term Care: Facts on Care in the US (LTCFocus)[6] *and Nursing Home Compare (NHC)*[7]	In addition, we obtained facility-level characteristics from the LTC Focus, and NHC for information about nursing home quality star ratings.

TABLE A2:

MDS COVARIATES INCLUDED IN THE DISCHARGE TO COMMUNITY & 30-DAY REHOSPITALIZATION MEASURES

DISCHARGE TO COMMUNITY The model includes 59 different variables in six domains from the MDS assessment file: demographic, functional status, prognosis, clinical conditions, clinical treatments, and clinical diagnoses	
DEMOGRAPHICS	**Age** **Gender** (A0800) **Marital Status** (A1200)
FUNCTIONAL STATUS	**Vision:** grouped as adequate vs. impaired vs. moderately/highly/severely impaired (B1000) **Makes self-understood:** grouped as understood, usually understood, sometimes/rarely/never understood (B0700) **Ability to understand:** grouped as understands, usually understands, sometimes/rarely/never understands (B0800) **Cognitive impairment** based on BIMS scale grouped as- mild, - moderate, and severe, Staff assessed (C0500) Any Sign/Symptoms of **Delirium** (C1310A-D) **Major Depression** (combined into a single item) According to CMS quality measure definition using MDS items (D0200A2, B2; D0300; D0500A2, B2; D0600) **Behavior Codes** (combined into a single item) for any yes on: Hallucination (E0100a) Delusion (E0100b) Physical Behavior (E0200a) Verbal Behavior (E0200b) Other Behavior (E0300c) **Any Rejection of Care** (E0800) Medicare **RUG** IV Hierarchical Group: Collapsed into 12 categories depending on levels of nursing and therapy **Activities of Daily Living** (each coded separately) Bed mobility (G0110A1) Transfer (G0110B1) Walk in Corridor (G0110D1) Locomotion (G0110E1) Eating (G0110H1) Personal Hygiene (G0110J) **ADL summary**: Combination of bed mobility, transfer, locomotion, dressing, eating, toilet use, and hygiene **ADL*Cognitive impairment**: Interaction term **Bathing** grouped as independent, supervised, physical help limited to transfer only, physical help in part of bathing activity, total dependence/activity did not occur (G0120) **Balance** (each coded separately) Moving from seated to standing (G0300A) Walking (G0300B) Turning around and facing the opposite direction (G0300C) Moving on and off toilet (G0300D) Steady at all times Not steady, but able to stabilize without staff assistance Not steady, only able to stabilize with staff assistance Activity did not occur **Urinary incontinence** rated as Always continent/occasionally incontinent, frequently/always incontinent, not rated (catheter, ostomy, no urine output) (H0300) **Bowel incontinence** rated as Always continent/occasionally incontinent, frequently/always incontinent, not rated (ostomy, no bowel movement) (H0400)
PROGNOSIS	**Any acute hospitalization within 30 days of admission** (A2100) **Special Treatments/Programs: Hospice Post-admit** (O0100K2)

CLINICAL CONDITIONS	**Shortness of Breath With Exertion** (J1100A) **Shortness of Breath When Sitting (**J1100B) **Shortness of Breath When Lying Flat** (J1100C) **Any Swallowing Disorder** (K0100A-D) **Weight loss** (K0300) **Pressure ulcer** (M0300B1-D1) **Hemiplegia** (I4900 Active Diagnoses) **Paraplegia** (I5000 Active Diagnoses)
CLINICAL TREATMENTS	**Oxygen Post-admit** (O0100C2) **Tracheostomy Post-admit** (O0100E2) **Ventilator Post-admit** (O0100F2) **Dialysis Post-admit** (O0100J2) **Max # injections** (N0300 or N0350a) **Antipsychotic use** (N0410a)
CLINICAL DIAGNOSES	**Anemia** (I0200 Active Diagnoses) **Heart Failure** (CHF) (I0600 Active Diagnoses) **Hypertension** (I0700 Active Diagnoses) **Pneumonia** (I2000 Active Diagnoses) **Septicemia** (I2100 Active Diagnoses) **Urinary Tract Infection** (UTI) (I2300 Active Diagnoses) **Viral Hepatitis** (I2400 Active Diagnoses) **Diabetes Mellitus** (I2900 Active Diagnoses) **Hyperkalemia** (I3200 Active Diagnoses) **Hyperlipidemia** (I3300 Active Diagnoses) **Hip Fracture** (I3900 Active Diagnoses) **Other Fracture** (I4000 Active Diagnoses) **Alzheimer's Disease** (I4200 Active Diagnoses) **Stroke** (CVA or TIA or Stroke) (I4500 Active Diagnoses) **Dementia** (I4800 Active Diagnoses) **Huntington's** (I5250 Active Diagnoses) **Malnutrition** (I5600 Active Diagnoses) **Anxiety Disorder** (I5700 Active Diagnoses) **Depression** (I5800 Active Diagnoses) **Manic Depression** (I5900 Active Diagnoses) **Psychotic** (I5950 Active Diagnoses) **Schizophrenia** (I6000 Active Diagnoses) **Asthma, COPD, Chronic Lung Disease** (I6200 Active Diagnoses)
30-DAY REHOSPITALIZATION RATES The model contains 33 different risk variables in six domains from the MDS assessment file: demographic, functional status, prognosis, clinical condition, diagnoses, and services and treatment.	
DEMOGRAPHICS	**Age** **Gender** (A0800)
FUNCTIONAL STATUS	**Total Bowel Incontinence** (H0400) **Eating Dependent** (G0110H1) **Needs 2-person assistance in ADLs** (G0110A2 - J2) **Cognitive impairment** (Dementia) (i4800)
PROGNOSIS	**End Stage prognosis poor** (J1400) **Recently rehospitalized History of respiratory failure** (I6300) **Receiving Hospice Care** (O0100K2)
CLINICAL CONDITIONS	**Daily Pain** (J0400) **Pressure Ulcer Stage** (4 variables) (M0300B2 - E2) **Venous arterial ulcer** (M1030) **Diabetic foot ulcer** (M1040B)
DIAGNOSES	**Anemia** (I0200 Active Diagnoses) **Asthma** (I6200) **Diabetes** (I2900) **Heart failure** (I0600) **Septicemia** (I2100) **Viral hepatitis** (I2400) **Internal bleeding** (J1550-D)
TREATMENTS	**Dialysis** (O0100J1) **Insulin prescribed** (N0350-A) **Ostomy Care** (H0100-C) **Cancer chemotherapy** (O0100A1) **Receiving radiation therapy** (O0100B1) **IV medication** (O0100H1)

	Oxygen (O0100C1) **Tracheostomy care** (O0100E1)

TABLE A3:

DISCHARGE TO THE COMMUNITY AND 30-DAY REHOSPITALIZATION RATES AMONG US MAINLAND AND PR PATIENTS ADMITTED TO SNF FOR POST-ACUTE CARE WITH COMPLETE DATA

	30-day rehospitalization rates	P-value	Discharge to the community	P-value
	N= 4,222,875		N= 2,540,166	
PUERTO RICO	27.1 (21.6 – 32.6)		84.4 (77.7 – 91.1)	
US STATES – ALL PATIENTS	14.9 (14.9 – 14.9)		71.2 (71.2 – 71.2)	
DIFFERENCE	12.2 (6.7 – 17.7)	<.001	13.2 (6.5 – 19.9)	<.001
	N= 220,831			
PUERTO RICO	27.1 (21.5 – 32.7)		84.6 (77.4 – 91.9)	
US STATES-HISPANICS ONLY	15.9 (15.8 – 15.9)		70.3 (70.2 – 70.4)	
DIFFERENCE	11.2 (5.7 – 16.8)	<.001	14.3 (7.2 – 21.5)	<.001

Note: The primary independent variables were receiving care in Puerto Rico vs. the US mainland and/or Hispanic ethnicity. Demographic covariates, based on the American Health Care Association (AHCA) ***risk-adjusted readmission model included***:[8] age, male sex, dual Medicaid eligibility status. Other AHCA covariates, grouped by domain, included: **functional status**: Total bowel incontinence, eating dependent, needs two-person assistance in activities of daily living (ADLs), cognitive impairment; **prognosis**: End stage prognosis poor, history of respiratory failure, receiving hospice care; **clinical condition:** Daily pain, pressure ulcer stage (4 variables), venous arterial ulcer, diabetic foot ulcer; **diagnosis:** Anemia, asthma, diabetes, history of heart failure, history of sepsis, history of viral hepatitis, history of internal bleeding; and **services and treatments:** Dialysis, insulin prescribed, ostomy care, cancer chemotherapy, receiving radiation therapy, continue to receive IV medication, continue to receive oxygen, continued tracheostomy care. ***The discharge to the community risk-adjusted model based on the AHCA measures included***:[9] **demographics**: age, gender, marital status; **functional status:** vision, makes self-understood, ability to understand, cognitive impairment based on BIMS scale, any sign/symptoms of delirium, major depression, hallucination, delusion, physical behavior, verbal behavior, other behavior, any rejection of care, Medicare RUG IV hierarchical group, Activities of Daily Living, ADL summary, ADL*Cognitive impairment, bathing, balance, urinary incontinence, bowel incontinence, prognosis: readmissions, hospice care, **clinicals conditions**: shortness of breath, any swallowing disorder, weight loss, pressure ulcer, hemiplegia, paraplegia, **clinical diagnoses**: anemia, heart failure, hypertension, pneumonia, septicemia, urinary tract infection (UTI), viral hepatitis, diabetes mellitus, hyperkalemia, hyperlipidemia, hip fracture, other fracture, Alzheimer's disease, stroke, dementia, Huntington's, malnutrition, anxiety disorder, depression, manic depression, psychotic, schizophrenia, and asthma, COPD, chronic lung disease

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TABLE 1:

PATIENT AND SKILLED NURSING FACILITIES CHARACTERISTICS WHERE MEDICARE BENEFICIARIES WERE ADMITTED IN PUERTO RICO AND THE UNITED STATES MAINLAND (N= 4,732,222)

MEASURES	Puerto Rico – all patients (n=2,994)	US States – all patients (n=4,729,228)	US states- Hispanics only (n= 258,396)	P-value (PR vs. US - all)	P-value (PR vs. US-Hispanics)
PATIENT CHARACTERISTICS					
AGE	72.3 (9.6)	78.9 (10.7)	76.2 (11.3)	<.001	<.001
FEMALE	67.5 (46.8)	60.8 (48.8)	57.0 (49.5)	<.001	<.001
MA	80.8 (39.4)	30.8 (46.2)	45.1 (49.8)	<.001	<.001
MARRIED	50.5 (50.0)	35.8 (50.0)	36.6 (48.2)	<.001	<.001
DEMENTIA *	4.7 (21.2)	17.5 (38.0)	18.3 (38.7)	<.001	<.001
ADL *	13.3 (5.45)	17.2 (4.6)	18.2 (4.64)	<.001	<.001
MDC 01	6.3 (24.4)	10.4 (30.5)	11.7 (32.2)	<.001	<.001
MDC 05	4.6 (21.0)	13.5 (34.2)	13.3 (34.0)	<.001	<.001
MDC 08	79.1 (40.7)	30.4 (46.0)	28.6 (45.2)	<.001	<.001
RUGS LOW	41.3 (49.3)	20.2 (40.1)	24.9 (43.2)	<.001	<.001
RUGS MODERATE	54.4 (49.8)	70.0 (45.8)	60.4 (48.9)	<.001	<.001
RUGS HIGH	0.7 (0.9)	1.1 (10.4)	1.6 (12.6)	.054	<.001
LENGTH OF STAY	13.4 (11.9)	49.2 (132.4)	48.5 (132.4)	<.001	<.001
FACILITY CHARACTERISTICS					
TOTAL BEDS	45.7 (58.7)	130.0 (75.8)	147.1 (100.1)	<.001	<.001
ADMISSIONS/BED	17.1 (7.8)	4.2 (3.7)	4.2 (3.7)	<.001	<.001
AVERAGE AGE	73.6 (3.7)	80.8 (5.0)	79.2 (5.2)	<.001	<.001
UNDER 65	21.6 (5.3)	13.6 (10.3)	16.9 (11.4)	<.001	<.001
% MEDICAID	5.8 (18.4)	48.6 (24.7)	52.4 (24.5)	<.001	<.001
% MEDICARE	56.3 (39.9)	23.3 (18.8)	21.3 (17.5)	<.001	<.001
% OTHER	37.9 (38.3)	28.1 (16.9)	26.3 (17.3)	<.001	<.001
% MA *	61.1 (40.8)	23.8 (19.4)	26.7 (20.4)	<.001	<.001
%FOR PROFIT	60.0 (50.0)	70.0 (50.0)	80.0 (40.0)	<.001	<.001
ACCUITY INDEX	11.7 (2.5)	12.3 (1.4)	12.7 (1.5)	<.001	<.001
AVERAGE ADLS *	13.1 (3.5)	17.3 (2.1)	18.2 (2.3)	<.001	<.001

MEASURES	Puerto Rico – all patients (n=2,994)	US States – all patients (n=4,729,228)	US states- Hispanics only (n= 258,396)	P-value (PR vs. US - all)	P-value (PR vs. US-Hispanics)
% LOW CFS *	84.5 (22.3)	40.6 (16.3)	38.6 (17.0)	<.001	<.001
CMS OVERALL STAR RATING *	2.5 (1.2)	3.4 (1.3)	3.4 (1.4)	<.001	<.001
2015	20.6 (40.5)	33.3 (47.1)	32.0 (46.7)	<.001	<.001
2016	40.9 (19.2)	33.6 (47.2)	33.7 (47.3)	<.001	<.001
2017	38.5 (48.7)	33.1 (47.1)	34.3 (47.5)	<.001	<.001

Notes:

* Denotes missing values; Activities of daily living scale which is the 28-point ADL scale includes items for bed mobility, transfer, locomotion on unit, dressing, eating, toilet use, and personal hygiene; MDC denotes the Centers for Medicare and Medicaid Services (CMS) Major Diagnostic Categories; MDC 01 encompasses diseases and disorders of the nervous system; MDC 05 encompasses diseases and disorders of the circulatory system; and MDC 08 encompasses diseases and disorders of the musculoskeletal system and connective tissue; Medicare RUG IV Hierarchical Group is collapsed into categories based on levels of nursing and therapy; Low nursing (GROUP 1– 4 - CE2, CE1, CD2, CD1, CC2, CC1, CB2, CB1, CA2, CA1, BB2, BB1, BA2, BA1, PE2, PE1, PD2, PD1, PC2, PC1, PB2, PB1, PA2, PA1; ES3, ES2, ES1, HE2, HE1, HD2, HD1, HC2, HC1, HB2, HB1, LE2, LE1, LD2, LD1, LC2, LC1, LB2, LB1, RLA, RHA, RMA, RHC, RHB, RMC, RMB, RLB); Moderate nursing (GROUP 5–10 - RVA, RVB, RVC, RUA, RUC, RUB); High nursing (GROUP 11–12 - RHX, RHL, RMX, RML, RLX, RUX, RUL, RVX, RVL); HMO stands for health maintenance organization; Acuity Index is a measure of the care needed by residents, based on the number of patients needing various levels of ADL assistance and receiving special treatments; Low care patients are classified as those who do not require physical assistance and are not clinically complex or require special rehab; low Cognitive Function Scale (CFS - score of 1) indicates low cognitive impairment; CMS health inspection is based on three most recent health inspections; and CMS quality measures is based on different clinical and physical measures from patients.

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TABLE 2:

DISCHARGE TO THE COMMUNITY AND 30-DAY REHOSPITALIZATION RATES AMONG US MAINLAND AND PR PATIENTS ADMITTED TO SNF FOR POST-ACUTE CARE (N= 4,732,222)

	30-day rehospitalization rates	P-value	Discharge to the community	P-value
PUERTO RICO	27.6 (22.5 – 32.7)		87.9 (83.3 – 92.6)	
US STATES – ALL PATIENTS	16.4 (16.3 – 16.4)		70.3 (70.3 – 70.3)	
DIFFERENCE	11.2 (6.2 – 16.3)	<.001	17.6 (13.0 – 22.3)	<.001
PUERTO RICO	26.6 (21.3 – 31.8)		88.5 (83.8 – 93.1)	
US STATES- HISPANICS ONLY	18.0 (17.9 – 18.0)		69.6 (69.5 – 69.7)	
DIFFERENCE	8.6 (3.3 – 13.9)	<.001	18.9 (14.1 – 23.6)	<.001

Note: The primary independent variables were receiving care in Puerto Rico vs. the US mainland and/or Hispanic ethnicity. Demographic covariates, based on the American Health Care Association (AHCA) ***risk-adjusted readmission model included***:[16] age, male sex, dual Medicaid eligibility status. Other AHCA covariates, grouped by domain, included: **functional status**: Total bowel incontinence, eating dependent, needs two-person assistance in activities of daily living (ADLs), cognitive impairment; **prognosis**: End stage prognosis poor, history of respiratory failure, receiving hospice care; **clinical condition:** Daily pain, pressure ulcer stage (4 variables), venous arterial ulcer, diabetic foot ulcer; **diagnosis:** Anemia, asthma, diabetes, history of heart failure, history of sepsis, history of viral hepatitis, history of internal bleeding; and **services and treatments:** Dialysis, insulin prescribed, ostomy care, cancer chemotherapy, receiving radiation therapy, continue to receive IV medication, continue to receive oxygen, continued tracheostomy care. ***The discharge to the community risk-adjusted model based on the AHCA measures included***:[29] **demographics**: age, gender, marital status; **functional status:** vision, makes self-understood, ability to understand, cognitive impairment based on BIMS scale, any sign/symptoms of delirium, major depression, hallucination, delusion, physical behavior, verbal behavior, other behavior, any rejection of care, Medicare RUG IV hierarchical group, Activities of Daily Living, ADL summary, ADL*Cognitive impairment, bathing, balance, urinary incontinence, bowel incontinence, prognosis: readmissions, hospice care, **clinicals conditions**: shortness of breath, any swallowing disorder, weight loss, pressure ulcer, hemiplegia, paraplegia, **clinical diagnoses**: anemia, heart failure, hypertension, pneumonia, septicemia, urinary tract infection (UTI), viral hepatitis, diabetes mellitus, hyperkalemia, hyperlipidemia, hip fracture, other fracture, Alzheimer's disease, stroke, dementia, Huntington's, malnutrition, anxiety disorder, depression, manic depression, psychotic, schizophrenia, and asthma, COPD, chronic lung disease

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