

# People Living With HIV in U.S. Nursing Homes in the Fourth Decade of the Epidemic

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## Abstract

As the number of persons living with HIV (PLWH) will continue to increase in the coming years, it is critical to understand factors influencing appropriate nursing home (NH) care planning. This study described the sociodemographic characteristics as well as the antiretroviral therapy treatment and physical and mental health among Medicare-eligible PLWH in NHs. Persons living with HIV were identified and summarized using a 2011–2013 nationwide data set of Medicare claims linked to NH resident health assessments and a prescription dispensing database, comparing new admissions in 2011–2013 with those from 1998 to 2000. We identified 7,188 PLWH from 2011 to 2013 in NHs of whom 4,031 were newly admitted. Of the total, 79% were prescribed antiretroviral therapy. Most were male (73%), Black/African American (51.1%), and a plurality resided in southern NHs (47%). Comparing the data sets, new admissions were older (60 vs. 44), had higher prevalence of viral hepatitis (16.2% vs. 7.5%), and anemia (31.1% vs. 25.1%) but had less pneumonia (11.0% vs. 13.6%) and dementia (8.7% vs. 21.0%). NH nurses can better anticipate health care needs of PLWH using these health profiles, understanding that there have been changes in the health of PLWH at admission over time.

**Key words:** HIV, aging, nursing homes, minimum data set, cross sectional study, two independent samples comparison

## Introduction

### Health of People Aging with HIV

Advances in antiretroviral therapy (ART) allow medication-adherent people living with HIV (PLWH) to anticipate a life expectancy similar to their uninfected counterparts. Persons living with HIV are living an average of 51.4 years after age 20 years and requiring nursing home (NH) care for age-related health reasons rather than advanced HIV disease (Antiretroviral Therapy Cohort Collaboration, 2008; Centers for Disease Control and Prevention, 2014, 2016; Samji et al., 2013). Compared with uninfected older adults, the onset of age-related comorbidities can occur more than

5 years earlier among older PLWH and is likely due to intersecting effects of aging, chronic HIV infection, and the effect of ART over time (Friedman & Duffus, 2016).

Regardless of the HIV status, aging is an independent risk factor for a host of ailments due to associated immune senescence (Younas, Psomas, Reynes, & Corbeau, 2016). More than 50% of the 1.2 million PLWH in the United States are older than 50 years (Centers for Disease Control and Prevention, 2016). Longer life also provides extended exposure to behavioral and environmental risk factors, such as poor diet, lack of exercise, and/or smoking. These intersecting risks have been linked to comorbidities, such as diabetes, dementia, and hypertension, which are some of the most common comorbidities in the NH and HIV populations (Moore, Boscardin, Steinman, & Schwartz, 2014).

Chronic systemic inflammation associated with HIV may accelerate age-related immune senescence (Effros et al., 2008; Younas et al., 2016). Furthermore, the average older PLWH is disproportionately a sexual minority and often lacks financial and/or social supports, all of which have been associated with depression, anxiety, and feelings of isolation (Effros et al., 2008; Nobre, Kylvä, Kirsi, & Pereira, 2016; Sabin et al., 2013). These factors may explain why PLWH enter NHs at a younger age than their uninfected counterparts.

Finally, the side effects of ART regimens impact the body's physiology. These regimens are comprised of several drugs and can have side effects that include reduced bone mineral density and dyslipidemia (Deeks, Lewin, & Havlir, 2013; Guaraldi, Falutz, Mussi, & Silva, 2016). Antiretroviral therapy can also increase the

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

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<http://dx.doi.org/10.1097/JNC.000000000000033>

risk for metabolic conditions, evident in the literature as a higher prevalence of diabetes among aging PLWH, compared to age-matched, uninfected counterparts (Guaraldi et al., 2016; Johnson, 2014).

Additionally, poor adherence to ART can lead to the development of treatment resistance, causing more viremic HIV despite treatment. Persons living with HIV may then transition to different ART regimens, introducing potentially more side effects, or stop ART, which can lead to advanced HIV disease. Physiological changes among PLWH vary depending on the individual's history with ART. These physical alterations can contribute to the development of frailty and the need for admission to an NH (Guaraldi et al., 2016).

### ***Persons Living With HIV in Nursing Homes, Historically***

The most recent information on Medicare-eligible PLWH in NHs came from Buchanan, Wang, & Huang, 2002, and Buchanan, Wang, & Kim, 2004, who summarized sociodemographics, and physical and mental health characteristics of 5,115 PLWH newly admitted to NHs from June 1998 to January 2000—an era shortly after highly active ART became the standard of care (Buchanan et al., 2002; Buchanan et al., 2004). They used data from the Centers for Medicare and Medicaid Services' (CMS) Minimum Data Set (MDS) version 1.0 NH admission assessments. These assessments are one of four comprehensive Resident Assessment Instruments, collected by any NH facility with residents in Medicare/Medicaid-certified beds. NHs that meet CMS care quality criteria can be approved to receive reimbursements from Medicare, Medicaid, or both for services rendered to eligible patients (Centers for Medicare and Medicaid Services, 2018). The authors found that newly admitted PLWH were mostly male, Black/African American, young (44.5 years), admitted to an NH from an acute hospital stay, and had Medicaid (Buchanan et al., 2002). Within 6 months, 12% of the 5,115 PLWH were expected to die.

Comparing the PLWH data with the 1996 general NH population, Buchanan et al. noted that newly admitted PLWH had a higher prevalence of conditions, such as anemia and depression, but on average, they were physically and mentally more independent (Buchanan et al., 2002). Persons living with HIV were, for example, less incontinent and better able to perform activities, such as eating and dressing themselves. The PLWH required more medication administration due to ART, in addition to pharmacotherapies for other comorbidities, and more clinical interventions due to, for example, viral load

monitoring, and less physical assistance from NH nursing staff compared with other patients. Buchanan et al. concluded that PLWH in NHs have complex care needs, like the general NH population, but the conditions for which the care is needed are different (Buchanan et al., 2002). They argued that this difference influenced reimbursement rates from Medicaid, determined by an algorithm based on physical dependence; a less physically dependent population, with more pharmaceutical and clinical needs, may result in estimates too low to cover the true cost of health care for PLWH in NHs. Although the population of PLWH in NHs now is likely different from the past, this study highlighted the potential disparity between NH resources, including nursing, and health care demand, when PLWH are part of the NH population.

The aim of this study was to describe the current sociodemographics, physical and mental health status, and ART coverage of Medicare-eligible PLWH in United States' NHs during the period of 2011–2013 using the most recent MDS Version 3.0. We then sought to compare PLWH newly admitted to NHs from 2011 to 2013 to the admissions described from the 1998 to 2000 MDS Version 1.0. Our objective was to update the profiles of PLWH in NHs and to identify characteristics at admission that have changed over time, with the goal of providing evidence from which NH care plans for PLWH can be based. The CMS (DUA# RSCH-2017-51615) and the Institutional Review Board of the Northeastern University (IRB# 14-02-23) approved this study.

## **Methods**

### ***Data***

We used a January 1, 2011, to December 31, 2013, database of 5 linked files created from previous research focused on antipsychotic prescribing among the general NH population (National Institute on Aging #R21AG049269 and #R01AG04634101A1), as well as published data describing PLWH admitted to NHs from June 22, 1998, to January 17, 2000 (Buchanan et al., 2002). One file from Omnicare—a long-term care pharmacy provider covering more than half of the NHs in the United States—contained all-payer prescription drug dispensing records for approximately three million individuals. Data variables included the national drug code, brand name, generic prescription name, date of prescription, days' supply, quantity dispensed, payment source, and the state where the NH was located (Briesacher, Soumerai, Field, Fouayzi, & Gurwitz, 2009).

Four files came from the CMS. The first file, the MDS comprehensive resident assessment Version 3.0 (a 427-item nurse–patient interview), captured NH patient data

on physical and mental health, including active diagnoses, continence, pain, frequency of psychotherapy, and cognitive skills for decision making. Minimum Data Set comprehensive resident assessments were collected at admission, upon discharge, quarterly throughout a year, or for any change in health status. These data were used in two ways in this study. First, any comprehensive assessment was used to summarize profiles of all PLWH in NHs. Second, only admission assessments were used to compare MDS 3.0 data from 2011 to 2013 with the data from 1998 to 2000, drawn only from MDS 1.0 admission assessments. Only certain characteristics remained statistically comparable between the MDS 1.0 and 3.0 (gender, age groups, race/ethnicity, marital status, from where they were admitted to the NH, continence, and select active diagnoses).

The second CMS file, the Medicare enrollment file, provided basic demographics, including gender, age, race (White, Black/African American, Hispanic, other), Medicaid eligibility, and mortality. The third file was Medicare Part A claims, and the fourth file was Medicare Part B claims. Respectively, these files included claims data for hospitalization and outpatient care data on diagnoses, procedures, and providers. All data were of individual level.

### Population

Medicare-eligible PLWH in NHs with complete data were the target population. We adapted a previously published algorithm that identified PLWH as anyone who had two diagnoses for HIV or AIDS in Medicare Part B or one diagnosis in Medicare Part A (Friedman & Duffus, 2016) by also including anyone with at least one ART prescribed from 2011 to 2013. Potential cases were excluded (a) if the person was not eligible for Medicare, because the MDS is mandated only for persons in Medicare/Medicaid-certified NHs, and all demographic, treatment, and diagnosis data are from Medicare; (b) if a complete MDS was lacking because complete summaries of physical and mental health information were needed; and/or (c) if any information in the prescription dispensing database was missing because these data provided details on all prescriptions dispensed while in the NH, regardless of who paid for the prescription, including ART. The MDS variable, entry type, was used to identify newly admitted PLWH for the historical comparison.

### Measures

Only people with complete data were analyzed. Minimum Data Set comprehensive assessments were considered complete based on 67 variables. Observations

with missing data not due to skip patterns were excluded. Thirty-two variables were selected and summarized for all PLWH in NHs because they were similar to those reported in the past study. Changes to data collection procedures precluded statistical comparison of the 32 variables over time. Nineteen variables were the same over time; they were summarized for all PLWH in NHs, and statistically compared between the present and past studies. An additional 15 variables (e.g., stroke, end-stage renal disease as the reason for admission), not previously available but with clinical relevance to the population, were selected with clinical consultants and summarized for all PLWH in NHs. The variable, entry type, was incorporated to differentiate admission and nonadmission (discharge, quarterly, or change of health status assessments).

Many of the variables selected as part of the 67 were components of the following tools: Activities of Daily Living (ADL) score (20 variables); the Brief Interview for Mental Health Status (BIMS; 1 variable); and the Confusion Assessment Method (CAM) for delirium (5 variables; Centers for Medicare and Medicaid Services, 2015a). Calculation specifics for ADL and CAM are published elsewhere (Centers for Medicare and Medicaid Services, 2015a, 2015b). The ADL score ranks physical dependence based on activities such as getting out of bed or feeding oneself and was categorized as independent or not fully independent. The BIMS score is precalculated as 1 variable in the MDS data set. It was quartered into intact cognitively (13–15 points), moderately impaired (9–12 points), severely impaired (0–8 points), and could not complete the BIMS or did not qualify for the assessment (Thomas, Dosa, Wysocki, & Mor, 2017). The CAM identified delirium (positive, negative, or not assessed), through a 4-item measure of frequency and severity of inattention, disorganized thinking, altered consciousness, and psychomotor retardation (slowness in mental processing and response; Centers for Medicare and Medicaid Services, 2015a). Any person with an inability to communicate was considered not qualified to be assessed by these tools.

National drug codes, as well as a manual review of drug names, were used to identify HIV-specific prescriptions (Arts & Hazuda, 2012; Gilman et al., 2013; Guaraldi et al., 2016). Two infectious disease specialists, with expertise in HIV, were consulted to ensure that all antiretrovirals were included in the drug list. Antiretroviral therapy regimens were categorized as preferred, acceptable, second line (recommended regimen for people no longer responding to preferred or acceptable regimens), not recommended, or no ART based on 2011–2012 recommended guidelines by the Department of Health

and Human Services (DHHS; Panel on Antiretroviral Guidelines for Adults and Adolescents, 2011, 2012). Regimens dispensed to fewer than 30 PLWH often included more drugs than would make up a single regimen. This indication of regimen switching prohibited categorization, and thus, regimens dispensed to 30 or more PLWH were selected for presentation in Figure 1.

### Analysis

Linked data were summarized under three headings: demographics, physical health, and mental health. Categorical variables were summarized by frequency and percent. Numerical variables were summarized by mean, standard error, and median. Table 1 summarizes all PLWH and PLWH newly admitted to an NH.

Sensitivity analyses were performed on all comprehensive MDS 3.0 assessments to detect differences among subgroups of the population. For example, regional differences in health care exist in the United States, prompting us to assess if there were differences between PLWH in NHs in the four different census regions (northeast: CT, MA, ME, NH, NJ, NY, PA, RI, VT; midwest: IA, IL, IN, KS, MI, MN, MO, NE, OH, SD, WI; South: AL, AR, DC, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV; West: AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY). We also assessed differences between those who stayed in NHs for more than 100 days and less than or equal to 100 days. Chi-squared tests compared categorical variables, and numerical variables were analyzed by two-sample *t*-test (assuming equal variances) or analysis of variance.

For the historical comparison, 19 variables from MDS 3.0 admissions were compared using chi-square test to admissions from the MDS 1.0. All analyses used SAS 9.4 (Cary, NC). All tests were performed with 95% confidence.

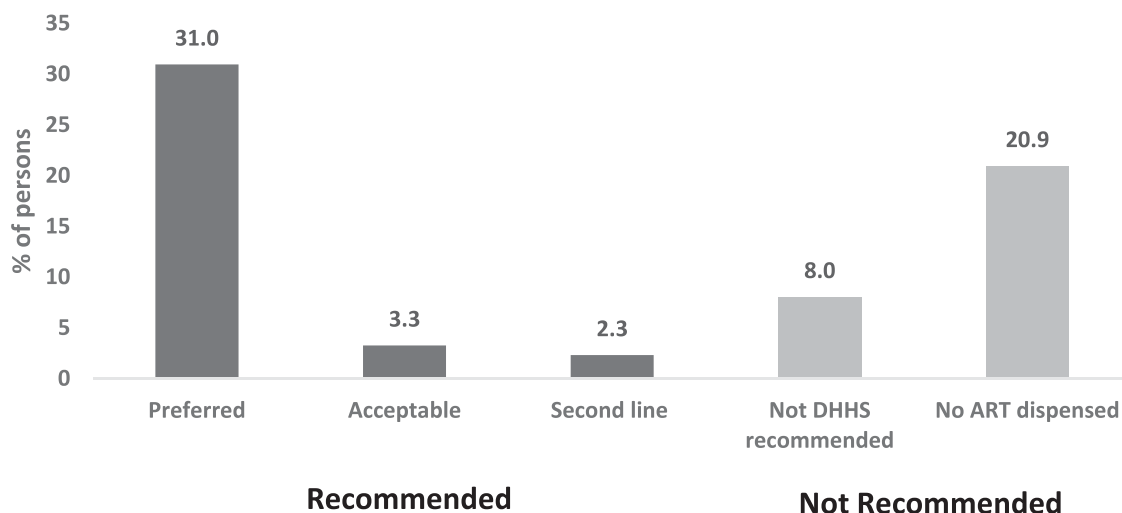
### Results

#### All Comprehensive Assessments: Demographics

Of the 2,667,506 people in the 3 years' worth of data reviewed, 10,445 PLWH were identified by Medicare Part A or B or ART prescriptions dispensed. After applying inclusion and exclusion criteria, 7,188 PLWH had a complete comprehensive MDS assessment analyzed. Table 1 indicates that the majority of PLWH in NHs were admitted from an acute hospital stay (93%). End-stage renal disease is one criteria by which a person is eligible for Medicare and was a reason for admission for 13.1%. Additionally, 93% had Medicaid.

Most PLWH in NHs were Black/African American (51.1%) and male (72.5%). Less than 40% were non-Hispanic White, and 10% were Hispanic. The majority were between ages 51 and 70 years (57.9%), and 19.9% were 71 years or older. More than half of PLWH in NHs had never been married (54.6%), and 34.8% died by the end of 2013.

Nearly half (46.8%) lived in NHs in the southern census region (DE, DC, FL, GA, MD, NC, SC, VA, WV, AL, KY, MS, TN, AR, LA, OK, and TX). By state, the largest proportion were found in Florida NHs (20%), followed by New York and California, 12% and 8%, respectively. All other states had less than 8% of this



**Figure 1.** Proportion of PLWH in nursing homes receiving ART by DHHS recommendation categories, 2011-2013 ( $N = 7,188$ ). *Note.* ART = antiretroviral therapy; DHHS = Department of Health and Human Services; PLWH = persons living with HIV. DHHS recommendations are a hierarchy in the order: preferred, acceptable, second line, not recommended, and no ART; second line = regimens recommended for individuals that no longer respond to preferred or acceptable regimens; not DHHS recommended = ART regimens that were not recommended by DHHS.

**Table 1. Demographic, Physical, and Mental Health Characteristics of all PLWH in NHs From 2011 to 2013 ( $n = 7,188$ ) and a Subset of PLWH Newly Admitted to a NH From 2011 to 2013 ( $n = 4,031$ )**

	All PLWH in NHs $n = 7,188$		Newly admitted PLWH $n = 4,031$	
	<i>N</i> or <i>M</i> (SE) or Median	%	<i>N</i> or <i>M</i> (SE) or Median	%
Demographics				
Gender				
Male	5,212	72.5	2,876	71.3
Female	1,976	27.5	1,155	28.7
Age groups, years				
≤30	57	0.8	36	0.9
31–40	285	4.0	155	3.8
41–50	1,243	17.3	661	16.4
51–60	2,231	31.0	1,232	30.6
61–70	1,935	26.9	1,121	27.8
71–80	981	13.6	567	14.1
≥81	456	6.3	259	6.4
Age, years				
<i>M</i> (SE)	60 (12.23)		60.3 (12.27)	
Median	59		60	
Race/ethnicity				
Black/African American	3,676	51.1	2,047	50.8
Non-Hispanic white	2,604	36.2	1,508	37.4
Hispanic	720	10.0	366	9.1
Other	188	2.6	110	2.7
Marital status				
Never married	3,925	54.6	2,148	53.3
Divorced	1,042	14.5	603	15.0
Married	924	12.9	531	13.2
Widowed	736	10.2	411	10.2
Unknown	332	4.6	208	5.2
Separated	229	3.2	130	3.2
Admitted to NH from				
Acute hospital	6,681	92.9	3,741	92.8

*(continued on next page)*

Table 1. (continued)

	All PLWH in NHs <i>n</i> = 7,188		Newly admitted PLWH <i>n</i> = 4,031	
	<i>N</i> or <i>M</i> (SE) or Median	%	<i>N</i> or <i>M</i> (SE) or Median	%
Community (private home/apt., board/care, assisted living, group home)	215	3.0	140	3.5
Other	292	4.1	150	3.7
Had Medicaid	6,683	93.0	3,699	91.8
Hospice care in the last 14 days				
While a resident	82	1.1	56	1.4
Prior to becoming a resident	38	0.5	37	0.9
Region				
South	3,366	46.8	1,850	45.9
Northeast	1,725	24.0	957	23.7
Midwest	1,199	16.7	693	17.2
West	898	12.5	531	13.2
Physical health				
Active diagnoses				
Hypertension	4,207	58.5	2,368	58.7
Anemia	2,271	31.6	1,253	31.1
Diabetes	2,123	29.5	1,205	29.9
Viral hepatitis	1,097	15.3	655	16.2
GERD	1,043	14.5	986	24.5
Stroke	835	11.6	458	11.4
ESRD	827	11.5	797	19.8
Pneumonia	736	10.2	442	11.0
Heart failure	724	10.1	408	10.1
Coronary artery disease	607	8.4	586	14.5
Urinary tract infection	578	8.0	349	8.7
Arthritis	444	6.2	419	10.4
Cancer	422	5.9	411	10.2
Peripheral vascular disease	261	3.6	193	4.8
Multidrug resistant organism	254	3.5	153	3.8
Respiratory failure	227	3.2	128	3.2
Wound infection	218	3.0	139	3.4

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Table 1. (continued)

	All PLWH in NHs <i>n</i> = 7,188		Newly admitted PLWH <i>n</i> = 4,031	
	<i>N</i> or <i>M</i> (SE) or Median	%	<i>N</i> or <i>M</i> (SE) or Median	%
Deep vein thrombosis	211	2.9	202	5.0
Septicemia	179	2.5	101	2.5
Osteoporosis	157	2.2	141	3.5
Cirrhosis	142	2.0	137	3.4
Hypotension	71	1.0	43	1.1
Tuberculosis	13	0.2	9	0.2
Huntington's disease	6	0.1	2	0.0
Continence: bladder				
Continent	3,869	53.8	2,128	52.8
Occasionally incontinent	1,135	15.8	703	17.4
Frequently incontinent	872	12.1	554	13.7
Incontinent	809	11.3	361	9.0
Not assessed	503	7.0	285	7.1
Continence: bowel				
Continent	4,436	61.7	2,450	60.8
Occasionally incontinent	658	9.2	405	10.0
Frequently incontinent	870	12.1	559	13.9
Incontinent	1,064	14.8	515	12.8
Not assessed	160	2.2	120	3.0
ESRD was reason for admission				
Yes	943	13.1	504	12.5
Deceased in 2011–2013 <sup>a</sup>				
Yes	2,498	34.8	1,328	32.9
ADL score				
<i>M</i> ( <i>SD</i> )	6.1 (4.73)		6.47 (4.59)	
Median	6		6	
ADL measure of independence				
Independent (ADL 0–5)	3,271	45.5	1,681	41.7
Not fully independent (ADL >5)	3,917	54.5	2,350	58.3
Oral problems				
Loss of solids or liquids from the mouth while eating	33	0.5	19	0.5

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Table 1. (continued)

	All PLWH in NHs <i>n</i> = 7,188		Newly admitted PLWH <i>n</i> = 4,031	
	<i>N</i> or <i>M</i> (SE) or Median	%	<i>N</i> or <i>M</i> (SE) or Median	%
Difficulty holding solids or liquids in the mouth	54	0.8	32	0.8
Choking while eating or drinking	93	1.3	57	1.4
Trouble swallowing	176	2.4	98	2.4
None of the above	6,883	95.8	3,859	95.7
Pain symptoms				
Pain present	3,875	53.9	2,396	59.4
Pain not present	2,732	38.0	1,444	35.8
Did not qualify for assessment/unable to answer	581	8.1	191	4.7
Pain frequency				
Rarely	233	3.2	144	3.6
Almost constantly	496	6.9	324	8.0
Frequently	1,574	21.9	940	23.3
Occasionally	1,551	21.6	973	24.1
Did not qualify for assessment/unable to answer	3,334	46.4	1,650	40.9
Pain intensity				
M (SE)	6.38 (2.16)		6.5 (2.18)	
Median	6		7	
Mental health				
Active diagnoses				
Depression	2,496	34.7	1,340	33.2
Anxiety disorder	1,260	17.5	685	17.0
Dementia other	762	10.6	350	8.7
Manic depression	522	7.3	271	6.7
Psychotic	483	6.7	174	4.3
Schizophrenia	473	6.6	213	5.3
Alzheimer disease	57	0.8	24	0.6
PTSD	53	0.7	32	0.8
Days received at least 15 min of psychotherapy				
None/not qualified	6,981	97.1	3,943	97.8
1 or more days	207	2.9	88	2.2

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Table 1. (continued)

	All PLWH in NHs <i>n</i> = 7,188		Newly admitted PLWH <i>n</i> = 4,031	
	<i>N</i> or <i>M</i> (SE) or Median	%	<i>N</i> or <i>M</i> (SE) or Median	%
BIMS score				
Intact cognitively	4,806	66.9	2,844	70.6
Moderately impaired	1,252	17.4	700	17.4
Severely impaired	534	7.4	282	7.0
Could not complete the BIMS or did not qualify for assessment	596	8.3	205	5.1
Cognitive skills for decision making				
Independent	96	1.3	18	0.4
Modified independence	77	1.1	29	0.7
Moderately impaired	219	3.0	76	1.9
Severely impaired	192	2.7	79	2.0
Did not qualify for assessment/assessment not necessary	6,604	91.9	3,829	95.0
CAM for delirium				
Delirium positive	417	5.8	219	5.4
Delirium negative	6,759	94.0	3,809	94.5
Not assessed	12	0.2	3	0.1

Note. ADL = activities of daily living; apt = apartment; BIMS = brief interview for mental health status; CAM = confusion assessment method; ESRD = end-stage renal disease; GERD = gastroesophageal reflux disease; M = mean; NH = nursing homes; PLWH = persons living with HIV; PTSD = post-traumatic stress disorder; SE = standard error.

<sup>a</sup> Individuals who died during our study period of 2011–2013 were in a NH and had complete data prior to death.

population (see Supplemental Digital Content 1, Figures 1, A–C, <http://links.lww.com/JNC/A0>).

### All Comprehensive Assessments: Physical Health

Hypertension, anemia, and diabetes were the most common of the 24 active diagnoses, reported in 58.5%, 31.6%, and 29.5% of the PLWH in NHs, respectively. Only 45.5% were considered physically independent (ADL score, 0–5); however, more than half of PLWH in NHs were fully continent in bowel or bladder (53.8% and 61.7%). Problems during eating, such as losing food or liquids from their mouth, or choking while eating, were rare occurring among less than 5% of the population. Pain was reported by 53.9%. Nearly equal proportions said pain was frequent (21.9%) or occasional (21.6%; Table 1).

### All Comprehensive Assessments: Mental Health

Of eight active diagnoses related to mental health, depression, anxiety, and dementia were the most common, reported in 34.7%, 17.5%, and 10.6%, respectively (Table 1). A high percentage of the population (97.1%), however, did not receive any psychotherapy in the past week. According to the BIMS, 66.9% of PLWH in NHs were cognitively intact. Only 5.7% had moderately or severely impaired cognitive skills for decision making, and 94.5% tested negative for delirium (Table 1).

### All Comprehensive Assessments: Prescriptions

Figure 1 indicates that 65.5% of our population was captured by ART regimens that were dispensed to at least 30 PLWH. Recommended regimens were dispensed to 35.5% of our population; 31% of PLWH received an

ART regimen that was preferred by DHHS. Acceptable regimens were dispensed to 3.3%, followed by 2.3% who received second-line treatments (treatments recommended for any person no longer responding to preferred or acceptable regimens). Antiretroviral therapy regimens were not dispensed to 20.9% of our population, and 8% received a regimen not recommended by DHHS.

### **Admission Assessments: Historical Comparison**

As seen in Table 2, the population of PLWH in NHs has changed since the study conducted nearly 15 years ago (Buchanan et al., 2002). Persons living with HIV recently admitted to NHs were more often male (71.3% vs. 69.4%;  $p = .0435$ ) and older. Where previously, most PLWH in NHs were between ages 31 and 50 years (69%); our study shows that most from 2011 to 2013 were between 51 and 70 years of age (58.4%;  $\chi^2 = 2,947.42$ ;  $p < .0001$ ). Race/ethnicity of PLWH in NHs has also shifted; those identifying as non-Hispanic White increased (37.4% vs. 23.5%), and both Black/African American (50.8% vs. 59.3%) and Hispanic individuals (9.1% vs. 16.1%) decreased ( $\chi^2 = 308.93$ ;  $p < .0001$ ). Table 2 also shows the proportion of PLWH who have been married or widowed has increased 6.9% in 15 years, and PLWH in NHs now were more likely to have ever been married (53.3% from 2011 to 2013 had never been married vs. 65.8% from 1998 to 2000 had never been married;  $\chi^2 = 434.10$ ;  $p < .0001$ ). In the past, most entered the NH from acute hospital stays (77.9%), which was still true but significantly higher (93%;  $\chi^2 = 382.36$ ;  $p < .0001$ ).

Clinical presentations also changed over time. Among PLWH newly admitted to NHs, prevalence decreased for the following conditions: tuberculosis (0.2% vs. 4.1%;  $\chi^2 = 145.38$ ;  $p < .0001$ ), septicemia (2.5% vs. 4.8%;  $\chi^2 = 32.78$ ;  $p < .0001$ ), and pneumonia (11% vs. 13.6%;  $\chi^2 = 14.44$ ;  $p = .0001$ ). There were, however, more PLWH in NHs diagnosed with urinary tract infections (8.7% vs. 6.5%;  $\chi^2 = 15.36$ ;  $p < .0001$ ), cancer (10.2% vs. 7.3%;  $\chi^2 = 24.25$ ;  $p < .0001$ ), viral hepatitis of any type (16.2% vs. 7.5%;  $\chi^2 = 232.53$ ;  $p < .0001$ ), and anemia (31.1% vs. 25.1%;  $\chi^2 = 40.24$ ;  $p < .0001$ ). Bladder and bowel continence showed a different distribution than in the past; less of the sample was fully continent for both functions (52.8% vs. 74.2%;  $\chi^2 = 1,129.84$ ;  $p < .0001$  and 60.8% vs. 71.7%;  $\chi^2 = 621.06$ ;  $p < .0001$ , respectively). Additionally, the prevalence of mental health conditions changed. Fewer PLWH newly admitted to NHs had dementia (8.7% vs. 21%;  $\chi^2 = 260.06$ ;  $p < .0001$ ); however, more had anxiety disorder (17% vs. 6.4%;  $\chi^2 = 257.42$ ;  $p < .0001$ ) and depression (33.2% vs. 20.7%;  $\chi^2 = 183.17$ ;  $p < .0001$ ).

## **Discussion**

### **All Persons Living With HIV in Nursing Homes**

This is the first study detailing the sociodemographics, ART, and physical and mental health of Medicare-eligible PLWH in NHs in nearly 15 years. We provided updated profiles of all PLWH in NHs. We also showed, with a subset of PLWH newly admitted to NHs, how select characteristics have changed over time.

In 3 years of MDS-linked data, we found 7,188 PLWH in NHs, 4,031 of whom were newly admitted. Persons living with HIV comprised 0.2% of NH residents in our data, similar to the 0.3% of the U.S. population (Centers for Disease Control and Prevention, 2014). The burden of HIV is disproportionately distributed among geographic locations and race/ethnicities. Black/African American individuals made up nearly 50% of HIV diagnoses in 2011 and a similar proportion of PLWH lived in the South (Centers for Disease Control and Prevention, 2014). This disproportionate distribution was reflected among PLWH in NHs who were mostly Black/African American, male, and had Medicaid, and a plurality resided in NHs in the South. In fact, sensitivity analyses showed that significantly more Black/African American PLWH were in NHs in the South than in any other region, and significantly more non-Hispanic White PLWH were in NHs in the West (see Supplemental Digital Content 1, Table 1, <http://links.lww.com/JNC/A0>). Additionally, PLWH are at high risk for end-stage renal disease, a known complication of HIV infection, particularly among Black/African American individuals (Friedman & Duffus, 2016; Guaraldi et al., 2016). End-stage renal disease was the original reason for admission to the NH for 13.1% of our population. An estimated 42% of the general U.S. population of PLWH have Medicaid (The Henry J. Kaiser Family Foundation, 2016). A disproportionate reliance of PLWH on Medicaid was also seen in the NH population, where 93% of Medicare-eligible PLWH in NHs also had Medicaid (Friedman & Duffus, 2016). Persons living with HIV in NHs seemed to mimic the geographic and demographic distributions of the general U.S. population of PLWH (Centers for Disease Control and Prevention, 2014).

There have clearly been advances in HIV care management, evident in the 65% still alive at the end of the 3 years. However, prevalence of comorbidities of aging, HIV, and ART use were high in our population. For example, at least 30% of PLWH in NHs were diagnosed with diabetes or hypertension, both of which are associated with advanced age and HIV. HIV has been linked to a 54% increase in cardiovascular-related death

**Table 2. Descriptive Statistics of PLWH Newly Admitted to NHs From 2011 to 2013 Compared with Historical Data on PLWH Newly Admitted to NHs From 1998 to 2000 (Buchanan et al., 2002).**

	2011–2013 (N = 4,031)		1998–2000 (N = 5,115)		$\chi^2/t$ value	p Value
	N or M (SE) or Median	%	N or M (SE) or Median	%		
Demographics						
Gender						
Male	2,876	71.3	3,550	69.4	<b>4.07</b>	<b>.0435</b>
Female	1,155	28.7	1,565	30.6		
Age groups, years						
≤30	36	0.9	327	6.4	<b>2,947.42</b>	<b>&lt;.0001</b>
31–40	155	3.8	1,606	31.4		
41–50	661	16.4	1,923	37.6		
51–60	1,232	30.6	772	15.1		
61–70	1,121	27.8	276	5.4		
71–80	567	14.1	118	2.3		
≥81	259	6.4	93	1.8		
Race/ethnicity						
Black/African American	2,047	50.8	3,033	59.3	<b>308.93</b>	<b>&lt;.0001</b>
Non-Hispanic White	1,508	37.4	1,202	23.5		
Hispanic	366	9.1	824	16.1		
Other	110	2.7	44	0.9		
Marital status						
Never married	2,148	53.3	3,366	65.8	<b>434.10</b>	<b>&lt;.0001</b>
Married	531	13.2	506	9.9		
Widowed	411	10.2	338	6.6		
Separated	130	3.2	307	6.0		
Divorced	603	15.0	598	11.7		
Unknown	208	5.2	0	0.0		
Admitted to NH from						
Acute hospital	3,741	92.8	3,984	77.9	<b>382.36</b>	<b>&lt;.0001</b>
Community (private home/apt., board/care, assisted living, group home)	140	3.5	532	10.4		
Other	150	3.7	599	11.7		

(continued on next page)

Table 2. (continued)

	2011–2013 (N = 4,031)		1998–2000 (N = 5,115)		$\chi^2/t$ value	p Value
	N or M (SE) or Median	%	N or M (SE) or Median	%		
Physical health						
Continence: bladder						
Continent	2,128	52.8	3,796	74.2	<b>1,129.84</b>	<b>&lt;.0001</b>
Occasionally incontinent	703	17.4	220	4.3		
Frequently incontinent	554	13.7	291	5.7		
Incontinent	361	9.0	803	15.7		
Not assessed	285	7.1	5	0.1		
Continence: bowel						
Continent	2,450	60.8	3,667	71.7	<b>621.06</b>	<b>&lt;.0001</b>
Occasionally incontinent	405	10.0	189	3.7		
Frequently incontinent	559	13.9	225	4.4		
Incontinent	515	12.8	1,028	20.1		
Not assessed	120	3.0	6	0.1		
Active diagnoses						
Tuberculosis	9	0.2	210	4.1	<b>145.38</b>	<b>&lt;.0001</b>
Septicemia	101	2.5	246	4.8	<b>32.78</b>	<b>&lt;.0001</b>
Wound infection	139	3.4	215	4.2	3.45	.0631
Urinary tract infection	349	8.7	332	6.5	<b>15.36</b>	<b>&lt;.0001</b>
Cancer	411	10.2	373	7.3	<b>24.25</b>	<b>&lt;.0001</b>
Pneumonia	442	11.0	696	13.6	<b>14.44</b>	<b>.0001</b>
Viral hepatitis	655	16.2	384	7.5	<b>232.53</b>	<b>&lt;.0001</b>
Anemia	1,253	31.1	1,284	25.1	<b>40.24</b>	<b>&lt;.0001</b>
Mental health						
Active diagnoses						
Schizophrenia	213	5.3	276	5.4	0.06	.8134
Dementia other	350	8.7	1,074	21.0	<b>260.06</b>	<b>&lt;.0001</b>
Anxiety disorder	685	17.0	327	6.4	<b>257.42</b>	<b>&lt;.0001</b>
Depression	1,340	33.2	1,059	20.7	<b>183.17</b>	<b>&lt;.0001</b>

Note. Bolded *p*-values indicate significant differences between the current and historical study, at the  $\alpha = 0.05$  level.  $\chi^2$  values are provided for categorical comparisons. *T*-test values are provided for continuous variable comparisons. NH = nursing homes; PLWH = persons living with HIV; SE = standard error.

(Guaraldi et al., 2016). Also, exposure to ART can cause insulin resistance, as well as anemia, prevalent in at least 30% of this population. Specifically, zidovudine, included in many of the regimens categorized as Not DHHS Recommended, increases anemia risk (Figure 1; Guaraldi et al., 2016). HIV is often associated with hepatitis co-infection, which is another risk factor for diabetes and renal failure (Guaraldi et al., 2016); more than 15% had viral hepatitis.

The NH population in general is at the high risk of poor mental health; one study reported that 26% of residents have depression with at least one other condition (Friedman & Duffus, 2016). The rate of depression among our population was 35%, and nearly 20% had anxiety. It is possible that rates of depression among PLWH in NHs are higher, in part, due to a type of survivor's guilt; the result of outliving friends and loved ones during the AIDS epidemic (Machado, 2012). Alternatively, depression and anxiety have been associated with experiences with HIV stigma, and the U.S. health care systems have been identified as major sources of HIV stigma (Davtyan, Olshansky, & Lakon, 2018). More research is needed to understand the high prevalence of depression and anxiety among PLWH in U.S. NHs.

Understanding links between HIV, and physical and mental health is key to caring for this population as they move into NHs. Appropriate use of ART is particularly important for PLWH of all ages. Surprisingly, 21% of PLWH in NHs did not receive ART, and some received ART regimens including older drugs like zidovudine, which was no longer recommended by the DHHS. It is possible that a lack of ART was appropriate for individuals in 2011 given that the treatment guidelines at the time only recommended ART for PLWH with a history of AIDS-defining illnesses or a CD4+ of 500 cells per cubic millimeter or less. However, beginning in 2012, the guidelines were revised to recommend ART for all PLWH. Furthermore, it is possible that prescriptions were filled outside of the NH pharmacy provider (Panel on Antiretroviral Guidelines for Adults and Adolescents, 2011; 2012). This finding deserves further research because access to ART in the NH setting is critical from the moment of admission. Fortunately, there was evidence of increased likelihood of receiving ART with longer stays in NHs. A sensitivity analysis, limited to only those staying in NHs for more than 100 days, showed that 82% received ART (see Supplemental Digital Content 1, Figure 2, <http://links.lww.com/JNC/A0>).

### **Historical Comparison of Admissions**

Comparing PLWH newly admitted to NHs between 1998 and 2000 with those newly admitted to NHs between

2011 and 2013, we saw significant shifts in demographic distributions over time. The average age increased by 15 years but remains younger than the average NH resident (Centers for Disease Control and Prevention, 2015), and it is likely a result of improved ART reducing mortality. Significantly, while Black/African American individuals remain the largest cohort, more "other" races/ethnicities (i.e., Asian/Pacific Islander, Native American) and non-Hispanic Whites were newly admitted to NHs from 2011 to 2013.

Comparing active diagnoses at admission over time, we saw 6% more anemia, 9% more hepatitis, 2% more urinary tract infections, and 2% more cancer. Other conditions, such as septicemia and pneumonia, were each seen in 2% fewer PLWH newly admitted to NHs, where 4% less presented with tuberculosis. Advanced age is a risk factor for cancers, urinary tract, and other infections. Furthermore, the pathologic effects of aging on cellular health, concurrent with those of HIV infection, are associated with an increase in the number and diversity of cancers (Peate, 2013; Sabin & Reiss, 2017). Reductions in conditions such as septicemia and pneumonia may be due to ART boosting immunity. Public health initiatives, such as vaccinations, may have also helped reduce the prevalence of pneumonia. An increase in the prevalence of viral hepatitis may reflect a public health initiative to increase hepatitis C screening among U.S. adults; however, it is unclear which types of hepatitis are captured in the MDS. Comparing new admissions over time gives a glimpse of what aspects of physical health have changed; however, this analysis lacks the granularity to attribute causality to aging, HIV, ART, or external factors not included in our data (i.e., public health initiatives).

The largest magnitude changes were seen in mental health diagnoses of PLWH newly admitted to NHs. Dementia was less common in our population, which is consistent with current reports of only 2% prevalence of AIDS-related dementia (Vance, McGuinness, Musgrove, Orel, & Fazeli, 2011). However, the prevalence of depression increased by 12% and anxiety nearly doubled in proportion. This population is highly cognitively intact (70.6% of new admissions had a cognitively intact BIMS rating; Table 1), but depression and anxiety have been associated with cognitive decline among PLWH (Vance et al., 2011).

### **Informing Nursing Home Nursing Staff**

Understanding today's population of PLWH in NHs is important for delivering high-quality care. The information presented in this study shows that ART use in NHs is not optimal. A substantial portion of our PLWH study population did not receive any ART therapy.

Although ART guidelines did not recommend ART for all PLWH for the first of the 3 years for which we had data, this indicates an important area for improvement. This could be addressed through staff development of current treatment guidelines. Additionally, medication reconciliation before hospitalization for those admitted to NHs is necessary because ART is occasionally not prescribed while in acute care settings for a variety of reasons. Finally, through formal interprofessional new admission reviews, it is possible for all members of the care team to collaborate, reducing the omission of ART coverage.

This research also shows the extent that age-related comorbidities are now present in the PLWH population. As a result, patient care in NHs needs to evolve to address the unique needs of the PLWH population who often experience a unique intersection of the effects of chronic HIV infection, ART use, and aging. Finally, we show that most PLWH in NHs are located in a few geographic areas within the United States rather than scattered throughout. This information is useful for targeting resources to the areas where PLWH in NHs are most likely to benefit.

### Limitations

The findings of this study should be interpreted in the context of several limitations. First, the sample is limited to records linking to the nationwide prescription dispensing database and excludes private-pay patients. This may limit generalizability to all PLWH on Medicare in NHs; however, a 2006 comparison showed comparable geographic distributions of NHs in both the prescription dispensing data and the certification, and survey provider-enhanced reporting required by all Medicare-registered NHs (Health Services Research and Evaluation Group, 2006). Also, the prescriptions dispensed may not reflect all prescriptions filled because some patients may obtain fills at non-Omnicare pharmacies and ART suggested the presence of HIV, but was not confirmed by a diagnosis code, for 12% of our population. As a result, our interpretation of the ART findings is conservative. Second, the MDS may underreport certain characteristics, particularly if the variables are not linked to claims or quality measures. Furthermore, there were select MDS variables not requested from CMS, preventing the assessment of specialty programs such as occupational therapy or condition stability items such as weight loss. Also, certain variables were not comparable between the MDS 1.0 and 3.0, preventing statistical comparison. The MDS is subject to human error; however, it has been validated as a tool for

### Key Considerations

- Persons living with HIV (PLWH) in nursing homes (NHs) have comorbidities associated with aging, chronic HIV, and ART use.
- PLWH newly admitted to NHs from 2011 to 2013 have more viral hepatitis, depression, and anxiety but less tuberculosis, wound infection, pneumonia, and dementia than their counterparts from 1998 to 2000.
- NH nurses and other direct care staff are the first line of health care providers in the NH setting, and they should be informed by updated information on the characteristics of PLWH residing in NHs to develop accurate, evidence-based care plans for PLWH.

determining the health status of NH residents (Saliba & Buchanan, n.d.). Third, an Active Diagnosis of HIV/AIDS, used by the past study to identify their population, is no longer collected in the MDS. Instead, we used diagnosis codes and HIV prescriptions to identify PLWH, which are believed to be more accurate because they are linked to claims. Finally, patient acuity and duration of HIV infection were not available, and we did not compare the health of PLWH with the health of the general NH population.

### Conclusions

This study provides the first nationwide assessment of characteristics of Medicare-eligible PLWH in NHs in nearly 15 years. This information can aid NH nursing staff in developing care plans that anticipate current health care needs because health profiles of PLWH in NHs have changed over time due to aging, chronic HIV infection, and ART use. Access to ART in the NH setting is pertinent and requires further research.

### Disclosures

The authors report no real or perceived vested interests that relate to this article that could be construed as a conflict of interest.

### Acknowledgments

This work was supported by the National Institute on Aging [R21AG049269 and R01AG04634101A1, PI for both: Becky Briesacher] and the Agency for Healthcare Research and Quality (R36HS025662, PI: Brianne Mui). Two consultants, Bisola O. Ojikutu, MD, MPH,

of Harvard Medical School, Brigham, and Women's Hospital and Massachusetts General Hospital, and Debra Winters, APRN-BC, AACRN, the clinical director of the New England AIDS Education and Training Center, provided clinical expertise throughout the study. Their input included review of medications identified, review of health information presented in the results, review of findings related to medications, and edits for language in the interpretation of clinical findings.

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