Osteoporosis Diagnosis and Management in Long-Term Care Facility

Erwin A. Aguilar, PharmD, MSc, MPH, Sean D. Barry, BSc, Charles A. Cefalu, MD, MS, Abir Abdo, MD, William P. Hudson, MD, James S. Campbell, MD, Thomas M. Reske, MD, PhD, Machaon Bonafede, PhD, Kathleen Wilson, MPH, Bradley S. Stolshek, PharmD, Carly J. Paoli, PharmD, MPH, Nguyet Tran, MPH and Lung-I Cheng, PhD

Abstract: *Background:* Contemporary estimates of the prevalence of diagnosed osteoporosis among long-term care facility residents are limited. *Methods:* This chart review collected data between April 1, 2012 and August 31, 2013 for adult (age ≥ 30 years) residents of 11 long-term care facilities affiliated with the Louisiana State University Health Sciences Center in the New Orleans metropolitan area. Data (demographics; comorbidities; osteoporosis diagnosis, risk factors, diagnostic assessments, treatments; fracture history; fall risk; activities of daily living) were summarized. Data for residents with and without diagnosed osteoporosis were compared using χ^2 tests and *t* tests. *Results:* The study included 746 residents (69% women, mean [SD] age: 76.3 [13.9] years, median length of stay approximately 18.5 months). An osteoporosis diagnosis was recorded for 132 residents (18%), 30% of whom received a pharmacologic osteoporosis therapy. Fewer than 2% of residents had bone mineral density assessments; 10% had previous fracture. Calcium and vitamin D use was more prevalent in residents with diagnosed osteoporosis compared with other residents (calcium: 49% versus 12%, vitamin D: 52% versus 28%; both $P < 0.001$). Over half (304/545) of assessed residents had a high fall risk. Activities of daily living were similarly limited regardless of osteoporosis status. *Conclusions:* The prevalence of diagnosed osteoporosis was higher than previously reported for long-term care residents, but lower than epidemiologic estimates of osteoporosis prevalence for the noninstitutional U.S. population. In our sample, osteoporosis diagnostic testing was rare and treatment rates were low. Our results suggest that osteoporosis may be underdiagnosed and undertreated in long-term care settings.

Key Indexing Terms: Long-term care; Osteoporosis; Prevalence. **[Am J Med Sci 2015;350(5):357–363.]**

In the United States, the number of individuals using residential or home-based long-term care is expected to increase from 15 million in 2000 to 27 million by 2050.[1] Although most individuals use home health services, approximately 1.4 million individuals were residing in long-term care facilities in the United States at some point in 2012.[2] A combination of factors, including a decreasing number of traditional family caregivers as family sizes shrink and more women enter the workforce, is leading to greater use of paid long-term care services, and more than two-thirds of Americans who reach age 65 will need long-term care services during their remaining lifetimes.[3]

Residents of long-term care facilities are generally of older age, and age is an important osteoporosis risk factor. Previous reports suggest that the prevalence of diagnosed osteoporosis ranges from 6.2% to 12.5% among long-term care residents in the United States although the true prevalence may be higher because of underutilization of osteoporosis screening and treatment in this setting.[4–9] Even after osteoporosis has been diagnosed, relatively few (25%) of the affected residents receive osteoporosis treatment.[8,10] Treatment includes regular weight-bearing, muscle-strengthening exercises and pharmacologic therapy.[11] Undertreatment of osteoporosis, elevated risk of falls, previous fractures and advanced age all increase the risk that a long-term care resident will experience an osteoporosis-related fracture. The literature suggests that 6% to 11% of long-term care residents will experience a fracture during a 1-year to 3-year interval.[12–15] Mortality risk may be impacted with up to 42% of affected long-term care residents dying within 2 years after a hip fracture.[5,12,15–20]

Despite the significant risk of osteoporosis and associated consequences, the disease burden among long-term care facility residents is not well understood, in part because the literature largely reflects data that are no longer current. As such, this study seeks to narrow this knowledge gap by describing the prevalence of diagnosed osteoporosis among long-term care facility residents and characterizing how osteoporosis is diagnosed and treated in this setting. In addition, this study also quantified the fracture history and risk of falls in this vulnerable population and also the ability of residents to perform activities of daily living (ADL).

METHODS

Data for this study were collected in a retrospective review of medical charts for adults residing in 11 long-term care facilities affiliated with the Louisiana State University Health Sciences Center in New Orleans (LSUHSC-NO). The study was approved by the LSUHSC-NO Institutional Review Board Expedite Status on April 22, 2012 under LSUHSC-NO IRB No. 7951. This project met the criteria for a Waiver of Authorization under the Health Insurance Portability and Accountability Act Privacy Rule.

Data collection was conducted sequentially at each of the 11 study sites between April 1, 2012 and August 31, 2013. This sample represents 11% of the long-term care facilities in the New Orleans Metro area, covered by the 504 area code.[21]

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Correspondence: Erwin A. Aguilar, PharmD, MSc, MPH, Department of Internal Medicine, LSU Health Sciences Center in New Orleans—School of Medicine, 1542 Tulane Avenue, Room 330A, New Orleans, LA 70112 (E-mail: eaguil@lsuhsc.edu).

The study was designed to quantify the prevalence of diagnosed osteoporosis in the residential long-term care population, which includes young patients affected with early disability, developmental anomalies and other neurodegenerative conditions, and also the elderly.[22] Residents receiving palliative treatment, in rehabilitation or hospitalized at the time of the chart abstraction were excluded from the study. Therefore, the study population included all current residents who were at least 30 years old at the beginning of the data collection period and who had resided in the facility for at least 3 months before that date. An electronic case report form was used to abstract data from chart cover sheets, history and physicals, physicians' and nurses' progress reports, physical therapy reports, imaging reports and from the Minimum Data Set (MDS), which is the standardized patient screening and assessment tool used in all long-term care facilities that participate in Medicare and Medicaid.[23] Data were collected retrospectively back through January 1, 2009 or the resident's admission date if the admission occurred after this date and included demographics; comorbidities; renal function and other clinical characteristics; osteoporosis diagnosis, risk factors, diagnostic assessments and treatments; fracture history and also nurse-administered risk assessment for falls and ADL. Data were summarized using frequencies and percentages for categorical data, and means and SDs for continuous data. Characteristics and outcomes for residents with and without diagnosed osteoporosis were compared using chi-square tests for categorical data and *t* tests for continuous data. A *P* value of less than 0.05 was considered statistically significant. Medications were assessed by reviewing the medications used at the time of chart abstraction and the start dates for those medications.

RESULTS

At the time of the chart abstraction, a total of 919 residents' charts were available in the 11 study facilities. Of those residents, 746 met all selection criteria and were included in the final sample. Approximately 69% of these residents were women and the mean (SD) age was 76.3 (13.9) years (Table 1). The study population was predominantly white (57.2%) or African American (41.7%). Most residents had Medicare and/or Medicaid coverage, and 29% had long-term care insurance. At the time of the chart review, the mean (SD) length of stay was 758 (650) days (median: 557 days [18.5 months], interquartile range: 322–942 days).

In the study population, 132 residents (18%) had been diagnosed with osteoporosis (Table 1). An *ICD-9-CM* diagnosis code (733.xx) for osteoporosis was explicitly documented in 79% of the osteoporosis cases, and bone mineral density (BMD) scans were recorded in the charts for only 2 of the osteoporosis cases. After dementia, gastroesophageal reflux disease was the 2nd most common comorbidity recorded at admission (Table 1). Proton pump inhibitors were used by 43% of all residents during their stay, with no significant difference in the levels of use among residents with and without diagnosed osteoporosis (Table 2). Approximately 17% of residents were current steroid users, with similar percentages for residents with and without diagnosed osteoporosis.

Among residents with diagnosed osteoporosis, 30% were treated with a pharmacologic osteoporosis therapy (ie, calcitonin, raloxifene, alendronate, risedronate, ibandronate or zoledronic acid) and alendronate was the most commonly used agent (Table 2). Among diagnosed residents, a greater proportion of women (n = 115) received pharmacologic osteoporosis therapy compared with men (n = 17), although this difference was not statistically significant (31% and 18%, respectively, $P = 0.249$). The percentage of diagnosed residents with pharmacologic treatment was similar ($P = 0.673$) for white (29%, n = 107) and African American residents (33%, n = 24). Among those with no documented osteoporosis diagnosis (n = 614), 4 residents had used a pharmacologic osteoporosis therapy. In the overall study population, calcium was used by 19% of residents and vitamin D was used by 32% of residents. Use of calcium and vitamin D was both more prevalent in residents with an osteoporosis diagnosis compared with residents with no osteoporosis diagnosis (both $P < 0.001$).

Of the 738 residents with historical data for the 2 years before admission, 10% had at least 1 fracture recorded during that period. Residents with diagnosed osteoporosis were more likely to report a previous fracture compared with residents with no osteoporosis diagnosis (15% versus 9%, $P = 0.037$). The most common fracture site was hip, followed by femur, in both residents with and without diagnosed osteoporosis. Most reported fracture events were fall-related.

Risk assessment for falls was conducted in 545 (73%) of residents and was more commonly performed in residents with diagnosed osteoporosis than in residents without an osteoporosis diagnosis (85% versus 71%, $P < 0.001$). Overall, most assessed residents were at high risk of falls, with similar percentages among residents with and without diagnosed osteoporosis (Figure 1). By contrast, a high risk of falls was more common among residents with current pharmacologic osteoporosis medication use compared with residents who were not using osteoporosis medications (62% versus 41%, $P = 0.013$).

On admission, ADL were similarly limited among residents with and without diagnosed osteoporosis (Table 3). Locomotion around the facility, which included wheelchair locomotion, was performed independently in 12% of residents with an osteoporosis diagnosis and 18% of residents without an osteoporosis diagnosis ($P = 0.121$). Independent walking in the room and in the facility was limited to 9% of patients with an osteoporosis diagnosis and 10% of patients without an osteoporosis diagnosis. In both subgroups, only 14% of residents had independent bed mobility. Fewer residents could transfer between surfaces independently (8% among residents with diagnosed osteoporosis and 11% among residence without an osteoporosis diagnosis). The average length of stay for those residents with the diagnosis of osteoporosis was significantly longer than that for those without the diagnosis of osteoporosis; this may be due to the fact residents with diagnosed osteoporosis were also significantly older.

DISCUSSION

In the long-term care facilities included in this study, approximately 1 in 5 (18%) residents had been diagnosed with osteoporosis. This is higher than previously published estimates for the prevalence of diagnosed osteoporosis obtained from information recorded in the MDS or on administrative claims (6.2% to 12.5%).[4,8,9] By contrast, our estimate is low compared with those reported by Greenspan et al[24] who determined osteoporosis prevalence among residents of long-term care facilities using a variety of screening criteria. In that study, osteoporosis prevalence was 17% when screening relied solely on the presence of a clinical fracture, 54% when osteoporosis was defined by the presence of either a clinical fracture or a T-score of ≤ -2.5 at the spine, total hip or femoral neck, and 73% when vertebral fractures were added to these 2 screening criteria. Results from the 2005 to 2008 National Health and Examination Survey (NHANES) suggest that the true underlying prevalence of osteoporosis in the elderly noninstitutional U.S. population may be