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Impact of In-Hospital Osteoporosis Treatment on Post-discharge Medication Continuity in Osteoporotic Fracture Patients: Implications for Care Continuity

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Background: Despite the well-established benefits of osteoporosis medication in reducing the risk of secondary fractures and mortality, post-fracture treatment rates remain suboptimal. The hospitalization period represents a critical opportunity to initiate therapy, yet the impact of in-hospital osteoporosis treatment on long-term adherence has not been fully evaluated in the Korean population.

Methods: This retrospective cohort study used data from the National Health Insurance Service sample cohort in South Korea. Patients aged ≥ 50 years who were hospitalized for osteoporotic fractures, including surgically and conservatively managed cases, between 2007 and 2019, were included. The primary exposure was receipt of osteoporosis medication during hospitalization, and the primary outcome was medication continuation within 1 year post-discharge. Log-binomial regression models were used to estimate adjusted risk ratios (aRRs) for post-discharge medication continuation, adjusted for demographic, socioeconomic, and clinical variables. Subgroup analyses were conducted by age, sex, fracture site, income level, and residential region.

Results: Of 19,021 patients with osteoporotic fractures, 25.9% received osteoporosis treatment during hospitalization. The 1-year post-discharge medication rate was 75.8% in the treatment group, compared to 25.4% in the non-treatment group. The aRR for post-discharge medication continuation was 2.23 (95% CI, 2.14–2.32). Similar effects were observed for both oral (aRR, 2.26) and injectable (aRR, 2.13) medications. Subgroup analysis revealed stronger associations in males (aRR, 5.01), younger patients (50–70 years; aRR, 2.93), and those with minor fractures (aRR, 3.22). Although the overall continuation rate was lower in older adults and patients with major fractures, in-hospital treatment was still positively associated with improved adherence.

Conclusions: In-hospital initiation of osteoporosis medication was associated with improved post-discharge treatment continuity in patients with osteoporotic fractures. Incorporating structured osteoporosis management into inpatient orthopedic care pathways may help enhance long-term adherence and support secondary fracture prevention.

Keywords: *Osteoporotic fractures, Medication adherence, Secondary prevention*

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The global burden of osteoporosis and related fractures is increasing rapidly due to the aging population.[1] In the United States, data from 2017 to 2018 show that 12.6% of adults aged 50 years and older had osteoporosis, and 43.1% had low bone mass, with a higher prevalence in women.[2] According to a United Kingdom study, 1 in 3 women and 1 in 5 men over the age of 50 years are expected to experience osteoporotic fractures in their lifetime, amounting to approximately 8.9 million fractures annually worldwide.[3] A recent meta-analysis involving over 2.1 million individuals across 64 cohorts revealed that patients with a prior fracture had an 88% higher risk of sustaining another clinical fracture, with similarly increased risks for major osteoporotic fractures and hip fractures, independent of bone mineral density and age.[4] Real-world data from Germany showed that among untreated patients aged ≥ 70 years with diagnosed osteoporosis, 30% experienced new fractures during a mean follow-up of 3.2 years, and only 9.2% initiated pharmacologic treatment post-fracture.[5] Despite this high disease burden, treatment rates remain unacceptably low. A previous study found that only 23% of women aged 67 years and older received either a bone density test or pharmacologic treatment within 6 months following a fracture, suggesting a substantial treatment gap.[6] Another previous study similarly found that just 24% of postmenopausal women received any osteoporosis medication within 1 year of sustaining a fracture.[7] These findings highlight the urgent need for early identification and initiation of osteoporosis medication to reduce the risk of subsequent fractures and the growing public health impact of osteoporotic injuries.

In a large Taiwanese cohort study, patients who initiated osteoporosis medication within 15–84 days after hip fracture had significantly lower rates of fracture-related hospitalization compared to those who started after 252 days, even when adherence was high.[8] Similarly, another study found that patients with high adherence (medication possession ratio ≥ 80%) to osteoporosis medication had significantly lower 1-, 3-, and 5-year mortality rates compared to those who were untreated or had poor adherence.[9] Initiating osteoporosis medication shortly after a fragility fracture has been associated with improved long-term adherence and a reduced risk of subsequent fractures and mortality. However, most previous studies in Korea have primarily focused on overall post-fracture osteoporosis treatment rates, without specifically evaluating the role of in-hospital initiation of osteoporosis medication.[10-12] As such, little is known about whether administering osteoporosis therapy during the acute hospitalization period influences long-term treatment adherence. Moreover, previous studies have not sufficiently addressed the patient-level factors that may affect continuity of care, such as age, sex, socioeconomic status, comorbidity burden, and residential region.

Therefore, this study aimed to investigate whether osteoporosis medication administered during hospitalization for an osteoporotic fracture was associated with increased rates of treatment continuation within 1 year after discharge. While several large-scale studies from Taiwan, Japan, and Western countries have reported similar associations, most focused on post-discharge initiation or outpatient follow-up rather than inpatient prescribing behavior. In the Korean healthcare context—where nearly all fragility fractures are managed surgically under a universal insurance system—the hospitalization period offers a critical and standardized opportunity to initiate treatment. From an orthopedic standpoint, the prescribing decision made during hospitalization can significantly influence long-term medication adherence and secondary fracture prevention.

METHODS

The study design and protocol were approved by the Institutional Review Board of Daejeon Eulji Medical Center (IRB No. 2024-11-005). Written informed consent was waived for all patients involved in this study.

Study Design and Data Source

This nationwide retrospective cohort study was based on data from the National Health Insurance Service (NHIS) sample cohort in South Korea.[13,14] The NHIS operates under a mandatory universal health insurance system, covering the entire Korean population and maintaining comprehensive records on demographics, healthcare utilization, and long-term care services. For research purposes, the NHIS developed the National Health Information Database, from which the sample cohort was derived. This cohort comprises 1 million individuals selected through systematic and stratified random sampling from the Korean population as of December 31, 2006.[14] The dataset includes longitudinal follow-up through 2019, unless individuals died or emigrated. Key variables include detailed claims data such as diagnosis codes, procedure codes, and prescription records, enabling the analysis of both inpatient and outpatient healthcare utilization.[13]

Identification of Patients with Osteoporotic Fracture

Patients aged 50 years or older who were hospitalized in an acute care facility with a primary diagnosis of major osteoporotic fractures—including those of the hip, spine,

proximal humerus, or distal radius—were considered eligible for inclusion.[15] Hip fractures were identified based on the first hospitalization with International Classification of Diseases, 10th Revision (ICD-10) codes S72.0 (femoral neck) or S72.1 (intertrochanteric region), along with receipt of standard surgical treatments such as internal fixation, hemiarthroplasty, or total hip arthroplasty.[16] Spine fractures were defined as initial hospital admissions coded as S22.0, S22.1 (thoracic spine fractures), S32.0 (lumbar spine), M48.4 (fatigue fractures of the vertebrae), or M48.5 (collapsed vertebrae, unspecified), accompanied by procedures like vertebroplasty, kyphoplasty, or spinal instrumentation.[17] Proximal humerus fractures were identified using ICD-10 codes (S42.2, S42.3, S42.4). Both surgically and conservatively treated cases were included, based on procedure or treatment codes such as open or closed reduction, external fixation, arthroplasty, or immobilization using a shoulder spica or Velpeau cast.[18] Distal radius fractures were identified using ICD-10 codes (S52.5, S52.6). Both surgical and conservative treatments were included, determined by the presence of procedure codes for open or closed reduction, external fixation, percutaneous pinning, or immobilization with a long arm cast or splint.[19] For subgroup analyses, fractures were categorized as major (hip and spine) or minor (proximal humerus and distal radius) according to their typical severity and impact on mobility.

Variables

Independent variables: osteoporosis treatment during hospitalization

The primary independent variable was whether patients received osteoporosis medication during their hospital stay. In this study, "in-hospital treatment" referred to the prescription and administration of osteoporosis medication during the acute hospitalization period. These prescriptions were typically made at the discretion of the attending orthopedic surgeon rather than through standardized institutional protocols, as a nationwide fracture liaison service (FLS) had not yet been fully implemented during the study period. Medications were identified according to national guidelines and previous research using NHIS claims data, including bisphosphonates, selective estrogen receptor modulators, denosumab, and teriparatide.[20] These were further classified as either injectable or oral agents.

Dependent variable: prescription of osteoporosis medication within 1 year after discharge

The main outcome variable was the prescription of osteoporosis medication within 12 months post-discharge, serving as an indicator of treatment continuity. Patients were coded as 1 if they received at least 1 prescription during this period, and 0 otherwise.

Covariates

To adjust for potential confounding factors, the following covariates were included: (1) fracture type: hip, spine, upper limb (radius or humerus), (2) age groups: 50–59, 60–69, 70–79, ≥ 80 years, (3) region of residence: urban (Seoul, Busan, Incheon, Daegu, Gwangju, Daejeon, Ulsan) or rural (all others),[21] (4) Charlson Comorbidity Index (CCI): calculated using Quan's method,[22] (5) household income: stratified into quartiles to reflect socioeconomic status, and (6) chronic kidney disease (CKD): included as a binary variable due to its influence on osteoporosis treatment decisions and bone health.[23,24]

Statistical Analysis

All statistical analyses were performed using SAS Enterprise Guide version 7.1 (SAS Institute Inc.). Descriptive statistics were used to summarize baseline characteristics of the study population. For comparisons between groups, the Rao–Scott chi-square test was applied to categorical variables to account for the complex survey design. In addition, standardized differences were calculated to assess covariate balance between groups, with values greater than 0.1 generally considered indicative of meaningful imbalance.

To investigate the association between osteoporosis treatment during hospitalization and the continuation of medication within 1 year after discharge, log-binomial regression models were employed to estimate adjusted risk ratios (aRRs). The multivariable-adjusted model included covariates such as age group, sex, household income level, CCI, fracture type, presence of CKD, and region of residence. Subgroup analyses were conducted to examine whether the association between in-hospital treatment and post-discharge continuation of osteoporosis medication varied according to sex, age group, fracture site, income level, and residential region. For each subgroup, separate regression models were constructed. A 2-sided p-value of less than 0.05 was considered statistically significant. Subgroup analyses were pre-specified, and p-values for subgroup interaction tests were not adjusted for multiple comparisons. Therefore, these interaction results should be interpreted as exploratory.

RESULTS

From the NHIS sample cohort comprising 1,065,811 individuals, a total of 20,021 patients who sustained osteoporotic fractures between 2007 and 2019 were identified. After excluding 1,000 patients who had received osteoporosis medication within 1 year prior to the fracture, 19,021 patients with complete data were included in the final analysis. The sample selection process is illustrated in Fig. 1. Among 19,021 patients with osteoporotic fractures, 25.9% (n = 4,925) received osteoporosis medication during hospitalization, while 74.1% (n = 14,096) did not (Table 1). Following discharge, 75.8% of patients who received in-hospital treatment continued osteoporosis medication, compared to 25.4% in the non-treatment group (Table 2). The aRR for post-discharge medication continuation was 2.23 (95% CI, 2.14–2.32; $p < 0.001$). When stratified by medication type, both oral agents (aRR, 2.26; 95% CI, 1.08–2.36; $p < 0.001$) and injectable agents (aRR, 2.13; 95% CI, 2.03–2.23; $p < 0.001$) were associated with similarly increased likelihood of treatment continuation. The corresponding absolute 1-year continuation rates were 77.2%

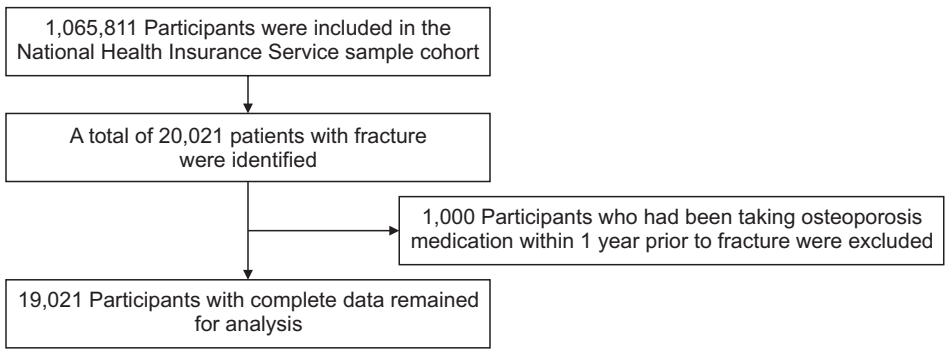

Fig. 1. Flowchart for study sample selection.

Table 1. General Characteristics of the Study Population

Category	Osteoporosis treatment during hospitalization			
	Total	Yes	No	Standardized difference
No. of patients	19,021 (100)	4,925 (25.9)	14,096 (74.1)	-
Fracture type				0.849
Hip	5,148 (27.1)	952 (19.3)	4,196 (29.8)	
Spine	7,051 (37.1)	3,196 (64.9)	3,855 (27.3)	
Upper limb fracture (radius + humerus)	6,822 (35.9)	777 (15.8)	6,045 (42.9)	
Age (yr)				0.472
50–59	2,901 (15.2)	264 (5.4)	2,637 (18.7)	
60–69	4,278 (22.5)	967 (19.6)	3,311 (23.5)	
70–79	6,419 (33.7)	2,018 (41)	4,401 (31.2)	
over 80	5,423 (28.5)	1,676 (34)	3,747 (26.6)	
Sex				–0.419
Male	4,184 (22.0)	645 (13.1)	3,539 (25.1)	
Female	14,837 (78.0)	4,280 (86.9)	10,557 (74.9)	
Region of residence*				–0.104
Urban	7,585 (39.9)	1,780 (36.1)	5,805 (41.2)	
Rural	11,436 (60.1)	3,145 (63.9)	8,291 (58.8)	

Table 1. Continued

Category	Osteoporosis treatment during hospitalization			
	Total	Yes	No	Standardized difference
Charlson Comorbidity Index				0.09
0	10,557 (55.8)	2,634 (53.5)	7,975 (56.6)	
1	4,677 (24.6)	1,258 (25.5)	3,419 (24.3)	
2	2,081 (10.9)	603 (12.2)	1,478 (10.5)	
3	928 (4.9)	250 (5.1)	678 (4.8)	
≥ 4	754 (3.8)	180 (3.7)	546 (3.9)	
Household income level in quartiles				0.047
Low	4,913 (25.8)	1,334 (27.1)	3,579 (25.4)	
Mid–low	3,234 (17.0)	817 (16.6)	2,417 (17.1)	
Mid–high	4,896 (25.7)	1,207 (24.5)	3,689 (26.2)	
High	5,978 (31.4)	1,567 (31.8)	4,411 (31.3)	
Year of fracture				0.18
2005	682 (3.6)	153 (3.1)	529 (3.8)	
2006	846 (4.4)	246 (5.0)	600 (4.3)	
2007	985 (5.2)	291 (5.9)	694 (4.9)	
2008	1,070 (5.6)	353 (7.2)	770 (5.5)	
2009	1,193 (6.3)	352 (7.1)	878 (6.2)	
2010	1,458 (7.7)	391 (7.9)	1,058 (7.5)	
2011	1,525 (8.0)	437 (8.9)	1,080 (7.7)	
2012	1,680 (8.8)	487 (9.9)	1,193 (8.5)	
2013	1,707 (9.0)	483 (9.8)	1,224 (8.7)	
2014	1,691 (8.9)	437 (8.9)	1,232 (8.7)	
2015	1,627 (8.6)	426 (8.6)	1,201 (8.5)	
2016	1,654 (8.7)	367 (7.5)	1,287 (9.1)	
2017	1,505 (7.9)	326 (6.6)	1,179 (8.4)	
2018	1,309 (6.9)	256 (5.2)	1,051 (7.5)	
History of chronic kidney disease				0.116
Yes	183 (1.0)	95 (1.9)	88 (0.6)	
No	18,838 (99.0)	4,830 (98.1)	14,008 (99.4)	

Values are presented as number (%).
*Urban areas were defined as Seoul and 6 major metropolitan cities in Korea, including Busan, Daegu, Incheon, Gwangju, Daejeon, and Ulsan, which comprise major urban areas and their adjacent regions and function as significant administrative and economic centers.

Table 2. One-Year Osteoporosis Medication Continuation Rates and aRRs According to In-Hospital Treatment

	Prescription of osteoporosis medication within 1 year after discharge					
	No. of subjects	No. of prescriptions	1-year continuation rate (%)	aRR	95% CI	*p*-value
Osteoporosis treatment during admission						
No	14,096	3,579	25.4	1		
Yes	4,925	3,732	75.8	2.23	2.14–2.32	< 0.001
Osteoporosis treatment type during admission						
No	14,096	3,579	25.4	1		
Yes	4,925	3,732	75.8			
Oral medication	3,577	2,763	77.2	2.26	1.08–2.36	< 0.001
Injectable medication	1,348	969	71.9	2.13	2.03–2.23	< 0.001

Adjusted for age, sex, household income, region of residence, Charlson comorbidity index, fracture type, and History of chronic kidney disease. Continuation rates are presented as absolute proportions. The 1-year continuation proportions for oral and injectable therapies were 77.2% and 71.9%, respectively.
aRR: adjusted risk ratio.

Table 3. Subgroup Analysis of aRRs for Post-Discharge Osteoporosis Medication Continuation by In-Hospital Treatment

Variable	Number of subjects	Post-discharge 1-year prescription rate (%)		Prescription of osteoporosis medication within 1 year after discharge			
		Treated during hospitalization	Not treated during hospitalization	No	Yes		
					aRR	95% CI	*p* for interaction
Age (yr)							< 0.001
50–70	7,179	82.6	18.3	1	2.93	2.73–3.14	
> 70	11,842	73.5	30.6	1	2.28	2.19–2.37	
Sex							< 0.001
Male	4,184	77.8	11.6	1	5.01	4.50–5.59	
Female	14,837	75.5	30.0	1	2.33	2.25–2.42	
Region							< 0.001
Urban	7,585	78.0	24.4	1	2.67	2.52–2.84	
Rural	11,436	74.5	26.1	1	2.48	2.37–2.60	
Fracture type							< 0.001
Major fracture (hip, spine)	12,199	76.2	30.5	1	2.37	2.28–2.46	
Minor fracture (radius + humerus)	6,822	73.5	18.5	1	3.22	2.99–3.47	
Household income							< 0.001
High	8,147	76.2	24.4	1	2.57	2.40–2.76	
Low	10,874	75.5	26.1	1	2.97	2.69–3.28	

Adjusted for age, sex, household income, region of residence, Charlson Comorbidity Index, fracture type, and history of chronic kidney disease.
aRR: adjusted risk ratio.

for oral agents and 71.9% for injectable agents, as shown in Table 2.

The positive association between in-hospital treatment and post-discharge medication continuation was consistently observed across all subgroups (Table 3). However, the strength of the association varied according to patient characteristics. The aRR was higher among patients aged 50–70 years (aRR, 2.93; 95% CI, 2.73–3.14; $p < 0.001$) compared to those aged over 70 (aRR, 2.28; 95% CI, 2.19–2.37), and among those with minor fractures (aRR, 3.22; 95% CI, 2.99–3.47; $p < 0.001$) compared to major fractures (aRR, 2.37; 95% CI, 2.28–2.46). Notably, the association was substantially stronger in males (aRR, 5.01; 95% CI, 4.5–5.59; $p < 0.001$) than in females (aRR, 2.33; 95% CI, 2.25–2.42).

DISCUSSION

The key findings of this study are as follows. First, the rate of osteoporosis medication use during hospitalization after a fracture was 25.9%. Patients who initiated medication during their hospitalization were 2.23 times more likely to continue treatment within 1 year compared to those who did not. This positive association was consistently observed for both injectable and oral medications, both of which were associated with more than twice the continuation rate compared to the non-treatment group. Second, the continuation rate within 1 year was higher among patients aged 50–70 years compared to those aged over 70, in males compared to females, and in patients with upper limb fractures compared to those with hip or spine fractures, when medication was initiated during hospitalization.

Early treatment after a fragility fracture is crucial not only for preventing secondary fractures but also for reducing mortality and disability. Previous studies have shown that a first hip fracture increases the risk of a second hip fracture up to 6-fold within the first year, and more than 30% of untreated patients sustain at least 1 new fracture within 3 years.[5,25] Furthermore, patients who are noncompliant with osteoporosis medication have a 20%–50% higher risk of hip or vertebral fractures and incur significantly higher medical costs compared to compliant patients.[26] Therefore, prompt initiation of osteoporosis medication after a fracture is a critical opportunity to intervene in the osteoporotic cascade, and the hospitalization period provides an optimal window for ensuring that patients begin this essential treatment. Our study found that 25.9% of patients hospitalized for osteoporotic fractures received in-hospital osteoporosis medication, a rate that remains suboptimal but aligns with prior international findings. For instance, Rabenda et al.[25] reported that only 2.6%–3.6% of Belgian hip fracture patients received bisphosphonate therapy within 6–12 months post-fracture, and a U.S.-based study using Medicare data found treatment initiation rates as low as 11% within 3 months.[10] These consistently low figures underscore a persistent global care gap, despite long-standing guideline recommendations for early initiation of osteoporosis therapy following fragility fractures.

Several previous studies have reported that the initiation of osteoporosis treatment during hospitalization or shortly after a fragility fracture significantly improves long-term medication adherence.[10,11,27] For example, 1 study reported that the introduction of a standardized hip fracture order set increased the 1-year persistence rate of anti-osteoporotic medication from 17.7% to 28.4%, demonstrating a significant improvement in long-term adherence.[27] A multicenter interventional study conducted across 6 hospitals found that following inpatient education and prescription of osteoporosis medication, 43.7% of patients were compliant at 6 months and 40.2% at 12 months post-fracture.[11] In addition, observational data from other clinical contexts have indicated that medications started during the inpatient period are more likely to be continued after discharge, consistent with patterns seen in other chronic disease management strategies.[28] Programs such as FLS, which typically initiate treatment during hospitalization, have consistently improved both initiation and persistence of therapy.[27,28] These findings suggest that the acute hospitalization period represents a pivotal opportunity for secondary fracture prevention. Our study corroborates these findings in a Korean population, showing that patients who received osteoporosis medication during hospitalization were more than twice as likely to continue treatment within 1 year after discharge. Unlike some prior studies limited to specific age groups or fracture types, our analysis using a nationally representative cohort demonstrated consistent associations across various subgroups, reinforcing the importance of in-hospital treatment as a scalable and effective strategy for improving long-term osteoporosis care.

A recent study comparing oral and injectable osteoporosis therapies demonstrated notable differences in medication adherence.[29] Specifically, the 1-year mean proportion of days covered (PDC) was 0.83 for denosumab and 0.66 for oral bisphosphonates, with persistence rates of 61.5% and 35.6%, respectively. The proportion of patients with good compliance (PDC ≥ 0.8) was also higher for denosumab (69.2%) than for oral bisphosphonates (45.8%).

These findings have been attributed to the convenient dosing schedule of injectable agents, such as denosumab administered every 6 months, and their delivery under medical supervision, which may reduce noncompliance due to patient error or concern about side effects. However, our study found no significant difference in post-discharge continuation rates between oral and injectable agents, with both groups showing similar aRRs (2.26 for oral and 2.13 for injectable medications). This discrepancy may be explained by characteristics of Korea's healthcare delivery system. In particular, the universal health insurance system, hospital-centered acute care, and structured discharge planning may facilitate more consistent follow-up and medication adherence compared with countries that rely predominantly on community- or primary care-based management. Patients who initiate treatment during hospitalization may also benefit from organized discharge education and early outpatient follow-up, which could minimize adherence differences typically observed between oral and injectable therapies in other settings. However, this interpretation remains speculative and requires further empirical validation.

Age and sex have also been identified as important determinants of medication persistence.[28-30] Previous studies have reported that elderly patients aged 70 years and older are generally less persistent with osteoporosis therapy due to factors such as cognitive decline, polypharmacy, and poor health literacy.[29,30] For example, 1 study reported that patients aged 70–79 years had significantly poorer compliance than those under 69 years of age.[29] In terms of sex differences, male patients have been consistently shown to be less likely to initiate and persist with osteoporosis treatment, despite having higher post-fracture mortality.[28,29] A study found that the 1-year persistence rate was substantially lower in males compared to females, and another report noted that more than two-thirds of male patients were nonadherent to bisphosphonate therapy.[28] In contrast, our study showed that once medication was initiated during hospitalization, males demonstrated a markedly greater relative improvement in post-discharge treatment continuity compared to females (aRRs 5.01 in males vs. 2.33 in females). This suggests that in-hospital intervention may be particularly effective in addressing the adherence gap among men. Additionally, although overall continuation rates were lower in older adults, the relative impact of in-hospital treatment was still positive. The lower aRRs observed in older patients and those with major fractures may be explained by a ceiling effect, where the baseline likelihood of treatment in these high-risk populations is already elevated, limiting the additional benefit of hospitalization-based interventions. In this context, orthopedic-led inpatient strategies may play a key role in secondary fracture prevention. Incorporating osteoporosis prescriptions into standardized postoperative order sets or discharge planning could ensure that anti-osteoporotic therapy is initiated before discharge, thereby enhancing care continuity. Such inpatient approaches may also reflect broader institutional practices, including more structured follow-up and patient education, which could contribute to the observed association. Although coordinator-based care systems or formal FLS have not yet been widely implemented in Korea, their future establishment could further improve both in-hospital treatment rates and long-term adherence.

This study had several limitations. First, although the analysis adjusted for a wide range of demographic and clinical covariates, residual confounding may still exist due to unmeasured variables such as frailty status, cognitive function, or social support, which are not captured in claims data. Second, as with all research using administrative databases, the accuracy of diagnostic and procedural coding may be imperfect, and misclassification bias cannot be completely excluded. Third, as a claims-based analysis, several clinically important variables—such as bone mineral density, fracture severity, specific surgical procedure type, and discharge education—could not be captured in the dataset. These unmeasured confounders may have influenced treatment continuation and should be interpreted as inherent limitations of claims-based research. In addition, although subgroup analyses were pre-specified, interaction *p*-values were not adjusted for multiple comparisons, and the subgroup findings should therefore be interpreted with caution. Fourth, medication adherence was inferred from prescription claims rather than actual pill-taking behavior or biological markers, which may overestimate true compliance. Fifth, we lacked data on institutional- or provider-level characteristics (e.g., availability of standardized postoperative order sets, discharge education programs, coordinator-based follow-up capacity), which may influence both in-hospital initiation and downstream adherence, introducing the possibility of unmeasured institutional confounding. Lastly, since the study population was limited to South Korea, generalizability to other healthcare systems may be limited due to differences in insurance coverage, prescribing practices, and post-discharge care infrastructure.

In-hospital initiation of osteoporosis medication was associated with improved post-discharge treatment continuity in this nationwide cohort. Incorporating structured osteoporosis management into inpatient orthopedic

care pathways may enhance long-term adherence and contribute to secondary fracture prevention. While the study design precludes causal inference, these findings highlight the importance of orthopedic-led inpatient interventions as a practical strategy to strengthen continuity of osteoporosis care.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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