Temporal Trends in Prescribing of Bone-Directed Therapies in the United States, 2009-2020

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Multiple new osteoporosis therapies, including some with novel mechanisms of action, have been introduced in the past decade. However, little is known about temporal trends in prescribing these new medications. Using claims data from the Clinformatics Data Mart (Optum, Inc.), we determined the number of enrolled individuals over age 50 who were prescribed any osteoporosis medication during each quarter between January 1, 2009 and March 31, 2020. Of all individuals receiving therapy, we then calculated the percent receiving each medication. In subgroup analyses, we limited the population to (1) only those with ICD codes for osteoporosis in the current or previous three quarters and without codes for active malignancy during the current or previous quarter, and (2) only those with ICD codes from an oncology provider for active malignancy likely to metastasize to bone during the current or previous quarter. In the all-user cohort, a total of 15.48 million unique prescription or medication administration claims from 1.46 million unique individuals during the study period were analyzed. Of these, 89% were women and 71% over the age of 65, with a mean age of 69. Alendronate was the most common medication used, representing >50% of all treated individuals, and its use increased over time. Percent of users receiving zoledronic acid doubled during this period but remained <5%. Use of other bisphosphonates declined steadily. By comparison, after its approval in 2010, denosumab use increased rapidly, reaching 10% of users in 2015 and 15% of users in 2018. Percent of individuals treated with raloxifene declined after 2013. Use of teriparatide, abaloparatide, and romosozumab remained less than 2% throughout the study period. Trends in the osteoporosis cohort paralleled those in the all-user cohort. In the malignancy cohort, alendronate and zoledronic acid were each used in approximately 30% of individuals at the onset of the study, and both declined over the decade. By contrast, denosumab use rapidly increased after introduction and surpassed use of either bisphosphonate by 2013. Denosumab use continued to increase over time and reached approximately 50% of all bone-directed medication use in the malignancy cohort. Use of other medications, mainly alternate bisphosphonates, was low and declined throughout the study period. In a privately insured cohort between 2009-2020, denosumab use increased significantly in both osteoporosis and malignancy populations, outpacing gains in use of other agents, despite guidelines suggesting that either bisphosphonates or denosumab could be considered first-line therapy for osteoporosis.