**Figure S1**: Flow chart of inclusion and exclusion of the study population

*identifiable reason for chronic osteoporosis therapy including index BMD T-score ≤ -1 at total hip of lumbar spine, diagnosis of prostate cancer, evidence of a fracture, diagnosis of osteoporosis or osteopenia

| n=2447 |
| Incident oral bisphosphonate script 11/1/2002-9/30/2013 and no other osteoporosis medications. |

| n=1078 |
| Included male age ≥50, female ≥45 but < 90 years, and 2 years of follow up. |

| n=1017 |
| Excluded Pagets disease n=33 Bisphosphonate allergy/adverse event n=28 Osteonecrosis of the jaw n=0 |

| n=987 |
| Included only weekly alendronate with index script at least 4 weeks |

| n=913 |
| Excluded if lacked an identifiable reason for chronic osteoporosis therapy* |
Table S1: Additional baseline characteristics

|                                | MPR <80% | MPR≥80% | p value |
|--------------------------------|----------|---------|---------|
| n=913                          |          |         |         |
| MPR year 1                     | 478      | 435     |         |
| Alendronate 35mg vs 70mg (%)    | 0.43±0.21| 0.95±0.05| 0.002  |
| Hyperparathyroidism             | 4        | 7       | 0.368   |
| Testosterone                   | 7        | 6       | 1.00    |
| Cyclosporine                   | 5        | 3       | 0.727   |
| Vitamin A/ retinoids           | 1        | 0       | n/a     |
| Medroxyprogesterone            | 2        | 3       | 0.674   |
| Antiviral                      | 0        | 1       | n/a     |
| Nitroglycerin patch            | 3        | 4       | 0.715   |
| Anticonvulsants (3.4%)         | 17       | 14      | 0.856   |
| Cancer therapy (3.5%)          | 16       | 16      | 0.858   |
| Calcium VA script              | 252      | 205     | 0.184   |
| Vitamin D VA script            | 186      | 174     | 0.100   |
| Anticoagulant (4.5%)           | 23       | 18      | 0.636   |
| Benzodiazepines                | 61       | 60      | 0.696   |
| Loop diuretics                 | 48       | 37      | 0.494   |
| Thiazides                      | 110      | 115     | 0.250   |
| Beta blocker                   | 134      | 119     | 0.825   |
| SSRI                           | 78       | 86      | 0.200   |
| Atypical antidepressants       | 30       | 23      | 0.572   |
| Thyroid drugs                  | 42       | 35      | 0.722   |
| Statin therapy                 | 185      | 211     | 0.003   |
Table S2: Predictors of year one persistence with high persistence (no gap 60 days or more) compared to low persistence (n=744). *Age is analyzed by 10 year increments. Data are presented as OR (95% CI). Bold indicates a confidence interval that does not contain unity.

| Predictor                          | Unadjusted OR (95% CI) | Adjusted OR (95% CI) |
|-----------------------------------|------------------------|----------------------|
| **Female Gender**                 | 0.90 (0.67, 1.23)      | 0.85 (0.57, 1.25)    |
| **Age (10 years)**                | 1.10 (0.98, 1.25)      | 1.00 (0.85, 1.18)    |
| **Baseline fracture**             | 0.65 (0.42, 1.01)      | 0.75 (0.45, 1.26)    |
| **Lowest T-score**                | 0.92 (0.80, 1.06)      | 0.88 (0.76, 1.02)    |
| **Tobacco use**                   | 0.42 (0.29, 0.60)      | **0.41 (0.27, 0.62)** |
| **Alcohol abuse**                 | 0.52 (0.28, 0.95)      | 0.84 (0.41, 1.69)    |
| **Acid Suppression**              | 1.19 (0.91, 1.55)      | 1.17 (0.85, 1.61)    |
| **Glucocorticoid**                | 0.85 (0.62, 1.17)      | 0.86 (0.58, 1.26)    |
| **Rheumatoid Arthritis**          | 0.66 (0.39, 1.10)      | 0.70 (0.37, 1.31)    |
| **Polypharmacy**                  | 1.07 (0.82, 1.39)      | 1.29 (0.91, 1.82)    |
| **Deyo score**                    | 0.99 (0.91, 1.07)      | 1.00 (0.90, 1.11)    |

**Males n=559**

| Predictor                          | Unadjusted OR (95% CI) | Adjusted OR (95% CI) |
|-----------------------------------|------------------------|----------------------|
| **Baseline fracture**             | 0.55 (0.34, 0.89)      | 0.68 (0.37, 1.25)    |
| **Tobacco use**                   | 0.39 (0.26, 0.59)      | **0.37 (0.23, 0.60)** |
| **Alcohol abuse**                 | 0.48 (0.24, 0.93)      | 0.85 (0.39, 1.85)    |
| **Prostate cancer**               | 1.57 (1.09, 2.26)      | **1.73 (1.05, 2.85)** |
Figure S2: Kaplan Meier curves of incident fracture by year one MPR strata in males without a baseline fracture (n=626).