Cost-Effectiveness of Bisphosphonates in Preventing Periprosthetic Fracture After Hip Arthroplasty

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INTRODUCTION: Osteoporosis is a common concomitant pathology affecting many patients undergoing total hip arthroplasty (THA) who are subsequently at higher risk for periprosthetic fracture. Osteoporosis screening and treatment have been implemented as targets for preoperative optimization; however, their cost efficacy within the global health care system remains unclear.

METHODS:

We utilized a modified economic model to evaluate the economic viability of one-year preoperative administration of Federal Drug Administration approved bisphosphonate medications for the prevention of periprosthetic THA fractures. Four bisphosphonates were identified (Alendronate, Ibandronate, Risedronate, and Zoledronate) with annual costs ranging from $10.45-92.56 according to the National Average Drug Acquisition Cost database. The cost and incidence of treating periprosthetic fracture was derived from estimates reported in the literature and ranged from $37,542 to $65,525 and 0.7% to 3.0%, respectively. Our model utilized the variables to yield an absolute-risk-reduction (ARR) from which we determined a number needed to treat.

RESULTS:

With an incidence of periprosthetic hip fracture of 0.75% at and the cost of treating periprosthetic hip fracture determined at $65,525, zoledronate, alendronate, ibandronate and risedronate are deemed cost-effective for a one-year treatment regimen if they prevented one event of periprosthetic hip fracture out of 6720 (ARR = 0.016%), 4345 (ARR = 0.023%), 1270 (ARR = 0.079%) and 708 (ARR = 0.141%) cases of THA, respectively. Our model reveals the primary determinant for cost-effectiveness is cost of treating the periprosthetic hip fracture followed by cost of a one-year regimen of medication with little effect by baseline incidence of periprosthetic fracture.

DISCUSSION AND CONCLUSION:

If bisphosphonates are clinically efficacious in reducing periprosthetic hip fracture risk, preoperative therapy is an economically viable intervention across a range of medications and baseline fracture rates. Given prior studies have shown strong correlation between osteoporosis undertreatment and periprosthetic fracture risk, our study deems this intervention highly cost-effective.