Seasonality of Hip Fractures and Estimates of Season-Attributable Effects:

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Abstract

INTRODUCTION: This study examined seasonal variations in hip fracture rates using nation-wide, population-based data from Taiwan, a subtropical island with fairly uniform weather conditions (mean ambient temperature difference of 11.3 degrees C between peak summer and peak winter months). METHODS: All inpatients aged 45+ years included in the National Health Insurance Database between 1997 and 2003 and bearing an ICD diagnosis code 820 (fracture neck of femur) were included (n=102,792 cases). RESULTS: Auto-regressive integrated moving average (ARIMA) modeling showed significant seasonality and an association of monthly hip fracture admission rates with ambient temperature among both sexes and all three age groups, 45-64, 65-74, and 75+ years. Crude rates show a significant trough during May-August (late spring and summer), followed by a sharp increase in September, and a discernible peak during November-February (late autumn and winter). Adjusted for seasonality, trend, and month, hip fracture rates are significantly reduced among males ($b=-0.280$, $p<0.001$) and females ($b=-0.341$, $p<0.001$) with increases in the mean ambient temperature. The protective effect of temperature intensifies with age ($b=-0.010$, -0.241 and -2.263 among the groups aged 45-64, 65-74, and 75+ years, respectively). January (mid-winter) is independently associated with 0.339, 0.663 and 8.153 more hip fractures, respectively, among the three age groups, beyond the temperature effect noted above, and May (late spring) is associated with 0.168, 1.364, and 7.255 fewer fractures. Hours of sunshine and atmospheric pressure were not significant predictors. CONCLUSIONS: Based on our ARIMA regression coefficients for temperature, January, and May, we estimate that 32.1% of total hip fractures in January (the peak incidence month) are attributable to the season effect among seniors aged 75+ years, 17.2% among those aged 65-74 years, and 11.5% among those aged 45-64 years. We find that in a sub-tropical climate the effects of winter on hip fracture propensity is significant and increases with age. The policy implications are discussed.