INTRODUCTION:
Accidental falls are the leading cause of injury to elderly Americans. Hip fractures resulting from falls are associated with lengthy hospital stays and poor outcomes. Advances such as the use of DEXA and modern anti-resorptives allow for the screening and prophylactic treatment of at-risk individuals. The purpose of this study was to use the Nationwide Inpatient Sample (NIS) to examine trends in hip fractures in the United States between 1993 and 2006 and to project the trends to 2030. Incidence rates and treatment for hip fractures were analyzed including fracture type (intracapsular or extracapsular), gender, age and race related effects. We hypothesized that declining incidence rates in hip fracture would compensate for the increase in elderly population due aging of the baby boom cohort.

METHODS:
The Nationwide Inpatient Sample (1993-2006) was used in conjunction with U.S. Census Bureau data to quantify hip fracture rates as a function of age, race, geographic region and gender. Fracture diagnoses were identified from the discharge records using the 9th Revision of the International Classification of Diseases (ICD-9-CM). Prevalence rates were calculated by dividing the number of records estimated from the NIS for each population subgroup by the corresponding population from the Census Bureau. The prevalence of fractures was modeled using a Poisson regression with age, gender, race, census region, and calendar year as well as two-way interactions between age, gender, race, census region, and calendar year as covariates to account for differences among population subgroups as well as changes over time (based on data from 2001-2006). Prevalence was calculated by dividing the number of procedures estimated from the NIS for each population subgroup by the corresponding population from the Census Bureau. The projected number of fractures was estimated by applying the fracture prevalence estimated from the regression model to the projected population data for each subgroup. The projected national total was the sum of the projected number of procedures from each subgroup. An additional fixed rate model was created using age, sex, race, and census region adjustments with a constant average rate from 2001-2006.

RESULTS:
The total number of records as well as the incidence rates increased between 1993 and 1996. After 1996, both the number of fractures and incidence rate decreased for women. However, for men the total number of fractures leveled off between 1996 and 2006 and only the incidence rate decreased slightly (Figure 1). Incidence rates were related to age with the highest rates in the oldest age groups. The observed peak in incidence at 1996 was apparent in all groups > 65 years old, but was most striking in the 85-99 year old group (Figure 2). Incidence rates were markedly lower for non-whites than for whites. Trends were similar for both extracapsular and intracapsular fractures.

DISCUSSION:
Our data indicate that the incidence of hip fractures peaked in 1996 and have been declining since. This effect was most marked in the elderly female population, where fracture incidence was highest. A similar peak in hip fractures has been noted in the USA, Canada and Scandinavia. Our identification of race as an important risk factor agrees with previous studies.

Projections using the variable rate model assumed that adjusted incidence rates will continue to drop during the prediction interval and should be provide reasonable projections as long as current trends in incidence continue. This resulted in both reasonable adjusted rates during the projection period studied and a better fit to the historical (pre 2001) data than the fixed rate model (Figures 3 & 4). Considering the current trends in adjusted incidence, the fixed rate model should be considered to represent an upper bound on the expected number of fractures. Although the period of declining fracture incidence coincides with the introduction of both anti-resorptive therapies and increased screening for BMD, other environmental influences such as changes in nutrition, lifestyle and longevity may be important causal factors.