What Are the Odds of Sustaining a Second Hip Fracture Within 2 Years of a First Hip Fracture?

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Purpose: Our objectives were (1) to develop a simple-to-use model that predicts short-term (2-year) risk of a second contralateral hip fracture in a cohort of first-time hip fracture patients and (2) to identify targets for preventative/prophylactic interventions.

Methods: 913 patients treated for unilateral hip fractures at an urban, academic medical center between September 2015 and December 2019 were identified. Using occurrence of a second contralateral hip fracture as the dependent variable, different logistic regression models were created using variables that comprise the FRAX score as the independent variables. These models were compared to the original FRAX score and the simplest model with the greatest predictive capacity (area under the curve [AUC]) was retained and rates of second hip fractures were compared across binned age quartiles.

Results: 39 patients (4.3%) sustained a contralateral hip fracture at a mean of 383 ± 320 days. The final model found only age (83-89 age cohort [odds ratio (OR) = 5.07, $P = 0.011$], 89-103 age cohort [OR = 5.83, $P = 0.006$]) and secondary osteoporosis (OR = 2.50, $P = 0.022$) to be independent predictors of second hip fracture in the short-term period. The predictive capacity of this model was no different than the FRAX score (AUC: 0.691 vs 0.668, $P = 0.345$). Of note, patients >83 years old had a 6.1% and 15.6% risk of second hip fracture occurring within 2 years (new model) and 10 years (FRAX).

Conclusion: This study demonstrates that age and presence of secondary osteoporosis (simple measurements) are equivalent to the more complex FRAX score with regard to predicting short-term odds of sustaining a second contralateral hip fracture. This risk is greatest in patients >83 years old and these patients should be targeted with preventative and/or prophylactic interventions.

Table 1: Subsequent Contralateral Hip Fracture Incidence and 10-Year FRAX Hip Fracture Risk Stratified by Age Group.

	Age 41 - 74 (n=253)	Age 74 - 83 (n=266)	Age 83 - 89 (n=254)	Age 89 - 103 (n=222)	Total (n=995)	P Value
Subsequent Contralateral Fracture, n (%)	3 (1.2%)	7 (2.6%)	15 (5.9%)	14 (6.3%)	39 (3.9%)	< 0.01
Subsequent Contralateral Fracture Within 1 Year, n (%)	0 (0.0%)	6 (2.3%)	7 (2.8%)	9 (4.1%)	22 (2.2%)	< 0.01
Time to Subsequent Fracture Surgery, mean ± SD, days	797 ± 246	292 ± 415	398 ± 325	325 ± 220	383 ± 320	0.07
FRAX 10-Year Hip Fracture Probability, mean ± SD	5.0% ± 4.4%	12.5% ± 6.7%	15.8% ± 7.3%	15.2% ± 6.5%	12.1% ± 7.6%	< 0.01