Mapping Translational Research into Individualised Prognosis of Fracture Risk

Abstract:
From the age of 60, one in two women and one in four men will sustain a fracture during their remaining lifetime. Fracture is associated with increased risk of mortality and impaired quality of life. In Australia recent estimates of direct and indirect costs associated with fracture were $7 billion annually. Although many risk factors of fracture have been identified during the past three decades, the translation of these risk factors into a prognostic model that can be used in primary care setting has not been well realised. The present study sought to develop prognostic models that incorporate non-invasive risk factors to predict 5-year and 10-year absolute risks of fracture for an individual man and woman.

The Dubbo Osteoporosis Epidemiology Study was designed as a community-based prospective study, with 1358 women and 858 men aged 60+ years as at 1989. Baseline measurements included femoral neck bone mineral density, prior fracture, a history of falls and body weight. Using these data, we have developed a number of prognostic models, in which an individual’s multiple risk factors are simultaneously considered in a multivariable model and represented by a nomogram. The use of continuous measurements and multiple risk factors increases the uniqueness of an individual and allows the risk of fracture to be individualised. Thus, the nomogram-based model recognizes the fact that there are different ways two individuals can attain the same risk level.

Accurate estimates of fracture risk are critically important for informed decision-making. Since fracture risk is determined by multiple factors, any unidimensional risk assessment is unlikely to be helpful. A multivariable-based nomogram can be an effective tool for individualising short-term and long-term absolute risks of fracture, which can help patient counseling and selecting appropriate patients for intervention.