RESPONSE TO COMMENT ON DAVIS ET AL.

Development and Validation of a Simple Hip Fracture Risk Prediction Tool for Type 2 Diabetes: the Fremantle Diabetes Study Phase I. Diabetes Care 2018;42:102–109

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Bůžková and Barzilay (1) question the absence of cognitive impairment and an elevated urinary albumin-to-creatinine ratio (ACR) from our Fremantle Diabetes Study (FDS) hip fracture risk equation for type 2 diabetes (2). The four supporting references they cite relate to studies in subsets of the general population (one a meta-analysis of the prevalence of dementia in hip fracture patients, and the three others in older people aged ≥65 years in whom both hip fractures and dementia are common). This contrasts with our equation, which was developed from longitudinal data derived from a cohort of well-characterized community-based people with type 2 diabetes with a wide age range (2). As we stressed in our article, fracture risk equations developed using general population data may not adequately capture disease-specific effects, including in the case of type 2 diabetes (3), and we would caution against any extrapolation from cohorts of patients without diabetes, especially if they are selected and do not have a wide range of potential explanatory and confounding variables.

Given that our sample comprised people with type 2 diabetes aged 40.0–89.9 years at baseline, it was not surprising that <1.0% had a diagnosis of dementia at recruitment and thus that dementia was not included as a risk variable. As we also pointed out in our report (2), potential risk factors for fracture (such as dementia and urinary ACR) that are outside the five in our equation (age, sex, BMI, peripheral sensory neuropathy, and renal function) are likely to be infrequent, well managed, have relatively small effect sizes, and/or be highly correlated with those that were included. Dementia and urinary ACR are themselves closely related in older individuals with type 2 diabetes (4), and they are in turn related to risk factors in our equation such as age, neuropathy, and renal impairment. We included risk assessment using QFracture, which has dementia among its 25 input variables (5), in our report, and it was no better in predicting incident hip fracture in type 2 diabetes than the much simpler FDS equation we developed (2). In addition, although baseline urinary ACR was significantly higher in our FDS participants who sustained a hip fracture during 10 years of follow-up in bivariate analysis, it did not enter the multivariate model. It should be noted that the multivariate models of albuminuria as a risk factor for hip fracture developed by Bůžková and Barzilay (1) did not consider diabetes as a potential confounding variable.

Risk equations in any disease context should be viewed as an aid to clinical management rather than a replacement for a careful assessment of the individual patient. Nevertheless, the very high negative predictive value of the FDS hip fracture risk equation (>98% in both the FDS and validation cohorts) (2) highlights its utility in the routine long-term care of people with type 2 diabetes.

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