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ABSTRACT SUBMISSION FORM

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TITLE Can foot ulcer risk stratification be improved by adding socioeconomic, comorbidity and person-level factors in people with diabetes?

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ABSTRACT (maximum 450 words. Please use the following or similar headings: Background/Methods/Results/Conclusions)

Background
The Scottish Foot Ulcer Risk Score (SFURS) was introduced in routine clinical practice in 2006 to stratify people with diabetes at low, medium or high risk according to the presence or absence of peripheral neuropathy, arterial disease and past history (foot-at-risk factors). We know that the worse outcomes for diabetic foot disease occur in areas of multiple deprivation in the West of Scotland in people with poorer health outcomes generally. Therefore, the aim of the study was to assess if adding socioeconomic and person-at-risk (co-morbidity and demographic) factors improves foot ulcer risk stratification.

Methods
We extracted and analysed anonymised digital health data from 59,582 people with diabetes from the Scottish Care Information – Diabetes Collaboration register for the period 2002-2016. This was linked this to other datasets to capture earliest SFURS score and a set of candidate risk factors comprising Scottish Index of Multiple Deprivation, Charlson comorbidity index, ethnicity and type of diabetes as well as age, gender, and time since diabetes diagnosis. We recorded incident diabetic foot ulcer events between 2007-2016. Using survival analysis methods, we determined the prognostic value of each risk factor (multivariate hazard ratio) and compared the discriminative performance of two predictive models using Harrel's C-statistic: (MODEL-1) SFURS score used in routine clinical practice; and (MODEL-2) SFURS plus candidate risk factors.

Results
Over a 9.8-year follow-up period, incident foot ulceration was observed in 2235 (3.8%) people. A high foot ulcer risk score on its own was the strongest factor associated with incident foot ulceration (adjusted hazard ratio (HR) 8.24 [95%CI 7.27-9.33], P= <0.001), followed by disease duration >16 years, being male, and aged 40-60 at time of entering the registry. Being any other ethnicity outside white Scottish/British and living in the least deprived geographical location resulted in 20% and 17% fewer incident ulcers respectively. Diabetes type and comorbidity were not independently associated with incident foot ulceration. The Harrel's C statistic was superior for MODEL-2 (C-stat:0.75) versus MODEL-1(C-stat: 0.68), indicating that the extended model was better at differentiating individuals who go on to develop a foot ulcer from those who do not.

Conclusions
Incident diabetic foot ulcer risk stratification can be improved by addition of socioeconomic and person-at-risk factors. However, high risk score on its own is strong prognostic factor. These findings are clinically significant as the foot ulcer risk score used in Scotland is implemented nationally. The additional discriminative performance of an extended model may not be sufficient to change practice given the challenges to modify socioeconomic and other emerging risk factors at the person-level.