Development of a prediction model for foot ulcer recurrence in people with diabetes using easy-to-obtain clinical variables

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Background: People with diabetes stratified as highest risk for foot ulceration vary widely in disease severity. It is important here to differentiate for ulcer risk to provide appropriate and personalized preventative strategies. We aimed to develop a prediction model for foot ulcer recurrence in people with diabetes using easy-to-obtain clinical variables and to validate its predictive performance.

Methods: We included 304 persons with diabetes at high-risk for foot ulceration with 18 months follow-up from the DIATEMP foot temperature monitoring trial. Two logistic regression models were created: one for recurrent foot ulcers (n=126) and one for recurrent plantar foot ulcers (n=70). Ten-fold cross validation, each including five multiple imputation sets, was used to internally validate the models; model performance was assessed in terms of discrimination and calibration using the area under the receiver operator curve (AUC; range:0-1), Brier score (range:1-0) and calibration graphs.

Results: Predictors for recurrent foot ulceration were: younger age, more severe peripheral sensory neuropathy, shorter time since healing of previous ulcer, presence of minor lesion, using a walking aid, and not monitoring foot temperatures; AUC: 0.69 (IQR:0.61–0.74); Brier score: 0.22 (IQR:0.21–0.24). Predictors for recurrent plantar foot ulceration were: the same, but not monitoring foot temperature, and in addition plantar location of previous ulceration, consumption of >1 unit alcohol per week, and foot care received in a university medical center; AUC: 0.67 (IQR:0.66–0.77) and Brier score: 0.16 (IQR:0.13–0.19).

Discussion/Conclusion: These well-designed and internally validated prediction models are built from a representative group of people at high risk of diabetes foot ulceration, using easy to obtain variables. The models predict with good calibration and fair discrimination who is at highest risk of ulcer recurrence. These people should be monitored more carefully and treated more intensively than others.