External validation of a prognostic model estimating the survival of patients with recurrent high-grade gliomas after reirradiation

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PURPOSE
We aimed to validate a controversial prognostic model for the survival of relapsed malignant glioma patients after reirradiation with an independent, multicentric patient cohort.

METHODS AND MATERIALS
A total of 165 malignant glioma patients underwent reirradiation at 4 different institutions between 1994 and 2012. Twenty-two patients had a good (score 1), 44 had a moderate (score 2), and 99 had a poor prognosis (score 3 or 4). Four statistical methods were used to validate the prognostic model: First, we compared survival according to prognostic group in the construction and the validation cohort by visual comparison of the respective Kaplan-Meier plots. Second, discrimination was quantified by calculating hazard ratios for death for each prognostic group, with the worst prognostic group serving as the reference. Calibration was assessed by a calibration plot for the time point 12 months after reirradiation. Finally, we compared the predictive performance of the score and a hypothetical prognostic model ignoring all predictor variables over time by means of a prediction error curve.

RESULTS
On visual validation, the survival curves of the 3 patient groups with good, moderate, and poor prognoses nicely separated from each other. Median survival rates after reirradiation were 17.9, 9.0, and 7.7 months in the patient groups with good, moderate, and poor prognosis, respectively. Hazard ratios confirmed satisfactory discrimination. Calibration was satisfactory for all and most accurate for the worst prognostic group. The score improved the prognostic performance in comparison to the "zero-model."

CONCLUSIONS
We successfully validated a prognostic model for the survival of malignant glioma patients after reirradiation with a multicentric, independent dataset. Being reliable and easy to handle, the model can be useful in personalized
patient counseling and clinical decision-making.

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