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Development and validation of a risk prediction model for incident liver cancer

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Objective: We aimed to develop and validate a risk prediction model for liver cancer based on routinely available risk factors using the data from UK Biobank prospective cohort study.

Methods: This analysis included 359,489 participants (2,894,807 person-years) without a previous diagnosis of cancer. We used the Fine-Gray regression model to predict the incident risk of liver cancer, accounting for the competing risk of all-cause death. Model discrimination and calibration were validated internally. Decision curve analysis was conducted to quantify the clinical utility of the model. Nomogram was built based on regression coefficients.

Results: Good discrimination performance of the model was observed in both development and validation datasets, with an area under the curve (95% confidence interval) for 5-year risk of 0.782 (0.748–0.816) and 0.771 (0.702–0.840) respectively. The calibration showed fine agreement between observed and predicted risks. The model yielded higher positive net benefits in the decision curve analysis than considering either all participants as being at high or low risk, which indicated good clinical utility.

Conclusion: A new risk prediction model for liver cancer composed of routinely available risk factors was developed. The model had good discrimination, calibration and clinical utility, which may help with the screening and management of liver cancer for general population in the public health field.

KEYWORDS

risk prediction, risk management, screening, nomogram, liver cancer

Introduction

Liver cancer is one of the most common cancers worldwide, ranking the fifth in men and the ninth in women (1). According to World Cancer Research Fund (WCRF), there were over 840,000 new cases in 2018 in 185 countries (1). In the United States, based on the data from Centers for Disease Control and Prevention (CDC) and National Cancer Institute (NCI), 34,638 new cases of liver cancer were reported and 27,685 people died of liver cancer in 2018 (2). Despite the significant advances in therapies, mortality and morbidity of liver cancer remain substantially high, posing a significant public health

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