EDITORIAL

Enhancing Early Detection of Early Onset Colorectal Cancer: A Novel Risk Prediction Model for Colorectal Adenomas

The incidence of Early Onset Colorectal Cancer (EOCRC), which refers to cancer diagnosed before the age of 50, has been increasing worldwide.[1,2] In the United States, the average annual percentage change of EOCRC incidence was 2.9% between 1999 and 2019.[3] Similarly, the average annual percentage change for colorectal adenocarcinomas was 5.6% for individuals aged 20–29 years, 1.6% for those aged 30–39 years, and 0.9% for those aged 40–49 between the years 2000 and 2016.[4] The reasons behind this rise in EOCRC cases are not entirely clear. However, several environmental, demographic, and genetic factors have been linked to increased risk of EOCRC.[5–7] Currently, guidelines in the United States recommend initiating colorectal cancer screening at age 45, notwithstanding additional individual risk factors. Given the rise in incidence, aggressive nature, and unique molecular features of EOCRC, there is a pressing need for tailored risk-based screening strategies, particularly for high-risk individuals under the age of 50.[8,9]

In this issue, Hood et al.[10] conducted a retrospective cohort study to construct internally validated predictive models for colorectal adenomas in individuals under 50. The study included 1417 participants who had undergone colonoscopy at the University of Miami from January 2020 to January 2023. Several predictive modeling techniques, such as multivariable regression, random forest, gradient boosting, and artificial neural networks, were utilized in developing the risk prediction models. After implementing a 70/30 train/test dataset split modeling approach and a 5-fold internal cross-validation, the logistic regression model was selected owing to its simplicity and robustness. The final model demonstrated good statistical performance, with an area under the curve of 0.71 (95% confidence interval: 0.65 to 0.77), and it included age, sex, nativity status, body mass index, diabetes status, and aspirin use. With an optimal cutoff point of 0.16, the final predictive model had 95% and 12% sensitivity and specificity, respectively, in adults ages 45 years or older. However, the model sensitivity and specificity were 28% and 85%, respectively, in individuals under the age of 45 years.

Developing and implementing a risk prediction approach for colorectal adenomas is a significant step forward in advancing a targeted screening protocol for EOCRC. This tailored risk-based screening model has the potential to lead to earlier detection, more efficient utilization of resources, and, ultimately, enhanced patient outcomes. Facilitating risk-stratified screening can potentially improve the efficiency and effectiveness of current screening protocols, moving beyond the generalized average risk approach of initiating screening at the age of 45. For example, the high specificity observed in individuals under 45 years of age suggests that the Hood et al. predictive model could be particularly useful for identifying high-risk individuals, thus optimizing resource allocation and improving patient prognostics. Additionally, the utilization of easily accessible clinical data in the Hood et al. model bolsters its pragmatic applicability, rendering it a potentially valuable instrument for various healthcare settings.

While the study by Hood et al. provides promising findings, it suffers from several limitations. The retrospective design and convenience sampling may introduce selection biases that could potentially affect the model's generalizability. Furthermore, the study's lack of data on established risk factors such as diet, alcohol consumption, and lifestyle factors could influence the model's accuracy. Additionally, while robust, the model's performance has not yet been validated in external populations, a crucial step to ensure its external validity. Future research should focus on prospective cohort studies to validate and refine the model and on incorporating comprehensive lifestyle and family history data to enhance its predictive power. Moreover, external validation across diverse populations will be essential to confirm the model's validity and reliability. Addressing these limitations through further research will be vital to integrating this risk-based screening strategy into clinical practice, ultimately improving early detection and prevention of EOCRC.

In conclusion, the risk prediction model developed by Hood et al. offers a promising tool to enhance early detection and prevention of EOCRC. This model aims to identify high-risk individuals under 50 by utilizing readily available clinical data, potentially allowing for more targeted and timely screening interventions. The model's high specificity in younger individuals suggests its potential utility in improving resource allocation and patient outcomes. However, further research is needed to address the study's limitations related to potential selection biases and the need for external validations. Continued investigation and refinement of risk prediction tools for colorectal adenomas are essential for their potential integration into clinical practice as part of a comprehensive risk stratification strategy. This tailored risk-based screening approach aligns with the necessity for personalized medicine strategies that address the clinical features and growing concern about EOCRC, especially for those under the age of 50.

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