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Establishment of a Nomogram Prediction Model for Postpartum Hemorrhage during Vaginal Delivery

Authors : Yinglisong, Jingge Chen, Jingxuan Chen, Yan Wang, Hui Huang, Jing Zhnag, Qianqian Zhang, Zhenzhen Zhang, Ji Zhang

Abstract : Purpose: The study aims to establish a nomogram prediction model for postpartum hemorrhage (PPH) in vaginal delivery. Patients and Methods: Clinical data were retrospectively collected from vaginal delivery patients admitted to a hospital in Zhengzhou, China, from June 1, 2022 - October 31, 2022. Univariate and multivariate logistic regression were used to filter out independent risk factors. A nomogram model was established for PPH in vaginal delivery based on the risk factors coefficient. Bootstrapping was used for internal validation. To assess discrimination and calibration, receiver operator characteristics (ROC) and calibration curves were generated in the derivation and validation groups. Results: A total of 1340 cases of vaginal delivery were enrolled, with 81 (6.04%) having PPH. Logistic regression indicated that history of uterine surgery, induction of labor, duration of first labor, neonatal weight, WBC value (during the first stage of labor), and cervical lacerations were all independent risk factors of hemorrhage ($P < 0.05$). The area-under-curve (AUC) of ROC curves of the derivation group and the validation group were 0.817 and 0.821, respectively, indicating good discrimination. Two calibration curves showed that nomogram prediction and practical results were highly consistent ($P = 0.105$, $P = 0.113$). Conclusion: The developed individualized risk prediction nomogram model can assist midwives in recognizing and diagnosing high-risk groups of PPH and initiating early warning to reduce PPH incidence.

Keywords : vaginal delivery, postpartum hemorrhage, risk factor, nomogram
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