

Predictive model

A **predictive model** and a **prognostic model** are related but not the same. Their distinctions lie in their purpose and application:

1. Predictive Model:

1. Aims to **predict** the **outcome of an intervention** or treatment.
2. Typically used to estimate the response to a therapy or procedure.
3. Example: A model predicting how well a patient will respond to chemotherapy based on genetic markers.

2. Prognostic Model:

1. Aims to **predict the natural course** of a disease or a patient's outcome **independent of treatment**.
2. Used to estimate disease progression or survival rates.
3. Example: A model estimating the survival probability of a glioblastoma patient based on age, tumor grade, and other clinical factors.

Key Difference: - A **prognostic model** gives insight into what will likely happen **without intervention**. - A **predictive model** helps guide treatment decisions by estimating the **effect of a specific intervention**.

Many clinical models integrate both aspects, but they serve different decision-making purposes in medicine.

While both predictive and prognostic models are types of **statistical models** used in medicine and other fields, they serve different purposes and address distinct questions.

Predictive Model:

A predictive model is designed to predict the likelihood or probability of a future outcome based on current or historical data. It focuses on estimating the probability that a specific event will occur. For example, a predictive model might be used to predict whether a patient is likely to develop a particular disease in the future based on their current health status and other relevant factors.

Prognostic Model:

A prognostic model, on the other hand, is developed to estimate the likely course or outcome of a disease or condition over time. It helps in assessing the natural progression of a disease and understanding factors that influence its trajectory. Prognostic models are more concerned with understanding the likely outcome without necessarily predicting whether a specific event will happen. For instance, a prognostic model might be used to estimate the overall survival time of patients with a certain type of cancer based on various clinical and biological factors. In summary, while both predictive and prognostic models involve making predictions, the key difference lies in their focus: predictive models aim to predict specific events in the future, while prognostic models focus on estimating the likely course or outcome of a condition over time.

The incidence of [pneumonia](#) in [ICU](#) patients with [TBI](#) is very high, seriously affecting the [prognosis](#). A study aimed to construct a predictive model for pneumonia in ICU patients with TBI and provide help for the prevention of TBI-related pneumonia. Clinical data of ICU patients with TBI were collected from the Medical Information Mart for Intensive Care (MIMIC)-IV database and hospital data. Variables were screened by lasso and multivariate logistic regression to construct a predictive nomogram model, verified in internal validation cohort and external validation cohort by receiver operator characteristic (ROC) curve, calibration curve and [decision curve analysis](#) (DCA). A total of 1850 ICU patients with TBI were enrolled in the study from the MIMIC-IV database, including 1298 in the training cohort and 552 in internal validation cohort. The external validation cohort included 240 ICU patients with TBI from hospital data. Nine variables were selected from the training cohort by lasso regression and multivariate logistic regression, and a pneumonia prediction nomogram was constructed. This [nomogram](#) has a high discrimination in training, [internal validation](#) and [external validation](#) cohorts (AUC = 0.857, 0.877, 0.836). The calibration curve and DCA showed that this nomogram had a high calibration and better clinical decision-making efficiency. The nomogram showed excellent discrimination and clinical utility to predict pneumonia, and could identify pneumonia high-risk patients early, thus providing [precision medicine](#) strategies for ICU patients with TBI ¹⁾

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Geng X, Wu H, Liu C, Qi L, Ballah AK, Che W, Wu S, Fu T, Li N, Wei X, Cheng R, Pang Z, Ji H, Wang Y, Wang X. Construction and validation of a predictive model of pneumonia for ICU patients with traumatic brain injury (TBI). *Neurosurg Rev*. 2023 Nov 21;46(1):308. doi: 10.1007/s10143-023-02208-9. PMID: 37985473.

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