**The definition and assignment of each clinical indicator for the multivariate analysis**

Explanations of Influencing Factors for after 2 h of HFNC treatment

To further discuss the influence of the clinical index change trends after 2 h of HFNC treatment on the prediction of early failure of HFNC,confounding factors were excluded,and a multifactor analysis was carried out on the basis of a single factor analysis.The definitions and values of the clinical indexes used in the multivariate analysis are shown in Table 1.

Table 1 Explanations of the Influencing Factors for high-flow nasal cannula oxygen therapy Failure Used in the Logistic Regression Analysis

|  |  |  |
| --- | --- | --- |
| Variable | Variable item | Variable value range and explanation |
| Y | HFNC failed | no=1，yes=2 |
| X 1 | △PEWS% | 1=decrease rate ≤14%，2= decrease rate ＞14% |
| X 2 | △oxygen saturation index% | 1=decrease rate ≤13%，2= decrease rate ＞13% |
| X 3 | △oxygenation index% | 1=decrease rate ≤28%，2= decrease rate ＞28% |
| X 4 | △pH% | 1=decrease rate ≤0.3%，2= decrease rate ＞0.3% |
| X 5 | PaO2(after treatment) | 1=≤70 mmHg，2=＞70 mmHg |
| X 6 | PaCO2/PaO2 ratio  (after treatment) | 1=≤0.54，2=＞0.54 |

Six variables that had statistical significance in the univariate analysis were introduced into the unconditional logistic regression model.A stepwise regression method was used to determine the predictive factors for early failure of HFNC.Thus,the OR of the △oxygenation index% was 5.875, indicating that the oxygenation index of HFNC decreased by >28% after 2 h of treatment, and the risk of early HFNC failure increased by more than 5 times (see Table 2).

Table 2 Multi-factor Logistic Analysis for high-flow nasal cannula oxygen therapy Failure

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variant | Regression coefficients | Standard error | *Wald* | *P* | *OR* | *95% CI* |
| △Oxygenation index%＞-28% | 1.771 | 0.693 | 6.537 | 0.011 | 5.875 | 1.512~22.830 |
| Constant | -3.829 | 1.021 | 14.052 | 0.000 |  |  |

Note:Wald=Wald test statistics,OR=odds ratios,the ratio of the possibility of an event happening to the impossibility of the event happening,95% CI=95% confidence intervals for the OR.