

Official title

Comparison of Classification Standards of BPD in Premature Infants

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Bronchopulmonary dysplasia (BPD), first reported and named by Northway and colleagues in 1967, is among the most common and severe sequelae of preterm birth.. BPD as a lung injury in preterm infants is an adverse consequence oxygenation of inspired gas and mechanical ventilation needed to rescue these patients. BPD imposes a considerable cost on health care delivery, a cost that may increase in the coming years due to the rising incidence of preterm babies saved by intense ventilator assistance. The development of new therapies and preventative strategies to reduce the incidence of BPD and BPD-associated morbidities should be a priority. However, the BPD definition has not been unified and standardized in clinical work, which limits clinical progress.

The first diagnostic standard for BPD published in 1979.^[11] In the following decades, standard has undergone numerous improvements and updates, among which those published in 2001, 2018, and 2019 have been adopted for wider use, but it has not been tested which of the three definitions is most accurate and most convenient for clinical applications. An appropriate definition of BPD would help predict adverse outcomes, reduce the incidence of late and serious complications through early prevention, and improve the quality of life of the patients.^[15] Therefore, there is still an unfulfilled need for a BPD screening diagnostic standard that can effectively assist with the early clinical prevention and diagnosis of BPD.

This study was an ambispective cohort study that aimed to compare the prognostic abilities of the three definitions of BPD, those published in 2001, 2018, and 2019, to optimize prospective evaluation of BPD cases.

Methods

The source study data were derived from the records available in the Department of Neonatology, Children's Hospital of Chongqing Medical University. We retrospectively obtained clinical data for the preterm infants with gestational age less than 32 weeks and the duration of hospital stay longer than 14 days during the period from January 1, 2018, to May 30, 2019. Postdischarge outcome data available through June 1, 2021, were then collected for this group of patients up to their corrected age of 18-24 months. Eligible infants survived 36 weeks postmenstrual age (PMA) and either completed 18-24 months follow-up or died prior to end of the planned follow-up period. The exclusion criteria were severe congenital malformations, missing key study data, or loss to follow-up. Informed consents were obtained from the parents for collecting pre-existing clinical data available in the NICU and for follow-up. The study was approved by the hospital's ethics committee (File No.2019-208).

We evaluated the clinical data of the enrolled infants at 18-24 months of corrected age and compared the incidence of different adverse outcomes under the three classification schemes of BPD severity to assess their ability to accurately predict the actual outcomes.

An adverse outcome was defined as the occurrence of at least one of the following:

- (1) Respiratory adverse outcomes.
- (2) Neurological adverse outcomes defined either as brain retardation according to the Child Neurological Development Scale, or a developmental quotient (DQ) score lower than 85 assessed by the Gesell developmental schedules of infants, or a brain damage requiring rehabilitation treatment verified by a qualified physical therapist, or disabilities such as blindness or deafness assessed by hearing and vision tests;
- (3) Low physical development: height, weight or head circumference at less than the 3rd percentile for the corrected gestational age and sex, with the growth percentiles defined using the World Health Organization Child Growth Standards at 18-24 months corrected age.
- (4) Death between 36 weeks PMA and 18-24 months follow-up.

We performed further in-depth analysis of respiratory outcomes and classified these outcomes as follows:

- (1) Occurrence of at least five outpatient services for respiratory reasons during the follow-up period;

- (2) At least two rehospitalizations for respiratory reasons during the follow-up period;
- (3) Hospitalization for respiratory infection;
- (4) Hospitalization for non-infectious respiratory problems;
- (5) Need for invasive ventilatory support

For the infants who after discharge were followed up in our hospital, we obtained the follow-up outpatient and inpatient records through the medical system of our hospital. For the infants who after discharge were served by other institutions, post-discharge outcome data were obtained from the parents during the follow-up contacts using questionnaires and telephone interviews. The patients whose parents were unable to provide the needed follow-up information were excluded.

The power of our statistical analysis with our sample size was estimated using PASS version 15.0. All analyses were performed with SPSS version 24.0. Maternal and infant characteristics, such as the risk factors, labour and delivery outcomes, and infant status at birth, were summarized using the descriptive statistics. Categorical variables were expressed as percentage and compared with either χ^2 -test or Fisher's exact test, whereas normally distributed variables were characterized by the means and standard deviations. All statistical comparisons were two-sided and $P < 0.05$ was regarded as statistically significant.