The Neonatal Network

Advanced Management of Moderate and Severe Bronchopulmonary Dysplasia

LESSONS LEARNED FROM MORE THAN 16 YEARS OF RESEARCH AND SPECIALIZED CARE

NATIONWIDE CHILDREN'S®
When your child needs a hospital, everything matters.

Meet Willow.

She was born via emergency C-section at just 22 weeks.
Doctors at the delivering hospital told Willow's mom Cortney that her baby's chances of survival were low. But after a long journey through the newborn intensive care unit (NICU) at Nationwide Children's Hospital, Willow is a vivacious 7-year-old.

Willow isn't alone. Each year, 10,000 to 15,000 babies born preterm are diagnosed with severe BPD, according to the National Institutes of Health. However, not everyone's story has the same happy ending.

The Comprehensive Center for Bronchopulmonary Dysplasia (CCBPD)

Nationwide Children's Hospital is an international leader in care and research for bronchopulmonary dysplasia (BPD). For patients with BPD, the neonatal team has provided life-saving care for patients across the country and provided expert consultations for many others.

We treat babies, regardless of their level of BPD severity, using a hybrid model of care that focuses on intensive therapy, including advanced ventilator settings that are shown to increase survival rate. We also place special emphasis on neurodevelopment by comforting babies through massage, music, speech and/or physical therapies, involving parents and guardians whenever possible.

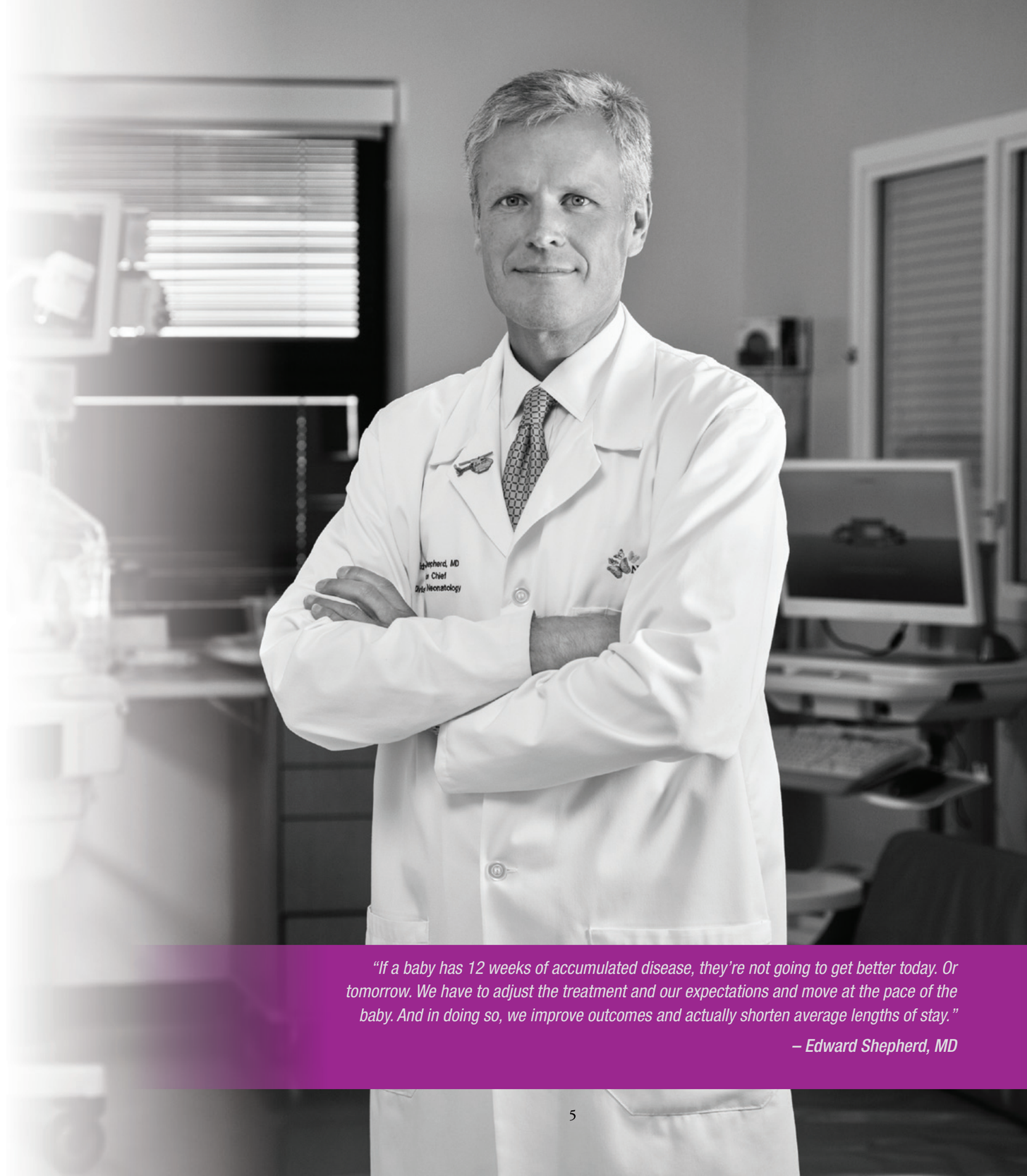
SEVERE BRONCHOPULMONARY DYSPLASIA DEFINED

The definitions of BPD, moderate, severe and "super severe" BPD are a hot topic of conversation among exerts in the field. Researchers at Nationwide Children's are continuing to help refine the definition of severe bronchopulmonary dysplasia. In a recent study published in *Journal of Perinatology*[1], members of the BPD Collaborative demonstrated that preterm infants with sBPD who were on invasive mechanical ventilation at 36 weeks, a criterion proposed in some newer definitions of BPD, had a significantly greater risk of in-hospital mortality and those who survived had a significantly greater risk of undergoing tracheostomy and/or gastrostomy.

Currently, BPD is generally defined and classified by the exposure of a preterm infant to respiratory support during the first 28 days of life and again at 36 weeks corrected.

DEFINING BPD AT NATIONWIDE CHILDREN'S

AGE	RESPIRATORY SUPPORT	DIAGNOSIS
28 days of life	Any supplemental oxygen	Some form of BPD
36 weeks adjusted	Supplemental oxygen >30% or positive pressure	Severe BPD
36 weeks adjusted	Ventilator	Type 2 Severe BPD



"If a baby has 12 weeks of accumulated disease, they're not going to get better today. Or tomorrow. We have to adjust the treatment and our expectations and move at the pace of the baby. And in doing so, we improve outcomes and actually shorten average lengths of stay."

– Edward Shepherd, MD

OUR APPROACH TO CARE

Treating BPD as a chronic disease is the keystone to the care model used by the Comprehensive Center for BPD (CCBPD). Our team uses a unique, hybrid model of care that includes both intensive care and a focus on neurodevelopment, including:

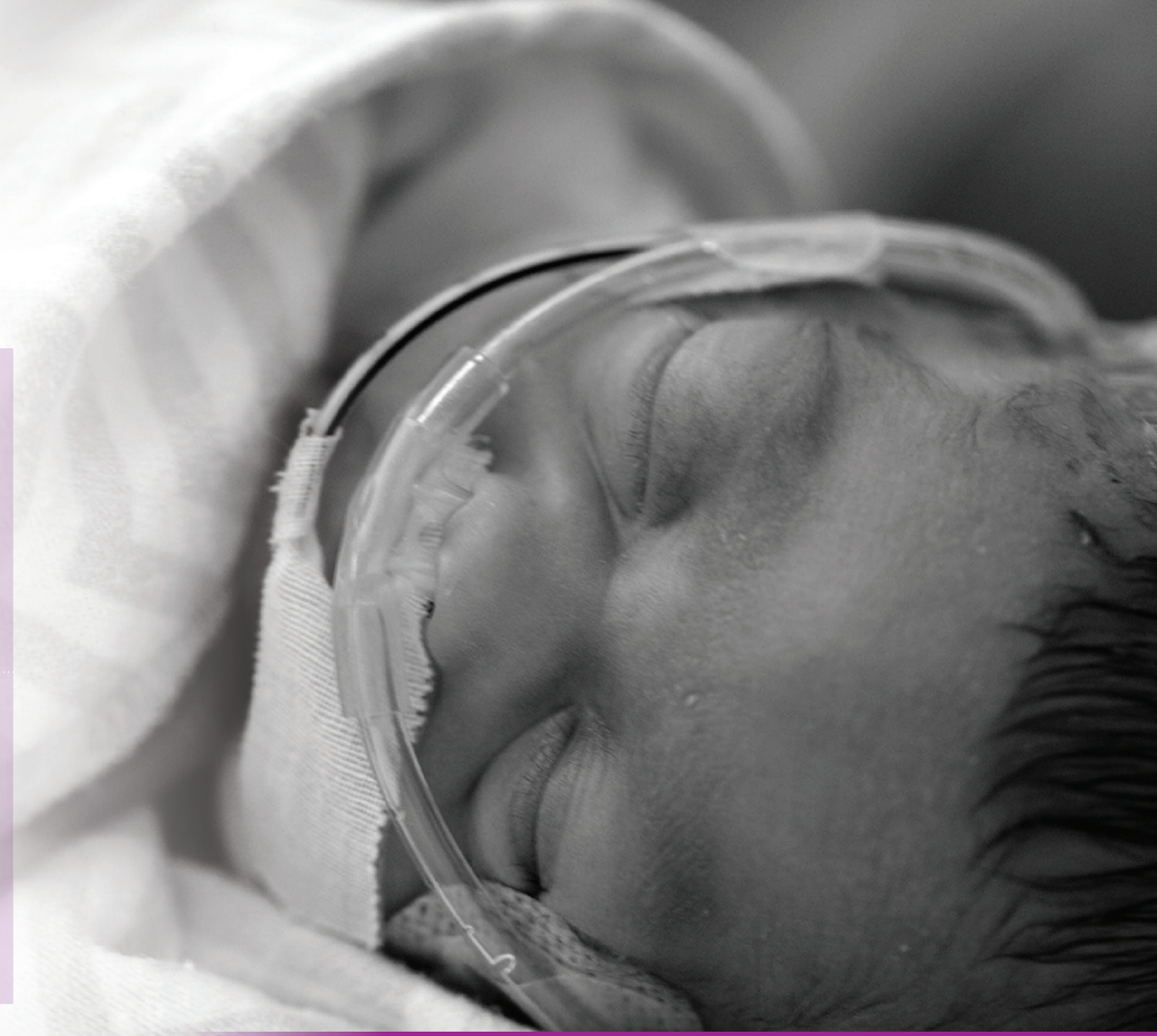
- A focus on baby's comfort, development, and play, instead of sedation and ventilation
- Addressing the medical, nutritional, developmental and social needs of the baby
- Getting parents/caretakers involved in in-hospital care
- Minimizes noxious stimuli and maximizes positive stimuli

Minimizes

- The number of laboratory draws obtained (no more than once per week, even in sick babies)
- The number of noxious nursing procedures (such as cuff blood pressure measurement)
- Any form of sedation

Maximizes

- Parents holding baby regardless of respiratory support
- Oral feedings as soon as feasible
- Interactive therapy sessions with all types of therapies
- Nonpharmacological approaches to calming the baby



"We want to help people understand that even when babies are extremely ill, if you use a thoughtful model of care for them, there is a good possibility that they can survive. We would love for our Center to inspire other places to invest in their ability to care for these babies."

***– Edward Shepherd, MD**, Section Chief of Neonatology at Nationwide Children's Hospital*

OUR OUTCOMES

Our care team in the CCBPD has a true passion for this special patient population and utilizes evidence-based practices and research to continuously improve care. Recent findings by our team suggest that our comprehensive, multidisciplinary approach may result in better neurodevelopmental outcomes, fewer readmissions, and improved survival.[2-4]

A recent study published by the BPD team at Nationwide Children's showed that specialized care can improve outcomes for patients even with established BPD.[5] Of the 71 patients in the study, 65 (92%) survived to hospital discharge, despite presenting late and being severely ill on admission. What's more, most survivors were discharged home without the need for positive pressure respiratory support or pulmonary vasodilators.

UNMATCHED SURVIVAL RATES

WITH A SURVIVAL RATE EXCEEDING

97%

we are exceeding national averages and providing best outcomes for this patient population.

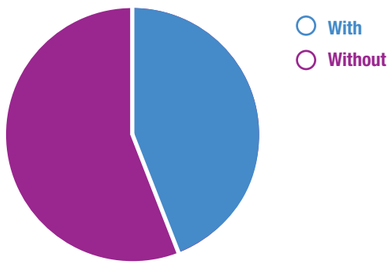
Using a ventilation protocol developed at our hospital, coupled with the treatment of the whole child, infants with severe BPD who were cared for at our CCBPD had significantly higher survival rates than the national average of other hospitals and programs. When excluding infants who required tracheostomy, Nationwide Children's survival rate is 99%.[3]

DECREASED READMISSION RATES

29% ↘ 5%

Since the implementation of our BPD program in 2004, 1-month readmission rates of patients with BPD decreased from 29% to just 5%.[2]

REDUCED NEURODEVELOPMENT IMPAIRMENT



Over half (56%)

Researchers in our CCBPD team demonstrated that more than half of our patients (56%) did not have neurodevelopmental impairment, despite multiple risk factors, including gestational age, birth weight, BPD, and level of sickness.[4] This finding contrasts with results of previous studies demonstrating that patients with BPD had higher rates of neurodevelopmental impairment (71%) than control patients (19%).[5]

ADDITIONAL MEASURES RELATED TO DISEASE SEVERITY OF OUR CCBPD PATIENT POPULATION INCLUDE:

TRACHEOSTOMY
RATE OF
5%
(Median for all hospitals 10%)

FUNDOPLICATION
RATE
0.3%
(Median for all hospitals 5%)

GASTROSTOMY
RATE
25%
(Median for all hospitals 26%)

23%
INTUBATED
ON MECHANICAL VENTALATION AT 36 WEEKS PMA

66%
ON NON-INVASIVE
POSITIVE PRESSURE AT 36 WEEKS PMA

OUR EXPERT TEAM

Our Comprehensive Center for Bronchopulmonary Dysplasia (CCBPD) addresses the medical, nutritional, developmental and social needs of patients diagnosed with BPD. We offer an inpatient unit and outpatient follow-up service dedicated to patients with Bronchopulmonary Dysplasia.

The multidisciplinary team includes neonatologists, advanced practice and registered nurses, respiratory, physical, music and developmental therapists. Our specialized transport team enables us to bring critically ill patients, many of whom have do-not-resuscitate orders at their first hospital, to transfer to our program.

The inpatient BPD team is comprised of many dedicated and focused medical professionals who have a passion for providing care to this special infant population. We care for patients needing mechanical ventilation via endotracheal tube or tracheostomy, CPAP, SiPAP and nasal canula. We focus on respiratory support, nutrition, developmental milestones and family-centered care to attain best outcomes for infants and their families.

Care doesn't end when the patient is discharged.

The outpatient BPD Clinic operates as a "medical home" model and serves as a bridge to Pulmonary Medicine. The BPD Clinic team works closely with the child's primary care physician to oversee care and progress, recognizing every member of the care team is vital to the holistic care of the child. Since its inception in 2004, the center decreased babies' readmission rates from over 30% to less than 10%, while at the same time improving pulmonary outcomes with the use of supplemental oxygen, bronchodilators, steroids and diuretics.

Families are equipped with care plans customized to meet the need of their child and family. And expert help is only a phone call away with the 24/7 call line for BPD families.

THE TEAM IS AVAILABLE 24/7 TO ANSWER CALLS FROM PATIENT FAMILIES.

OUR RESEARCH

We are proud to be one of 18 elite research centers in the Neonatal Research Network, a national network of investigators leading the way in neonatal medicine.

Our close integration with the Center for Perinatal Research at the Abigail Wexner Research Institute at Nationwide Children's and the national BPD Collaborative enable us to conduct research that fuels our understanding of BPD pathology and enables us to develop and test innovative algorithms and standards of care.

For updates and summaries on current research initiatives, visit **PediatricsNationwide.org/Tag/BPD.**

"No baby should die from BPD or have a decreased quality of life from the disease. We're excited to share what we're learning, and we look forward to learning even more together. That's why we have the BPD Collaborative. Why we publish. And why we consult with other institutions openly."

– Leif Nelin, MD, Division Chief of Neonatology at Nationwide Children's Hospital

A DEDICATED BPD UNIT

We have the nation's largest and only dedicated unit for patients with moderate to severe BPD. And while it is a highly skilled level 4 intensive care center, the comment we most often get from families and visitors is that "it doesn't feel like a NICU here."

Features

- Inpatient and outpatient services
- A combination of single-patient and multi-patient rooms, depending on the needs of the child and family
- Space to accommodate a baby's daily therapy and parent bonding sessions to help prepare families for their transition home
- Large, open windows allowing for visual development (natural light helps premature babies grow)

Facts

The BPD Unit opened in 2005

24 beds distributed across single and multi-patient rooms

Up to 50% of patients in the BPD unit may be from outside the Nationwide Children's region

OUR PROGRAM BY THE NUMBERS

The size and strength of our Neonatal Network allow us to provide the highest level of experience and translate that expertise into our CCBPD program from diagnosis and therapies, across the broad spectrum of their unique set of needs.

MORE BPD ADMISSIONS THAN ANY OTHER HOSPITAL

(38% more than second largest children's hospital, 75% higher than the median for all other children's hospitals)

89% OF TOTAL PATIENTS WITH SEVERE BPD

(as defined by NIH Consensus Definition)

OUR COMMITMENT TO COLLABORATION

In many cases, parents call Nationwide Children's CCBPD looking for a transfer for their child. The team's first approach is to connect with the provider at the outside NICU and offer a consultation. This collaborative approach as opened the doors for collaboration, knowledge sharing and supportive relationships across institutions.

We are available 24/7 to answer peer questions or provide a consult.

Call the Physician Direct Connect Line toll free at (877) 355-0221.

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REFERRALS AND CONSULTATIONS

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DOWNLOAD THE VENTILATOR STRATEGIES CHART

Severe BPD Ventilator Strategies: A Quick Guide

A chart, adapted from recommendations from the Bronchopulmonary Dysplasia Collaborative and current clinical practice at Nationwide Children's, shows the differences in strategies between the first week of life, when prevention is the goal, and later, when severe BPD has been established.

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