Risk Factors for Foster Care Placement in Patients with Bronchopulmonary Dysplasia

Tyler L King, DO[1] A. Ioana Cristea, MD MS[2] James E. Slaven, MS[3] Jason Z. Niehaus, MD[4]

[1] Division of Newborn Medicine, Washington University School of Medicine in St. Louis, St Louis, Missouri
[2] Division of Pediatric Pulmonology, Allergy and Sleep Medicine, Indiana University School of Medicine, Indianapolis, Indiana
[3] Department of Biostatistics, Indiana University School of Medicine, Indianapolis, Indiana
[4] Division of Neonatal-Perinatal Medicine, Indiana University School of Medicine, Indianapolis, Indiana

Address for correspondence Jason Z. Niehaus, MD, Department of Pediatrics, Riley Hospital for Children, Neonatal-Perinatal Medicine, Indiana University School of Medicine, 1030 West Michigan Street, Suite C 4600, Indianapolis, IN 46202 (e-mail: jzniehau@iu.edu).

Am J Perinatol

Abstract

Objective Bronchopulmonary dysplasia (BPD) is a major cause of morbidity in neonates and can be associated with long hospitalization and high health care utilization. This extremely stressful situation can be difficult for many families and caregivers. The high-risk situation combined with increased medical complexity can result in involvement of Department of Child Services (DCS) and even foster care placement. This study seeks to define risk factors for DCS involvement and foster care placement in children with BPD.

Study Design A retrospective study of children born at less than 32 weeks of gestation born between 2010 and 2016, on oxygen at 28 days of life and discharged home from a tertiary care center.

Results A total of 246 patients were identified. DCS was involved in 49 patients with 13 requiring foster care placement. The most common correlated risk factors that were identified for DCS involvement were maternal THC (tetrahydrocannabinol) positivity, hospital policy violations, maternal mental health diagnosis, and home insecurity. Home insecurity ($p < 0.005$) and amphetamine use ($p < 0.005$) were associated with foster care placement.

Conclusion There are numerous risk factors for both DCS and foster care placement. The identification of these risk factors is important to help establish services to help families and identify potential biases to avoid.

Keywords

- bronchopulmonary dysplasia
- foster care
- social determinants of health

Key Points

- There were both substance-related and non-substance-related risk factors for DCS involvement.
- Home insecurity and maternal amphetamine use were risk factors associated with foster care placement.
- This study fills the knowledge gap of risk factors for DCS and foster care placement in BPD.

received
July 28, 2021
accepted
February 17, 2022

DOI https://doi.org/10.1055/s-0042-1744509.
ISSN 0735-1631.

Children may be placed in foster care for many reasons including, but not limited to, abuse, neglect, and medical complexity that surpasses parent's ability to care for the child. Nearly half of children in foster care have chronic medical problems.[1] Adoption and Foster Care Analysis and Reporting System (AFCARS) data showed that foster care placement is highest in the first year of life with implications in better identifying how to better serve at-risk parents.[2] Prematurity and low birth weight have been associated with increased risk for both foster care placement and adoption; however, delineating the degree of prematurity beyond gestational age less than 37 weeks is limited and sparse.[3,4] The neonatal intensive care unit (NICU) offers an environment where the care team may be able to better identify family's psychosocial risk factors impacting patient outcomes after discharge.[5]

Bronchopulmonary dysplasia (BPD) is a major cause of morbidity in neonates.[6] BPD contributes to prolonged hospitalization stays and high health-care utilization associated with extreme prematurity.[7–9] Despite improving therapeutic interventions, the incidence of BPD has remained largely unchanged.[10] Following a NICU admission, BPD has also been shown to have a high health-care utilization and burden.[11]

BPD is a disease process linked with prematurity.[12] There are numerous risk factors studied, including medical, nutritional, obstetric, environmental, and sociodemographic factors, contributing to preterm birth.[13] Multiple studies have evaluated socioeconomic and environmental impacts in neonatal morbidity. With this, it has become increasingly important to better understand how these factors contribute and subsequently intervene appropriately for at-risk populations.[14]

There is limited information regarding which risk factors may lead to involvement with Department of Child Services (DCS) and subsequent foster care placement for patients with BPD prior to NICU discharge. Due to this, we wanted to identify risk factors leading to both DCS involvement and foster care placement. We hypothesize that there are identifiable risk factors contributing to foster care placement in infants with BPD.

Materials and Methods

We performed a retrospective cohort study of premature infants diagnosed with BPD born less than 32 weeks transitioning to home from a tertiary care center between January 2010 and December 2016. Infants with BPD with reported DCS Involvement were compared with infants with BPD and no DCS involvement. Definition of BPD was based on oxygen requirement at 28 days of life to potentially identify patients earlier than 36 weeks corrected gestational age.[6,15] The primary outcome was DCS involvement. Secondary outcome was foster care placement. Clinical characteristics and demographics were compared between the groups.

Reasons for DCS involvement were identified through social work and physician team documentation within the infant's medical record. Identifiable factors included substance use from prenatal visits as specified on infant's documented admission note or identified on infant urine drug screen/meconium drug screen, maternal history of mental health disorders, history of domestic violence (DV), legal concerns, previous DCS involvement, hospital policy violations, parental communication problems, parent care failures, and home insecurity.

Substance use was defined as any positive prenatal urine drug screen (including any prenatal visit and on delivery admission) as well as any infant urine drug screen or meconium drug screen. Positive screens for medications given prior to delivery were excluded (i.e., morphine during labor). Maternal mental health history was defined as self-reported history or current diagnosis of depression, anxiety disorder, or other psychiatric disorder requiring medication and/or therapy. DV was defined as any previous history of reported DV requiring DCS involvement, any reported physical or verbal abuse during any prenatal visit, and any verbal or physical altercation requiring security involvement on hospital property during NICU admission. Legal concerns included maternal history of incarceration, probation, and court ordered substance abuse program for any reason prior to and during NICU admission. Previous DCS involvement was any previously filed case on mother or father including current pregnancy reported in social work documentation. Hospital policy violations included parental noncompliance with hospital protocols during any part of maternal or neonate admission. Discharge policy violations included inadequate number of caregivers on discharge and not having an infant car seat. Communication problems were defined as any social work consult and/or follow-up from the primary team after multiple failed phone message attempts to reach parents. Parent care failure was defined as any parent care failure documented. Home insecurity was defined as self-reported homelessness or eviction, living in a homeless shelter during pregnancy or during any part of the NICU stay. The study was approved by the Institutional Review Board of Indiana University.

REDCap (Research Electronic Data Capture) was used for study data collection and management.[16,17] Results were provided with values in medians (interquartile range [IQR]) for continuous variables and frequencies (percentages) for categorical variables. Statistical analyses were performed with the Kruskal–Wallis/Wilcoxon nonparametric and Fisher's exact tests (due to expected small cell counts), respectively. All analytical assumptions were verified, and analyses were performed using SASS v9.4 (SAS Institute, Cary, North Carolina).

Results

We identified a total of 246 patients with BPD who were transitioned to home between 2010 and 2016. Of these, 80% (197) of patients had no DCS involvement or foster care placement. DCS was involved in 20% (49) of patient cases with 5.2% (13) of patients subsequently placed into foster care (►Table 1). There were no statistically significant differences between gestational age, maternal race, gravida/para history, birth weight, birth length, and birth head

Table 1 Patient characteristics and demographics

	No DCS	DCS only	DCS and fostered	*p*-Value
N	197	36	13	
Gestational age (wk)	27.29 (25.57, 28.43)	26.57 (25.43, 28.36)	27.64 (26.14, 29.07)	0.505
Birth weight (g)	900 (735, 1,159)	865 (720, 1,085)	945 (835, 1,180)	0.419
Birth length (cm)	35 (32, 37.4)	34.25 (32.5, 35.75)	35.5 (33.75, 37.5)	0.571
Birth OFC (cm)	24.2 (22.5, 26)	24.5 (22.75, 2.625)	24.65 (23.1, 27.05)	0.661
Race				
White	116 (58.9)	21 (58.3)	8 (61.5)	0.926
Black	67 (34.0)	14 (38.9)	5 (38.5)	
Hispanic	7 (3.6)	0 (0)	0 (0)	
Asian	4 (2.0)	1 (2.8)	0 (0)	
Other	3 (1.5)	0 (0)	0 (0)	
Gravida	2 (1, 4)	3 (2, 4)	2.5 (2, 5.5)	0.203
Para	2 (1, 3)	2 (1, 3)	2 (1, 3.5)	0.874
Prenatal care				
Yes	179 (91.3)	29 (80.6)	5 (41.7)	<0.001[a]
No	3 (1.5)	2 (5.6)	5 (41.7)	
Late	10 (5.1)	3 (8.3)	2 (16.7)	
Unknown	4 (2.0)	2 (5.6)	0 (0)	

Abbreviation: DCS, Department of Child Services; IQR, interquartile range.
Note: This table illustrates the patient characteristics studied. Values are medians (IQRs) for continuous variables and frequencies (percentages) for categorical variables, with *p*-values from Kruskal–Wallis and Fisher's exact tests, respectively.

circumference amongst all three groups. Positive history of prenatal care was a statistically significant finding between the three groups ($p < 0.001$).

Discharge medical outcomes are shown in ►Table 2. Discharge respiratory support and discharge feeding mechanism did not differ amongst the groups, but discharge feeding type was statistically significant (breast milk vs. formula). Thirteen infants died in total, 11 from the non-DCS or foster care group and two from the DCS alone group. Infant length of stay did not differ between the three groups.

Risk factors for DCS involvement and foster care placement are illustrated in ►Table 3. The most common reasons for DCS involvement were maternal tetrahydrocannabinol (THC) positivity, hospital policy violations, maternal mental health history, and home insecurity. Home insecurity ($p = 0.009$) and amphetamine use ($p = 0.004$) were independently significant risk factors for foster care placement compared with DCS involvement alone. Of the remaining drugs tested, there were no statistically significant differences between the groups. Marijuana (THC) use was present in 47.2% (17) of cases for DCS involvement alone and 53.9% (7) of cases associated with foster care placement. Communication problems, hospital policy violations, parent care failures prior to discharge, legal concerns, history of DV, and maternal mental health history did not show statistically significant differences between the groups.

There was a median of 2 total risk factors identified for the DCS alone group (IQR: 2–4) compared with a median of 4 risk factors identified in the foster care group (IQR: 3–6) with a statistically significant difference between number of risk factors between the groups ($p = 0.027$). The median number of substances abused was 1 for the DCS alone group (IQR: 0–1.5) and 1 in the foster care group (IQR: 0–2) with no statistically significant differences between the groups ($p = 0.607$). There were nine cases involving DCS with exclusive substance abuse as a risk factor. The median number of substances abused was 1 (IQR: 1–2) when no other risk factors were identified. There was no exclusive substance use in the foster care group.

We further categorized the data to exclude substance use and further evaluated other risk factors. A median of 2 non-substance risk factors were identified in the DCS alone group (IQR: 0.5–3) and a median of 3 non-substance risk factors in the foster care group (IQR: 2–4) with a statistical significance between these groups ($p = 0.033$). When evaluating the non-substance use risk factors (excluding any substance use from this group), 39% (14) of patients were identified in the DCS alone group and 39% (5) of patients were identified in the foster care group. When any substance use was excluded,

Table 2 Patient discharge medical outcomes

	No DCS ($n = 197$)	DCS only ($n = 36$)	DCS and fostered ($n = 13$)	p-Value
Discharge respiratory support				
Room air	98 (55.1)	11 (32.4)	7 (58.3)	0.312
Home O_2	74 (41.6)	21 (61.8)	5 (41.7)	
Trach collar	1 (0.6)	0 (0)	0 (0)	
Trach vent	5 (2.8)	2 (5.9)	0 (0)	
Discharge feeding type				
Formula	135 (68.9)	34 (94.4)	12 (100)	0.004[a]
Breast milk	38 (19.4)	0 (0)	0 (0)	
Both	23 (11.7)	2 (5.6)	0 (0)	
Discharge feeding mechanism				
PO	84 (42.9)	16 (44.4)	5 (41.7)	0.313
NG/PO	44 (22.5)	7 (19.4)	5 (41.7)	
NG only	42 (21.5)	5 (13.9)	0 (0)	
GT/GJ	26 (13.3)	8 (22.2)	2 (16.7)	
Unknown	0 (0)	0 (0)	0 (0)	
Deaths	11 (5.6)	2 (5.6)	0 (0)	0.701
Length of stay (d)	96 (78, 117)	104.5 (76, 122)	103.5 (79.5, 107.5)	0.775

Abbreviation: DCS, Department of Child Services; IQR, interquartile range.
Note: This table specifies discharge respiratory support, feeding type, and mechanism as well as infant morbidity and length of stay. Values are medians (IQRs) for continuous variables and frequencies (percentages) for categorical variables, with p-values from Kruskal–Wallis and Fisher's exact tests, respectively.

there were a median of 3 risk factors identified in the DCS group (IQR: 2–4) and a median of 4 risk factors identified in the foster care group (IQR: 3–4), with no statistically significant difference between the groups ($p = 0.563$).

Maternal mental health history was further evaluated in relation to substance abuse. There were 8 total cases of positive maternal mental health history and positive substance abuse, 43% (6) were in the DCS group alone and 40% (2) were in the foster care groups. There were no statistically significant differences between these groups ($p > 0.999$). There were six cases in total where there was positive maternal mental health history and no positive substance abuse, four cases in the DCS group and two cases in the foster care group with no statistically significant difference between the groups ($p = 0.6452$).

Discussion

There have been population-based studies looking at foster care placement with prematurity.[18] However, there have not been risk factors evaluated specific to patients diagnosed with BPD. This study evaluated potential risk factors associated with foster care placement in a cohort of patients with BPD discharging from the NICU. Approximately 1% of children enter foster care before their first birthday. Previous studies have shown that foster care placement during infancy and overall cumulative risk is highest in African American and Native American populations.[2] Additionally, there is a higher cumulative prevalence in Child Protective Services (CPS; or DCS) investigation, substantiation, placement, and termination for African Americans.[19] In our study, we found an increased risk for foster care placement (5.7% compared with 1% risk of placement in the first year) and no correlation with maternal race. Foster care placement is likely higher given the increased medical complexity associated with BPD. The NICU also provides an environment with the resources to identify and communicate concerns efficiently to community partners including DCS. We suspect that our cohort size and study design may account for differences in previous racial disparity data. AFCARS data and foster care incidence are reported annually. Our study looked at foster care placement prior to NICU discharge. We did not account for foster care placement following NICU discharge of these patients which may be more reflective of the current population studies. Additionally, our cohort size was small and there were no patients who identified as Native Americans to compare with the larger studies and population data.

In this study, there was a difference between discharge formula type amongst the groups studied, reflecting change in parental care and need for formula at discharge. However, there were no differences in feeding mechanism and respiratory support between groups at discharge. This suggests that the presence of increased supplies for feeding and respiratory support at the time of discharge may not impact patient disposition with families versus foster care.

Adequate prenatal care was a protective factor against foster care placement in this cohort. Previous studies have shown that prenatal care is impacted by many factors including maternal age, race, education, parity, insurance status, and DV history.[20] In our study, maternal race, parity,

Table 3 Risk factors for DCS and Foster Care Placement

	DCS but not fostered ($n = 36$)	DCS and fostered ($n = 13$)	*p*-Value
Substance related			
Cannabinoids/THC	17 (47.2)	7 (53.9)	0.682
Amphetamines	1 (2.8)	4 (30.8)	0.004[a]
Opiates (outside program)	5 (13.9)	3 (23.1)	0.442
Opiates (in OUD program)	6 (16.7)	0 (0)	0.116
Heroine	0 (0)	2 (15.4)	0.066
Other substance	3 (8.3)	1 (7.7)	0.942
Non-substance related			
Communication problems	5 (13.9)	2 (15.4)	0.895
Maternal mental health history	10 (27.8)	4 (30.8)	0.838
Parent care failure	4 (11.1)	4 (30.8)	0.100
Home insecurity	10 (27.8)	9 (69.2)	0.009[a]
Previous DCS involvement	8 (22.2)	5 (38.5)	0.256
Hospital policy violations	11 (30.6)	3 (23.1)	0.609
Domestic violence history	7 (19.4)	3 (23.1)	0.781
Legal concerns	6 (16.7)	5 (38.5)	0.107
Other	9 (25.0)	5 (38.5)	0.357
Total risk factors	2 (2, 4)	4 (3, 6)	0.027[a]
Total substances used	1 (0, 1.5)	1 (0, 2)	0.607
Exclusive substance use—where they have ZERO non-substance risk factors	1 (1, 2); $n = 9$	$n = 0$	n/a
Total non-substance risk factors	2 (0.5, 3)	3 (2, 4)	0.033[a]
Total non-substance risk factors—where they have ZERO substance risk factors	3 (2, 4); $n = 14$	4 (3, 4); $n = 5$	0.563
Maternal mental health history + any positive substance abuse	6 (42.9)	2 (40.0)	>0.999
Maternal mental health history and no positive substance abuse	4 (18.2)	2 (25.0)	0.645

Abbreviation: DCS, Department of Child Services; IQR, interquartile range; OUD, opioid use disorder; THC, tetrahydrocannabinol.
Note: Values are medians (IQRs) for continuous variables and frequencies (percentages) for categorical variables, with *p*-values from Kruskal–Wallis and Fisher's exact tests, respectively.

and DV alone were not associated with foster care placement but may have contributed to inadequate postnatal care. Of the risk factors studied, methamphetamine use and home insecurity individually showed higher rates of foster care placement in this population.

Substance use in pregnancy is associated with both maternal and neonatal adverse outcomes. Parental substance abuse is a known contributor of foster care placement and certain states have implemented criminal justice policies surrounding maternal substance use.[21] Marijuana is the most used illicit drug in women of reproductive age and pregnancy.[22] This study did not show an increased risk of foster care placement for patients with BPD born to mothers who used marijuana in pregnancy. These findings may be state-dependent and reflect criminal justice policies surrounding parental substance use. In our state all cases of positive drug screens required DCS involvement. There is an increasing use of illicit drugs in reproductive-age women with a prevalence of 1 in 20 pregnant women reporting illicit and nonmedical prescription drug use.[23] Methamphetamine use in pregnancy is associated with increased risk for preterm birth, growth restriction, and fetal death.[24,25] However, this risk is often compounded with multiple other maternal comorbidities including other poverty, psychiatric disorders, and substance abuse.[26]

Home insecurity has been associated with adverse outcomes in both children and adults. In younger children, it can contribute to poor growth, developmental delay, and subsequently poor health outcomes.[27] Home insecurity may also be a marker of food insecurity, another important contributor to poor health and developmental outcomes in children.[28] In our study, home insecurity was associated with increased foster care placement. Because of this, it is very important in BPD patients to assess for home insecurity while in the NICU, especially given increased medical complexity of this population. Our study suggests that if we can implement both effective and early interventions against parental home insecurity while in the NICU, we may be able

to prevent DCS involvement and/or foster care placement for patients with BPD.

This study suggests that an increasing number of risk factors identified may increase risk for foster care placement in BPD patients. Addressing social determinants of health is crucial toward rectifying prenatal care inadequacies and improving neonatal outcomes.[29,30] There is an increasing interest in evaluating how individual psychosocial factors and their community impact infant morbidity and mortality.[31] It has been previously shown that parental socioeconomic factors contribute to CPS maltreatment cases in pediatric patients.[32] However, this has not been thoroughly assessed in patients with BPD. For these reasons, we believe that identifying socioeconomic risk factors are important in patients with BPD. Continued efforts are needed to rectify these disparities.

Limitations of this study included sample size, categorization limitations, recall limitations, and implicit biases. Some of the risk factors studied had small sample sizes impacting hypothesis testing of the individual risk factors studied and may have limited a comparison between variables (i.e., foster care group with exclusive substance use and no other risk factors had an *N* of 0). The methodology for certain risk factors in this retrospective review was dependent on documentation from the medical and social work team. There were historical aspects to risk factor categorization that may be impacted by recall and appropriate disclosure including home insecurity, maternal mental health, history of DV, and even legal concerns if more remote. Reviewing patient intake addresses, inquiry about home inhabitants, and employment provided additional opportunities to address home insecurity if not disclosed by parents. Risk factors identified throughout NICU stay including communication problems, hospital policy violations, and parent care failure may have underlying medical team's implicit biases. These risk factors were reasons for social work involvement and subsequent DCS/foster care involvement and inherently may have had different thresholds in the teams communicating concerns about family members.

For patients with BPD, there may be additional medical problems impacting health outcomes (i.e., interventricular hemorrhage, congenital heart disease, necrotizing enterocolitis, etc.) that may have contributed to discharge disposition. Some families may elect for their child to be admitted to long-term care facilities following discharge from the NICU, especially in the context of increasing medical complexity. These families may have qualified for DCS involvement for certain risk factors but would not have been considered for foster care placement given placement in a long-term care facility. The sample size for these cases, specifically in BPD patients with chronic respiratory failure patients with tracheostomy dependence, was small and may have been irrelevant.

Conclusions

Our study shows that both DCS and foster care placement at NICU discharge are prevalent in patients with BPD. Identification of socioeconomic risk factors both independently and cumulatively may contribute to these outcomes. There is a significant need to better address social determinants of health surrounding prematurity and its morbidity, including BPD. There is an opportunity in the NICU setting to address potential barriers impacting families. It is crucial that we begin developing institutional strategies to better understand how social determinants of health impact BPD patient outcomes.

Conflict of Interest

None declared.

References

1 Williams EP, Seltzer RR, Boss RD. Language matters: identifying medically complex children in foster care. Pediatrics 2017;140 (04):e20163692
2 Wildeman C, Emanuel N. Cumulative risks of foster care placement by age 18 for U.S. children, 2000-2011. PLoS One 2014;9 (03):e92785
3 Tung I, Christian-Brandt AS, Langley AK, Waterman JM. Developmental outcomes of infants adopted from foster care: predictive associations from perinatal and preplacement risk factors. Infancy 2020;25(01):84–109
4 Vig S, Chinitz S, Shulman L. Young children in foster care. Infants Young Child 2005;18(02):147–160
5 Parker MG, Garg A, McConnell MA. Addressing childhood poverty in pediatric clinical settings: the neonatal intensive care unit is a missed opportunity. JAMA Pediatr 2020;174(12): 1135–1136
6 Voynow JA. "New" bronchopulmonary dysplasia and chronic lung disease. Paediatr Respir Rev 2017;24:17–18
7 Hintz SR, Kendrick DE, Vohr BR, Poole WK, Higgins RDNational Institute of Child Health and Human Development (NICHD) Neonatal Research Network. Community supports after surviving extremely low-birth-weight, extremely preterm birth: special outpatient services in early childhood. Arch Pediatr Adolesc Med 2008;162(08):748–755
8 Mowitz ME, Ayyagari R, Gao W, Zhao J, Mangili A, Sarda SP. Health care burden of bronchopulmonary dysplasia among extremely preterm infants. Front Pediatr 2019;7:510
9 Álvarez-Fuente M, Arruza L, Muro M, et al. The economic impact of prematurity and bronchopulmonary dysplasia. Eur J Pediatr 2017;176(12):1587–1593
10 Michael Z, Spyropoulos F, Ghanta S, Christou H. Bronchopulmonary dysplasia: an update of current pharmacologic therapies and new approaches. Clin Med Insights Pediatr 2018; 12:1179556518817322
11 Mowitz ME, Mangili A, Han L, et al. Prevalence of chronic respiratory morbidity, length of stay, inpatient readmissions, and costs among extremely preterm infants with bronchopulmonary dysplasia. Expert Rev Pharmacoecon Outcomes Res 2021;21 (05):1117–1125
12 Kalikkot Thekkeveedu R, Guaman MC, Shivanna B. Bronchopulmonary dysplasia: a review of pathogenesis and pathophysiology. Respir Med 2017;132:170–177
13 Vogel JP, Chawanpaiboon S, Moller AB, Watananirun K, Bonet M, Lumbiganon P. The global epidemiology of preterm birth. Best Pract Res Clin Obstet Gynaecol 2018;52:3–12
14 Vos AA, Posthumus AG, Bonsel GJ, Steegers EA, Denktaş S Deprived neighborhoods and adverse perinatal outcome: a systematic review and meta-analysis. Acta Obstet Gynecol Scand 2014; 93(08):727–740
15 Tooley WH. Epidemiology of bronchopulmonary dysplasia. J Pediatr 1979;95(5, Pt 2):851–858

16 Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)–a metadata-driven methodology and workflow process for providing translational research informatics support. J Biomed Inform 2009;42(02): 377–381
17 Harris PA, Taylor R, Minor BL, et al; REDCap Consortium. The REDCap consortium: building an international community of software platform partners. J Biomed Inform 2019; 95:103208
18 Alenius S, Kajantie E, Sund R, et al. Out-of-home care placements of children and adolescents born preterm: a register-based cohort study. Paediatr Perinat Epidemiol 2020;34(01): 38–476
19 Wildeman C, Edwards FR, Wakefield S. The cumulative prevalence of termination of parental rights for U.S. children, 2000-2016. Child Maltreat 2020;25(01):32–42
20 Wolf ER, Donahue E, Sabo RT, Nelson BB, Krist AH. Barriers to attendance of prenatal and well-child visits. Acad Pediatr 2021;21 (06):955–960
21 Sanmartin MX, Ali MM, Lynch S, Aktas A. Association between state-level criminal justice-focused prenatal substance use policies in the US and substance use-related foster care admissions and family reunification. JAMA Pediatr 2020;174(08): 782–788
22 Wendell AD. Overview and epidemiology of substance abuse in pregnancy. Clin Obstet Gynecol 2013;56(01):91–96
23 McHugh RK, Wigderson S, Greenfield SF. Epidemiology of substance use in reproductive-age women. Obstet Gynecol Clin North Am 2014;41(02):177–189
24 Gorman MC, Orme KS, Nguyen NT, Kent EJ III, Caughey AB. Outcomes in pregnancies complicated by methamphetamine use. Am J Obstet Gynecol 2014;211(04):429.e1–429.e7
25 Nguyen D, Smith LM, Lagasse LL, et al. Intrauterine growth of infants exposed to prenatal methamphetamine: results from the infant development, environment, and lifestyle study. J Pediatr 2010;157(02):337–339
26 Smid MC, Metz TD, Gordon AJ. Stimulant use in pregnancy: an under-recognized epidemic among pregnant women. Clin Obstet Gynecol 2019;62(01):168–184
27 Cutts DB, Meyers AF, Black MM, et al. US Housing insecurity and the health of very young children. Am J Public Health 2011;101 (08):1508–1514
28 Drennen CR, Coleman SM, Ettinger de Cuba S, et al. Food insecurity, health, and development in children under age four years. Pediatrics 2019;144(04):e20190824
29 Gadson A, Akpovi E, Mehta PK. Exploring the social determinants of racial/ethnic disparities in prenatal care utilization and maternal outcome. Semin Perinatol 2017;41(05):308–317
30 Beck AF, Edwards EM, Horbar JD, Howell EA, McCormick MC, Pursley DM. The color of health: how racism, segregation, and inequality affect the health and well-being of preterm infants and their families. Pediatr Res 2020;87(02):227–234
31 Lorch SA, Enlow E. The role of social determinants in explaining racial/ethnic disparities in perinatal outcomes. Pediatr Res 2016; 79(1–2):141–147
32 Rijbroek B, Strating MMH, Konijn HW, Huijsman R. Child protection cases, one size fits all? Cluster analyses of risk and protective factors. Child Abuse Negl 2019;95:104068