IC 7. Health Disparities, Prematurity, and Cerebral Palsy: Opportunities and Challenges. Michael E. Msall, MD; Leslie I. Rubin, MD

Despite advances in obstetrics and neonatal medicine, high rates of prematurity disproportionately impact families experiencing poverty and social disadvantage. Though rates of survival have dramatically increased for very preterm and extremely preterm infants, there are high rates of cerebral palsy and neurodevelopmental disabilities in survivors. Post hospital discharge, these children from low income, minority and underserved communities often experience barriers to medical, therapeutic, educational and vocational services. We will examine how the ICF model of functioning and participation can be a useful framework or understanding health, development, and life-course trajectories. Through active participation of attendees, we will develop strategies to begin to reduce disparities in services while promoting health equity among the most vulnerable children in our society.

Learning Objectives:
1) To review current population data on health disparities and prevalence of prematurity.
2) To examine current neurodevelopmental outcomes after prematurity in relation to health disparities.
3) Through audience participation, to develop key indicators of health, development, rehabilitation, and family supports that increase resiliency in settings of adversity.
4) To discuss advocacy strategies to promote health equity among the most vulnerable children in our society.


Abstract

OBJECTIVE:
To determine whether risk factors associated with grade 2-4 intraventricular hemorrhage (IVH) differs between infants of African ancestry and white infants.

STUDY DESIGN:
Inborn, appropriate for gestational age infants with birth weight 500-1250 g and exposure to at least 1 dose of antenatal steroids were enrolled in 24 neonatal intensive care units. Cases had grade 2-4 IVH and controls matched for site, race, and birth weight range had 2 normal ultrasounds read centrally. Multivariate logistic regression modeling identified factors associated with IVH across African ancestry and white race.

RESULTS:
Subjects included 579 African ancestry or white race infants with grade 2-4 IVH and 532 controls. Mothers of African ancestry children were less educated, and white case mothers were more likely to have more than 1 prenatal visit and multiple gestation (P ≤ .01 for all). Increasing gestational age (P = .01), preeclampsia (P < .001), complete antenatal steroid exposure (P = .02), cesarean delivery (P < .001), and white race (P = .01) were associated with decreased risk for IVH. Chorioamnionitis (P = .01), 5-minute Apgar score <3 (P < .004), surfactant use (P < .001), and high-frequency ventilation (P < .001) were associated with increased risk for IVH. Among African ancestry infants, having more than 1 prenatal visit was associated with decreased risk (P = .02). Among white infants, multiple gestation was associated with increased risk (P < .001), and higher maternal education was associated with decreased risk (P < .05).

CONCLUSION:
The risk for IVH differs between infants of African ancestry and white infants, possibly attributable to both race and health care disparities.


BACKGROUND: Large disparities in adverse birth outcomes persist between African American and white women in the US despite decades of research, policy, and public health intervention. Allostatic load is an index of dysregulation across multiple physiologic systems that results from chronic exposure to stress in the physical and socio-cultural environment which may lead to earlier health deterioration among racially or socio-economically disadvantaged groups. The purpose of this investigation was to examine relationships between maternal biomarkers of allostatic load prior to conception and the occurrence of preterm birth and small for gestational age infants among a cohort of white and African American women participants in the Bogalusa Heart Study.

METHODS: Data from women participants were linked to the birth record of their first-born infant. Principal components analysis was used to construct an index
of allostatic load as a summary of the weighted contribution of nine biomarkers representing three physiologic domains: cardiovascular, metabolic, and immune systems. A series of Poisson regression models based on samples ranging from 1467 to 375 women were used to examine race, individual biomarkers of allostatic load, and quartiles of the allostatic load index as predictors of preterm birth (n = 150, 10.2%) and small for gestational age (n = 135, 9.2%).

RESULTS: There was no evidence of a relationship between maternal preconception allostatic load and either adverse birth outcome in this sample. Further, there was no evidence of effect modification of by race or education.

CONCLUSIONS: More work is needed in understanding the biological mechanisms linking social inequities to racial disparities in adverse birth outcomes.

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BACKGROUND: Birthweight and gestational age are associated with socioeconomic deprivation, but the evidence in relation to temporal changes in these associations is sparse. We investigated changes in the associations between socioeconomic status (SES) and birthweight and gestational age in Newcastle upon Tyne, North of England, during 1961-2000.

METHODS: We used population-based data from hospital neonatal records on all singleton births to mothers resident in Newcastle (births with complete covariate information n = 113,182). We used linear regression to analyse the associations between neighbourhood SES and birthweight over the entire 40-year period and by decade, and logistic regression for associations with low birthweight (LBW) and preterm birth, adjusting for
potential confounders.

RESULTS: There was a significant interaction between SES and decade of birth for birthweight (p = 0.028) and preterm birth (p < 0.001). Socioeconomic gradients were similar in each decade for birthweight outcomes, but for preterm birth, socioeconomic disparities were more evident in the later decades [for 1961-70, odds ratio (OR) was 1.1, 95% CI 0.9, 1.3, for the most deprived versus the least deprived quartile, while for 1991-2000, the corresponding OR was 1.5, 95% CI 1.3, 1.7]. In each decade, there was a significant decrease in birthweight adjusted for gestational age for the most deprived compared to the least deprived SES group [1961-1970: -113.4 g (95% CI-133.0, -93.8); 1991-2000: -97.5 g (95% CI-113.0, -82.0)], while there was a significant increase in birthweight in each SES group over time.

CONCLUSIONS: Socioeconomic inequalities did not narrow over the four decades for birthweight and widened for preterm birth. Mean birthweight adjusted for gestational age increased in all socioeconomic groups, suggesting an overall increase in fetal growth.

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Abstract

BACKGROUND:
Cerebral palsy (CP) is a nonprogressive neurologic disorder. Anecdotal evidence suggests there are worse outcomes in this population after common operative procedures like appendectomy. This study aims to classify whether there are relevant disparities in postoperative outcomes in CP versus non-CP patients after open or laparoscopic appendectomy.

METHODS:
Hospital discharge data from the 2003-2009 weighted Nationwide Inpatient Sample were used. Unadjusted and adjusted multiple logistic regression
were used to assess postoperative complications, as well as inpatient mortality, average duration of hospital stay, and cost.

RESULTS:
Approximately 1,250 patients with CP met the inclusion criteria. After adjusted analysis, CP patients displayed significantly greater odds of the following postoperative complications: Sepsis/organ failure, operation-related infection, pneumonia, urinary tract infection, and acute respiratory distress syndrome. Patients with CP also had a greater cost and in-hospital stay after appendectomy.

CONCLUSION:
Patients with CP have greater adjusted odds of complications after open or laparoscopic appendectomy. The mechanisms that led to these disparities need to be studied and may include difficulties in patient assessment and communication. Additional education of healthcare providers to improve recognition of symptoms and care for patients with disabilities may be more immediately helpful in decreasing disparities in outcomes.


Abstract
BACKGROUND:
Previous studies of the frequency of cerebral palsy in the United States have found excess prevalence in black children relative to other groups. Whether the severity of cerebral palsy differs between black and white children has not previously been investigated.

METHODS:
A population-based surveillance system in 4 regions of the United States identified 476 children with cerebral palsy among 142,338 8-year-old children in 2006. Motor function was rated by the Gross Motor Function Classification System and grouped into 3 categories of severity. We used multiple imputation to account for missing information on motor function and calculated the race-specific prevalence of each cerebral palsy severity level.

RESULTS:
The prevalence of cerebral palsy was 3.7 per 1000 black children and 3.2 per 1000 white children (prevalence odds ratio [OR] = 1.2 [95% confidence interval = 1.0-1.4]). When stratified by severity of functional limitation, the racial disparity was present only for severe cerebral palsy (black vs. white
prevalence OR=1.7 [1.1-2.4]). The excess prevalence of severe cerebral palsy in black children was evident in term and very preterm birth strata.

CONCLUSION:

Black children in the United States appear to have a higher prevalence of cerebral palsy overall than white children, although the excess prevalence of cerebral palsy in black children is seen only among those with the most severe limitations. Further research is needed to explore reasons for this disparity in functional limitations; potential mechanisms include racial differences in risk factors, access to interventions, and under-identification of mild cerebral palsy in black children.


Abstract

We examine racial differences in health-related quality of life (HRQoL) among 2- and 3-year-olds born very low birthweight (VLBW, <1500 g). The sample included 611 children (290 males and 321 females) from the Newborn Lung Project, a cohort of VLBW infants hospitalized in Wisconsin's newborn intensive care units during 2003 to 2004. Of the 611 children, 14% (86/611) were black, non-Hispanic and 86% (525/611) were white, non-Hispanic and 4% (23/611) had cerebral palsy. HRQoL was measured using the Pediatric Quality of Life Inventory. Black children scored nearly four points lower (mean difference -3.6, 95% confidence interval [CI]: -6.9 to -0.3) on HRQoL than their white peers. Cerebral palsy is associated with lower HRQoL (mean difference -24.4, 95% CI: -29.3 to -19.5), especially among black children, but does not explain racial differences in HRQoL. Living in a neighborhood with lowest levels of female education is associated with lower HRQoL (mean difference -5.6, 95% CI: -9.2 to -2.1), but does not explain the racial difference in HRQoL.


Abstract

BACKGROUND: Over the last decades, there have been great advances in health care delivered to children with chronic conditions, but not all children have benefitted equally from them.
OBJECTIVES: To describe health inequities experienced by children with chronic health conditions.

METHODS:
We performed a literature review of English-language studies identified from the Medline, Centers for Disease Control and Prevention, National Cancer Institute, and Cystic Fibrosis Foundation Web sites that were published between January 1985 and May 2009, included children aged 0 to 18 years, and contained the key words "incidence," "prevalence," "survival," "mortality," or "disparity" in the title or abstract for the following health conditions: acute leukemia, asthma, attention-deficit/hyperactivity disorder (ADHD), autism spectrum disorders, cerebral palsy, cystic fibrosis, diabetes mellitus, Down syndrome, HIV/AIDS, major congenital heart defects, major depressive disorder, sickle cell anemia, spina bifida, and traumatic brain injury.

RESULTS:
Black children had higher rates of cerebral palsy and HIV/AIDS, were less likely to be diagnosed with ADHD, had more emergency department visits, hospitalizations, and had higher mortality rates associated with asthma; and survived less often with Down syndrome, type 1 diabetes, and traumatic brain injury when compared with white children. Hispanic children had higher rates of spina bifida from Mexico-born mothers, had higher rates of HIV/AIDS and depression, were less likely to be diagnosed with ADHD, had poorer glycemic control with type 1 diabetes, and survived less often with acute leukemia compared with white children.

CONCLUSIONS:
Serious racial and ethnic health and health care inequities persist for children with chronic health conditions.


Abstract
BACKGROUND:
With 80% of children with disabilities living in resource-poor settings, it is likely that there is a high prevalence of cerebral palsy (CP) and neurological impairment in these settings. The prevalence and incidence rates of disability, in particular of children with CP in resource-poor settings, are difficult to access and clarify.

AIM:
To review the recent literature relating to the prevalence, incidence, type and aetiology of cerebral palsy in low-income settings.

METHODS:
A systematic search of studies published between 1990 and 2009 was performed using PubMed, Cinahl on Ovid, the Cochrane database, SCOPUS and information from international disability organisations. All studies with information about neurodisability, CP or disability in resource-poor settings were included. Titles and/or abstracts of all studies were reviewed and full texts of relevant studies were obtained.

RESULTS:
Disparities in methodology, age range, classification systems and populations made studies difficult to compare. Population-based studies provided rates of childhood disability of 31-160/1000. When using limited age ranges of 2-9 years with the Ten Question Questionnaire, rates were 82-160/1000 for children disability and 19-61/1000 for neurological impairment. Rates of CP in population-based settings in China and India gave figures of 2-2.8/1000 births, similar to western settings. Hospital-based studies of CP showed increased rates of spastic quadriplegia rather than diplegia or hemiplegia and possibly increased rates of meningitis, jaundice and asphyxia and lower rates of low birthweight and prematurity in CP populations. These studies were small and not case-controlled or population-based.

CONCLUSIONS:
Rates of CP and neurological impairment are difficult to obtain in resource-poor settings. Methods of identifying children with CP and causal factors and the effects of disability need to be better classified in order to improve management and help shape preventive measures.


Abstract

OBJECTIVES: To explore the communication skills of children with cerebral palsy (CP) at 24 months' corrected age with reference to typically developing children, and to determine the relationship between communication ability, gross motor function, and other comorbidities associated with CP.

DESIGN: Prospective, cross-sectional, population-based cohort study.

SETTING: General community.

PARTICIPANTS: Children with CP (N=124; mean age, 24mo; functional
severity on Gross Motor Function Classification System [GMFCS]: I=47, II=14, III=22, IV=19, V=22).

**INTERVENTIONS:**
Not applicable.

**MAIN OUTCOME MEASURES:**
Parents reported communication skills on the Communication and Symbolic Behavior Scales Developmental Profile (CSBS-DP) Infant-Toddler Checklist. Two independent physiotherapists classified motor type, distribution, and GMFCS. Data on comorbidities were obtained from parent interviews and medical records.

**RESULTS:**
Children with mild CP (GMFCS I/II) had mean CSBS-DP scores that were 0.5 to 0.6 SD below the mean for typically developing peers, while those with moderate-severe impairment (GMFCS III-V) were 1.4 to 2.6 SD below the mean. GMFCS was significantly associated with performance on the CSBS-DP (F=18.55, P<.001), with gross motor ability accounting for 38% of the variation in communication. Poorer communication was strongly associated with gross motor function and full-term birth.

**CONCLUSIONS:**
Preschool-aged children with CP, with more severe gross motor impairment, showed delayed communication, while children with mild motor impairment were less vulnerable. Term-born children had significantly poorer communication than those born prematurely. Because a portion of each gross motor functional severity level is at risk, this study reinforces the need for early monitoring of communication development for all children with CP.

Links
3. [http://www.businessgrouphealth.org/pub/f314b76e-2354-d714-5142-0b6fe2192d60](http://www.businessgrouphealth.org/pub/f314b76e-2354-d714-5142-0b6fe2192d60)
5. [http://www.cdc.gov/mmwr/preview/mmwrhtml/su6203a22.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/su6203a22.htm)