Intimate Partner Violence Increases Adverse Outcomes at Birth and in Early Infancy

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Objective To determine the effect of intimate partner violence (IPV) on birth outcomes and infant hospitalization.
Study design Hospitalization records for the first 4 months of life for infants born in the Military Health System in 2006-2007 were linked to Family Advocacy Program–substantiated cases of IPV among military parents. Adverse outcomes were identified using *International Classification of Diseases*, *Ninth Revision* codes. Logistic regression modeling calculated the OR of children exposed to IPV experiencing adverse outcomes.
Results A total of 204 546 infants were born during the study period. Among these, 173 026 infants (85%) were linked to active duty military parents. 31 603 infants (18%) experienced adverse outcomes, and 3059 infants (1.8%) were born into families with IPV. The infants exposed to IPV had a 31% increased odds of experiencing adverse outcomes compared with infants without known IPV exposure. IPV exposure increased the odds of the following outcomes: prematurity (OR, 1.45; 95% CI, 1.29-1.62), low birth weight (OR, 1.57; 95% CI, 1.25-1.97), respiratory problems (OR, 1.17; 95% CI, 1.04-1.32), neonatal hospitalization (OR, 1.39; 95% CI, 1.20-1.61), and postneonatal hospitalization (OR, 1.52; 95% CI, 1.29-1.81). After controlling for prematurity and demographic variables, IPV exposure was associated with low birth weight (OR, 1.52; 95% CI, 1.16-1.99), neonatal hospitalization (OR, 1.24; 95% CI, 1.02-1.49), and postneonatal hospitalization (OR, 1.27; 95% CI, 1.03-1.56).
Conclusion Infants exposed to IPV are more likely to experience adverse birth outcomes and infant hospitalization. Routinely addressing IPV during prenatal and early pediatric visits may potentially prevent these adverse outcomes. *(J Pediatr 2014;165:1034-9)*.

Intimate partner violence (IPV) is a widespread and pervasive problem in the US, with 1 in 4 women and 1 in 13 men experiencing violence perpetrated by an intimate partner in their lifetime.[1] The impact of IPV is not isolated to adults; each year, it's estimated that between 3.3 and 10 million children in the US are exposed to parental IPV.[2] The risk of IPV exposure may be increased for children in military families. The Family Advocacy Program (FAP), a military-wide organization that investigates and documents reported cases of IPV, reports rates of 11.2-16.5 cases per 1000 military couples between 2001 and 2010.[3] These military rates of IPV are substantially higher than the national estimate of 3.6 cases of IPV per 1000 women in 2010.[4] In addition, the prevalence and severity of IPV may be increased in families that experience multiple combat deployments.[5,6]

The negative impact of IPV on children can be evident at birth, with studies reporting an increased risk of preterm birth and low birth weight (LBW) in infants exposed to IPV.[7-14] Parental IPV has been associated with a 37%-314% increased risk of preterm birth.[7,9,14] Infants born in families with IPV have an almost 4-fold increased incidence of LBW[9,12-14] and lower mean birth weight.[11] A meta-analysis of 30 studies examining the relationship between IPV exposure and birth outcomes reported a 46% increased risk of prematurity and a 53% increased risk of LBW in neonates exposed to IPV.[10] A separate meta-analysis of 8 studies found that infants exposed to IPV had a 40% increased risk of being born LBW.[8]

The current body of research indicates a relationship between IPV exposure in utero and adverse birth outcomes, although research gaps remain.[7-14] One study has reported an independently increased risk of LBW in both term and preterm infants exposed to IPV.[12] The large majority of existing IPV research depends on self-report surveys to identify victims of IPV, which is subject to reporter bias and can represent a wide range of violent behaviors.[7,11-14] In addition, some larger studies have been limited in the scope of the geographic location of the surveyed populations.[7,9] Research on the impact of IPV at birth and in children as young as 18 months has been published, although data on the period between birth and preschool age are limited.[15,16]

CM	Child maltreatment
EDIPN	Electronic data interchange patient number
FAP	Family Advocacy Program
FY	Fiscal year
IPV	Intimate partner violence
LBW	Low birth weight
TMA	Tricare Management Activity

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The US military provides a unique population in which to investigate the relationship between IPV and adverse health outcomes. The Military Health System provides universal healthcare, minimizing access to care bias, and maintains comprehensive medical records that facilitate examination of birth, neonatal, and infant health outcomes. The FAP, which acts like a military child protective service, identifies and treats IPV and child maltreatment (CM) in the military and maintains records of verified IPV adjudicated by FAP. The maintenance and linkage of health and IPV records provides a unique opportunity to explore the relationship between parental IPV and infant health. We hypothesize that parental IPV exposure negatively affects infant health from birth into the first few months of life.

Methods

Infant healthcare data were obtained from the Tricare Management Activity (TMA), which oversees healthcare delivery for US military personnel and their families in the US and abroad. The TMA maintains records of all inpatient hospitalizations and outpatient visits for enrollees, including care received from both military and civilian providers. Birth hospitalization records for infants born in fiscal year (FY) 2006 and 2007 (October 1 to September 30) were identified, and inpatient hospitalization data for the first 4 months of life were extracted. A unique identifier, the electronic data interchange patient number (EDIPN), common to all Department of Defense databases, was used to link hospitalization and family IPV data. All patients without an EDIPN and all patients who could not be linked to an active duty military parent were excluded.

Adverse infant outcomes were suggested by existing research on the effects of adversity and IPV on infant health. Adverse outcomes studied included preterm birth, LBW, respiratory conditions, hypoxia and/or birth asphyxia, extended hospitalization or readmission during the neonatal period, and hospital readmission outside of the neonatal period, as well as a composite indicator of any adverse birth outcome. Outcome variables were identified by *International Classification of Diseases*, *Ninth Revision* codes and categorized using the Agency for Healthcare Research and Quality's Clinical Classification System,[17] which includes 18 diagnostic groupings including "certain conditions occurring during the perinatal period." Subcategories of this group included preterm birth, LBW, diagnosis of a respiratory condition, and hypoxia and/or birth asphyxia. Preterm birth was defined by *International Classification of Diseases*, *Ninth Revision* codes for prematurity, and LBW was defined as birth weight <2500 g based on standard clinical definitions.[18] Diagnosis of a respiratory condition included Clinical Classification System subcategories for respiratory distress syndrome and other respiratory conditions of the fetus and newborn. Extended neonatal hospitalization was defined as initial birth hospitalizations of ≥4 days or hospital readmissions in the first 28 days of life. Extended hospitalization was defined as ≥4 days based on published reports of average hospital length of stay after birth of 46-74 hours.[19] Hospital readmission outside of the neonatal period was defined as any readmission to the hospital after 28 days of life and up to 4 months of life. The standard definition of the first 28 days of life was considered the neonatal period.[18] All extended hospital stays and readmissions for a primary diagnosis of jaundice were excluded.

Data on IPV incidents occurring in FY 2002-2009 were provided by the Office of the Deputy Assistant Secretary's (Military Community and Family Policy) Pentagon FAP Office. The FAP is a military-wide family violence prevention and treatment agency similar to Child Protective Services that identifies, investigates, adjudicates, and treats IPV and CM victims and offenders. Like Child Protective Services, an FAP investigation of IPV involves a referral, examination of evidence, and an official judgment (substantiation) on the occurrence of IPV or CM. The FAP maintains a database of all substantiated cases of IPV and CM and provides a unique, externally substantiated indicator of IPV extending across jurisdictions. Even though this method may exclude some cases, it ensures occurrence of IPV in confirmed cases and sets a consistent definition of violence across cases. Children born to active duty parents with founded IPV incidents (identified by parent's EDIPN) were identified as categorically exposed to parental IPV. Although IPV behavioral patterns are regularly present before an incident's substantiation, and continue after involvement of formal systems, we limited IPV incidents in this study to those occurring in FY 2005-2007 to ensure close proximity of IPV to each infant's birth.[20] Sensitivity analyses with wider and more narrow periods of substantiated incidents of IPV were conducted as well.

Demographic data were provided by the Defense Manpower Data Center, which supplied military parents' age, rank, sex, and marital status. Military rank, which acts as a proxy for socioeconomic status, was dichotomized as junior military (enlisted ranks E-4 and below) or senior military (enlisted ranks above E-4, warrant officer, and officer). On average, junior enlisted personnel with dependents earn <$32 000/year.[21] Military parents were categorized by sex as well, because female military members report elevated rates of IPV, are at increased risk for IPV revictimization, and are at increased risk of experiencing IPV during pregnancy.[22-24] Infants of National Guard or Reserve personnel were not included, owing to incomplete data for this group. The study was reviewed and approved by the Institutional Review Boards of the Uniformed Services University and TMA.

Statistical Analyses

Demographic data of infants exposed to IPV and those unexposed to IPV were compared using the Student *t* test and the χ^2 statistic. Binomial logistic regression modeling was used to calculate the OR of negative infant outcomes by IPV exposure. IPV exposure was considered a fixed characteristic. Models controlling for preterm birth excluded prematurity from the composite outcome. Covariates considered for