# Inpatient Costs of Low Birth Weight and Pre-Term Infant Stays in the United States in 2008

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#### ABSTRACT

OBJECTIVES: Despite efforts to decrease the incidence of low birth weight (LBW) and pre-term infants, rates for these conditions have continued to rise in recent years. The objective of this study was to determine the recent prevalence of and burden associated with hospitalizations among LBW and pre-term infants in the United States (US).

METHODS: This study used data from the 2008 Healthcare Cost and Utilization Project Nationwide Inpatient Sample. Hospital stays were selected for inclusion if the patient was aged ≤1 year old. Stays were broken into three categories: LBW/pre-term stays (any diagnosis with an ICD-9-CM code of 764.xx 765.xx, and V21.3x), uncomplicated newborn stays (primary diagnosis with an ICD-9-CM code between V30 and V39.2), and all other infant stays. LBW/preterm stays were stratified by infants weighing less than or greater then 2.500 grams. Study measures were weighted and included demographics, hospital characteristics, length of stay (LOS), and costs.

RESULTS: In 2008 there were 499,473 stays for LBW/pre-term infants, representing 10% of all infant stays. The average LOS for LBW/pre-term infants was 11.9 days, versus 2.4 days among infants with an uncomplicated newborn stay, and 4.2 days among all other infant stays. LBW/pre-term infant stays resulted in costs of more than \$9.7 billion, or approximately 45% of all costs for all infant stays, and nearly 1.7 times the costs of uncomplicated newborn stays. LBW/pre-term Infants with a birth weight less than 2,500 grams had costs that were approximately 3.9 times greater than costs for LBW/pre-term infants with a birth weight greater then 2.500 grams (mean (SEI \$23.382 [\$1.220]) versus \$5.952 [\$350]) among patients with a birth weight less than versus greater than 2,500 grams, respectively).

CONCLUSIONS: While LBW/pre-term infant stays represent a small percentage of all infant hospitalizations, they accrue almost half of all inpatient costs

#### BACKGROUND

- · Prematurity is the leading cause of neonatal mortality and a major cause of pediatric morbidity and disability.1
- The rates of pre-term birth (<37 completed weeks of gestation) in the United States are significantly higher than in most</li> major industrialized countries and have been steadily increasing to the current level of 12.3% of all 4 million annual births.2
- Despite advancements in technologies and treatments in the past decade, the incidence of severe acute complications for low birth weight (LBW)/pre-term infants have not markedly diminished since the mid-1990s.
- · Although research evaluating the economic impact of LBW/pre-term infants has previously been conducted, these studies focused on older data sets (the most recent being 2001).3

#### **OBJECTIVE**

The primary objective of this research was to compare demographics, length of stay (LOS), and costs for LBW/preterm infant hospital stays versus uncomplicated and all other infant stays in the US in 2008.

#### **METHODS**

- Data were taken from the 2008 Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS), a nationally representative inpatient database sponsored by the Agency for Healthcare Research and Quality.4
- The NIS is the largest all-payer inpatient care database in the US: the dataset contains information for nearly 8 million hospital stays, drawn from approximately 1,000 surveyed inpatient facilities
- Data collected includes age, gender, race, paver type, admission source, admission type, geographic region, hospital status. year admitted, length of stay, and total charges.
- . Stays for infants aged ≤1 year were selected for inclusion, and stratified as follows:
  - > LBW/pre-term infant stays: any diagnosis with an ICD-9-CM code of 764.xx, 765.xx, and V21.3x
  - The fifth digit of the ICD-9-CM code was used to assess infant weight ≥2,500 grams and <2,500 grams)</li>

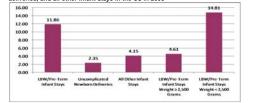
  - > Uncomplicated newborn deliveries: primary ICD-9-CM diagnosis between V30.xx and V39.2x
- > All other infant stavs
- . Study measures included patient demographics, length of stay, and costs
- Total charges were converted to costs using hospital-specific cost-to-charge ratios
- · All analyses were descriptive and involved the mean (standard error) of continuous variables, and the frequency distribution for categorical variables

#### RESULTS

Table 1. Demographic, hospitalization, and facility characteristics of inpatient stays for LBW/pre-term infants, uncomplicated newborn deliveries, and all other infants in the US in 2008\*

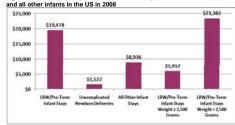
	Cohort		
	LBW/Pre-Term	Newborn Deliveries	All Other Infant Stays
	Infant Stays		
Total Sample	499,473	3,805,579	696,672
Male (%)	51.71	51.13	53.43
Race (%)			
White	41.00	42.25	39.80
Black	13.25	9.14	12.70
Other	23.20	26.84	25.57
Missing	22.55	21.75	21.93
Payer (%)			
Medicald	44.37	40.21	53.44
Private	47.96	51.17	39.14
Otherimissing	7,67	8.61	7.43
Admission Type (%)			
Emergency	3.02	0.07	43.36
Urgent	4.07	0.23	23.84
Elective	1.98	0.44	16.27
Newborn/delivery	79.35	85.07	1.37
Other/missing	11.59	14.20	15.15
Discharge Type (%)			
Routine	80.49	96.86	92.44
Short-term hospital	8.32	0.78	2.68
Home health care	7.55	2.15	3.51
Other/missing	3.63	0.21	1.37
Region (%)	110		
Northeast	16.97	16.58	19.76
Midwest	21.72	22.56	17.92
South	38.07	35.08	39.47
West	23.23	25.78	22.86
Missing	_	_	_
Urban Location (%)	91.78	88.31	88.98
Teaching hospital (%)	57.35	47.27	58.32
Hospital Bedsize (%)	77 (1)		
Small	9.27	11.59	11.79
Medium	25.94	26.85	23.15
Large	64.69	61.39	64.98
Missing	0.10	0.17	0.07

Figure 1, Length of stay, for LBW/pre-term infant stays, uncomplicated newborn deliveries, and all other infant stays in the US in 2008



## RESULTS (CONTINUED)

Figure 2. Costs, for LBW/pre-term infants, uncomplicated newborn deliveries.



- In the US in 2008, approximately 10% of all infant stays were classified as LBW/pre-term (Table 1)
- . LOS for LBW/pre-term infants was approximately 5 times longer than the LOS for uncomplicated newborn stays, and LBW/pre-term newborns weighing less than 2,500 grams had a length of stay that was approximately 3 times longer than the LOS for pre-term newborns weighing more than 2,500 grams (Figure 1).
- . Health care costs for LBW/pre-term infants were almost 13 times greater than the costs for uncomplicated newborn stays, and LBW/pre-term newborns weighing less than 2,500 grams had costs that were approximately 4 times greater than the costs for pre-term newborns weighing more than 2,500 grams (Figure 2).

#### LIMITATIONS

- · Infant hospitalizations were identified based upon ICD-9-CM diagnosis codes, which, if recorded inaccurately, may cause misidentification of events
- Physician charts were not available to confirm low-birth weight and pre-term diagnoses.
- . This study examined only US hospitals, and results may not be relevant outside the US setting.
- . Only inpatient stays were examined, therefore, results of this analysis may not be generalizable to other care

### CONCLUSIONS

- LBW/pre-term infants accrued almost \$10 billion in inpatient health care costs in 2008.
- . While LBW/pre-term infants represent only10% of infant hospitalizations, they accrue nearly 45% of all inpatient infant
- Interventions that improve outcomes among LBW/pre-term infants may result in a lower rate of rehospitalization and reduced health care costs.

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