

# Insurance-Associated Disparities in Hospitalization Outcomes of Michigan Children

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**Objective** To investigate whether children in Michigan with private insurance have better hospitalization-related outcomes than those with public or no insurance.

**Study design** Population-based hospitalization rates were calculated for newborns and children aged <18 years in Michigan for the years 2001-2006 and stratified by age, disease grouping, and health insurance status using inpatient records from the Michigan Inpatient Database and population estimates from the US Census Current Population Survey.

**Results** Michigan children with public/no insurance had significantly higher overall hospital admission rates and admission rates for ambulatory-sensitive conditions, and were more likely to be admitted through the emergency room, compared with those with private health insurance. Similarly, newborns with public/no insurance had significantly higher rates of hospitalization-related outcomes. Hospital charges per child were higher in the public/no insurance population, translating to potential excess charges of between \$309.8 and \$401.8 million in 2006.

**Conclusions** There are disparities in health outcomes and charges between Michigan children and newborns with public/no insurance and those with private health insurance, presenting a significant opportunity to improve the efficiency and efficacy of care. (*J Pediatr* 2011;158:313-8).

In 2005, ambulatory care-sensitive conditions represented 7 of the 20 leading causes of hospitalization in Michigan and >20% of all hospitalizations for children aged <18 years.<sup>1</sup> This percentage has risen progressively over the past 15 years, as has the percentage of Michigan children enrolled in Medicaid managed care (MMC) programs.<sup>2</sup> The state of Michigan has aggressively enrolled Medicaid-eligible children in statewide Health Maintenance Organizations, resulting in one of the lowest percentages of uninsured children in the United States.<sup>3,4</sup> Concurrently, physician reimbursement for children with Michigan Medicaid remained low (55%-61% of Medicare rates in 2004/2005).<sup>5</sup> With hospital, teaching, and federally qualified health clinics providing a safety net for the ever-expanding population. Although insurance can be an important enabling factor for the use of health services, its presence alone is hardly a guarantee of appropriate use or receipt of high-quality care, especially with disadvantaged children.<sup>6,7</sup>

A previous study has documented the higher morbidity, mortality, and hospital charges in children with public or no insurance compared with those with private health insurance in Colorado,<sup>8</sup> a state whose Medicaid population was primarily unassigned fee for service during the study.<sup>9-11</sup> We performed a similar type of analysis, adding newborn comparisons, in a state with a much different Medicaid population to examine whether there is state-by-state variation in these rates and to evaluate the role of type of delivery of Medicaid services in influencing these health outcomes.

## Methods

This retrospective ecological study compared population-based hospitalization rates for children in Michigan aged <18 years over the years 2001-2006 based on health insurance coverage. Hospitalization rates were determined using complete numerator data from the all-patient Michigan Inpatient Database (MIDB)<sup>12</sup> obtained from the Michigan Health and Hospital Association and denominator data based on insured population estimates obtained from the Current Population Survey (CPS) of the US Census.<sup>3</sup> Only cases with age missing were excluded. Diagnostic categories used for comparison of the pediatric age populations were created using major diagnostic categories (MDCs) and *International Classification of Diseases, Ninth Revision (ICD-9)*

APR-DRG	All-patient refined diagnosis-related grouping
CPS	Current Population Survey
DRG	Diagnosis-related group
ED	Emergency Department
HEDIS	Health Plan Employer Data and Information Set
ICD-9	<i>International Classification of Diseases, Ninth Revision</i>
MDC	Major diagnostic category
MIDB	Michigan Inpatient Database
MMC	Medicaid managed care

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diagnostic/procedural codes as described previously.<sup>8</sup> Additional categories were created for the newborn population (Table I; available at [www.jpeds.com](http://www.jpeds.com)). All primary and secondary diagnoses/procedural codes were included for classification in these diagnostic categories.

Denominator estimates of health insurance coverage for the pediatric population were obtained from the CPS produced by the US Census Bureau.<sup>3</sup> Coverage was estimated for children aged <18 years for the years 2001-2006 grouped as private insurance and public/no insurance (the total number of children aged <18 years who did not have private health insurance at any time during the given year). Denominator estimates for the pediatric population included all children aged 0-17 years. Denominator insurance data for the newborn population was determined from the MIDB as the total number of births within each insurance category during the given year, as determined from the inpatient database.

Pediatric hospitalization rates were estimated for children aged <18 years, excluding pregnancies (MDC 14) and newborns/neonates (MDC 15). Newborn hospitalization rates were determined separately using cases categorized as MDC 15 and were further defined by the presence of the ICD-9 live birth codes (V30-V39) as the primary diagnosis, admission source, and disposition. Newborns with a live birth code or with an admission source from another institution were assumed to be first admissions, and all others were assumed to be readmissions. All populations were grouped by admission year and included only patients with Michigan zip codes. Given the lack of patient identifiers in the MIDB, we were unable to adjust for recurring admissions of the same individual. Health insurance coverage for both newborn and pediatric hospitalization was grouped as "private" and "public/no" (Appendix; available at [www.jpeds.com](http://www.jpeds.com)). The public/no group was a combined group based on previous analysis<sup>8</sup> showing that treating the public or no insurance population as two separate populations inherently overestimates the hospitalization rate of those with public insurance, due primarily to hospitals' ability to retroactively qualify noninsured patients to Medicaid coverage on hospital admission without the possibility of making a similar adjustment for the denominator.

### HEDIS Data

Measurements used to gauge health plan performance for immunization and asthma care were taken from the Health Plan Employer Data and Information Set (HEDIS) report for 2006<sup>13</sup> produced for the Michigan Department of Community Health and compared with the estimated hospital admission rates for asthma and vaccine-preventable diseases.

### Outcome Variables

In the pediatric population, hospitalization rates were calculated for all hospitalizations, hospitalizations via the emergency department, high-severity hospitalizations (ie, those with an all-patient refined diagnosis-related grouping [APR-DRG] severity score >2), chronic disease, and

ambulatory-care sensitive conditions such as asthma, diabetes, psychiatric disease, vaccine-preventable disease (excluding influenza), and appendicitis associated with a ruptured appendix or peritonitis. In the newborn population, poor health outcomes included low birth weight (<2500 g), very low birth weight (<1500 g), prematurity (gestation <37 weeks), respiratory distress syndrome, intraventricular hemorrhage, bronchopulmonary dysplasia, sepsis, perinatal jaundice, hypoglycemia, and hospitalization with high APR-DRG severity (subset score >2) or risk of mortality (subset score >1). Neonate readmissions within 28 days were considered admissions and coded with MDC 15 (newborns/neonates) that did not have an ICD-9 live birth code as their primary diagnosis or hospital transfer recorded as the source of admission.

Hospital charges were estimated for the most current year (2006) only. Because hospitals are not required to report hospital charges to the MIDB, data on charges were available for only 59.3% of pediatric admissions and only 56.2% of newborn hospitalizations in 2006. To estimate pediatric hospital charges for the entire population, a sample was created by stratifying all hospitalizations by zip code. Individuals with charges reported in zip codes with a high proportion of charges reported (>80% of all hospitalizations) comprised the sample (private: n = 7394 [19.8% of total]; public/no: n = 4854 [18.8% of total]). Linear regression analysis measuring the breakdown (%) of admissions by MDC in the sample population compared with the total population in each insurance-based category was preformed to validate the use of this sample in extrapolating charges to the entire population (private:  $R^2 = 0.985$ ; public/no:  $R^2 = 0.988$ ). We assumed that some small area variation could not be accounted for. Estimated total charges were used to determine average charge per child in each insurance category; this difference, multiplied by total number of children in each population, yielded the potential excess charge difference.

### Data Analysis

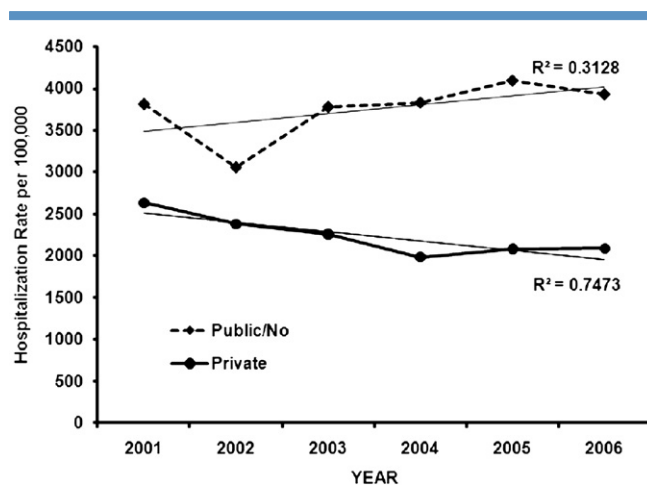
Numerator data were taken from the MIDB and grouped based on illness category. Rates were calculated for those with private insurance and those with public/no insurance for each year between 2001 and 2006 and compared using a paired-sample *t* test for comparing differences between paired means. Rate ratios between the two insurance-based populations were calculated over the years 2001-2006. Because the CPS methodology might underestimate public health insurance coverage denominators for children based on either inaccurate reporting recall or shifts from private to public/no categories during the year, rate ratios for pediatric hospitalizations were secondarily adjusted to account for denominator shifts that might increase public/no coverage estimates by 20% with a commensurate decrease in private coverage.<sup>14</sup> Newborn denominators did not require adjustment, because they were calculated based on actual births.

## Results

In 2006, the CPS estimated that 1 787 042 (73.1%) of Michigan children aged <18 years were covered by private health insurance for at least part of the year, leaving 658 559 (26.9%) children either covered by public insurance or with no insurance. These numbers represent a decrease in the privately insured population (from 77.3% to 73.1%) and an increase in the public insured/noninsured population (from 22.7% to 26.9%) over the 6-year study period. Out of the 63 261 total hospitalizations in 2006 for these children, 37 374 (59.1%) were covered by private insurance and 25 887 (40.9%) were either covered by public insurance or were not covered by insurance. In addition, from 2001 to 2006, the percentage of total births in those with public or no insurance increased from 29.6% to 41.4%, and the percentage of children aged 0-17 years increased from 22.7% to 26.9%.

### Michigan Pediatric Hospitalization Rates Beyond the Newborn Period

The **Figure** shows the growing disparity in the total hospital admission rates of the two insurance-based populations over the years 2001-2006, with an increasing rate in the public or no insurance population and decreasing rate in the privately insured population (difference in slopes,  $P < .001$ ). **Table II** shows the average of this rate difference over this time period (rate ratio, 1.68; mean rate difference, 1514 per 100 000; 95% [CI, 985-2043), along with significantly increased hospitalization rates in the public/no insurance group for emergency department (ED) admission, high-severity hospitalizations, chronic disease, asthma, diabetes, bronchiolitis, vaccine-preventable disease, and psychiatric disease. This group also had a significantly increased mortality rate.



**Figure.** Estimated Michigan hospitalization rates with fitted linear regression curves for children aged <18 years by insurance type for 2001-2006.

A comparison of these hospitalization rates demonstrated increased rate ratios, ranging from 1.47-fold to 2.26-fold higher (adjusted rate ratios, 1.14-2.04), in those with public or no insurance compared with those with private health insurance. The only comparison to not show a statistically significant difference between the two populations was the hospitalization rate for appendectomy with appendicitis (rate ratio, 0.9; 95% CI, -25.1 to 5.69); however, the percentage of these cases with ruptured appendix or with peritonitis was significantly higher (29.8% vs 23.8%; rate ratio, 1.25; 95% CI, 3.32-8.59) in the public/no insurance group. The percentage of hospitalizations admitted through the ED (49.3% vs 53.6%; rate ratio, 1.09) also was significantly higher in the public/no insurance group.

### Adverse Birth Outcomes in Michigan

**Table III** shows the rates of adverse birth outcomes in the two insurance-based newborn populations. The rate of jaundice was significantly lower (rate ratio, 0.93) in the public/no insurance group, whereas the rate of hypoglycemia (rate ratio, 1.01) did not differ significantly between the two populations. All other poor birth outcomes measured were found to be significantly higher in the public/no insurance group, with rate ratios ranging from 1.14 to 1.69.

The rate of readmission for neonatal-related problems within 28 days of birth was found to be 1.24 times higher in the public/no insurance group compared with the private insurance group. Readmissions classified by admission source also varied, with the private insurance group more often readmitted by physician referral (51.1% vs 21.8%) and the public/no insurance group more often readmitted through the ED (38.3% vs 29.4%).

### Hospital Charges

In 2006, charges per insured child in the pediatric population (excluding newborns) were significantly higher in the public/no insurance group than in the private insurance group (**Table II**), with an excess charge difference of \$464 per child (adjusted charge difference, \$271). Had the children in the public/no insurance group the same hospitalization rate as those in the private insurance group, an estimated \$305 million (adjusted, \$213 million) in excess charges in the pediatric population could have been saved in 2006.

Adverse birth outcomes in newborns in the public/no insurance group compared with those in the private insurance group translated to an 11% longer average length of stay (3.32 days vs 2.99 days) and an excess charge difference of \$481 (\$11 144 vs \$10 663) per birth in 2006. This charge difference rose to \$1787 (\$11 181 vs \$9394) when average charges were estimated based on APR-DRG severity subset score. Neonate readmissions within 28 days showed a 36.9% longer average length of stay (6.23 days vs 4.55 days) in the public/no insurance group and an excess charge difference of \$4430 (\$23 063 vs \$18 633) per neonatal readmission in 2006. These would have translated to a potential charge savings of \$96.8 million had the newborns in the

**Table II.** Population-based, category-specific hospitalization rates for Michigan children by insurance coverage, 2001-2006

Hospitalization rate (per 100 000)	Insurance, n		Mean difference (95% CI)	P	Rate ratio	Adjusted rate ratio <sup>†</sup>
	Public/none	Private				
All hospitalizations	3752	2238	1514 (985-2043)	.001	1.68	1.30
Hospitalization via ED	2016	1098	917 (563-1272)	.001	1.83	1.43
APR severity >2	536	257	278 (226-331)	<.001	2.08	1.62
Mortality rate	16.8	8.0	8.8 (5.6-12.1)	.001	2.10	1.64
Chronic disease	766	339	427 (336-517)	<.001	2.26	1.75
Asthma	373	204	169 (64.4-274)	.009	1.83	1.42
Bronchiolitis	382	146	236 (200-272)	<.001	2.62	2.04
Diabetes	84.6	53.0	31.5 (11.6-51.5)	.01	1.59	1.24
Vaccine-preventable disease	51.7	25.3	26.4 (13.3-39.5)	.004	2.05	1.59
Psychiatric disease	100	68.9	32.0 (22.1-42.0)	<.001	1.47	1.14
Appendectomy	82.7	92.4	-9.7 (-25.1 to 5.7)	.166	0.90	0.70
ED admission, %	53.6	49.3	4.3 (2.1-6.5)	.004	1.09	
Ruptured appendix, %	29.8	23.8	6.0 (3.3-8.6)	.002	1.25	
Charges per insured, \$,*	937	473	464		1.98	
Adjusted charges per insured, \$,*	781	510	271			1.53

\*2006 only.

†Adjusted to account for denominator shifts that might increase public/no insurance coverage estimates by 20% between 2001 and 2006.

public/no insurance group the same hospital charges as those in the private insurance group.

Overall, excess hospital charges for publicly insured newborn and pediatric patients in Michigan were estimated to be exceed \$401.8 million (adjusted, \$309.8 million) in 2006 alone.

### HEDIS Results

In 2006, each of the 15 MMC plans in Michigan scored above the high-performance level in the HEDIS measurement for use of the appropriate medication for asthma in children aged 5-9 years and those aged 10-17 years (data not shown), yet the asthma-related hospitalization rate was 2.23 times higher in children with public or no health insurance compared with those with private health insurance.<sup>13</sup> Similarly, 9 of 15 Michigan MMC plans scored above the high-performance level in the HEDIS measurement for childhood

immunization, but the hospitalization rates for vaccine-preventable diseases were 2.05 times higher in children with public or no insurance.

## Discussion

This study documents increased rates of morbidity, mortality, and hospital charges for both newborns and children with public/insurance compared with those with private health insurance in Michigan. A similar type of analysis was performed with similar results in Colorado,<sup>8</sup> a state whose Medicaid population was largely enrolled in unassigned fee-for-service programs rather than managed care programs,<sup>9-11</sup> with nearly 15% of children without health insurance in 2006.<sup>3</sup> This comparison is put into context considering that Michigan boasts one of the lowest percentages of uninsured children in the United States (4.7% in 2006),<sup>3</sup>

**Table III.** Category-specific rates of poor birth outcomes for Michigan newborns with birth code V30-V39 as primary diagnosis by insurance coverage, 2001-2006

Hospitalization rate per 100 000	Insurance		Mean difference (95% CI)	Rate ratio	P
	Public/none	Private			
Very low birth weight (<1500 g)	1749	1164	596 (466-726)	1.50	<.001
Low birth weight (<2500 g)	7147	5267	1883 (1550-2216)	1.36	<.001
Prematurity (<28 weeks)	8632	7556	1034 (728-1341)	1.14	<.001
Septicemia	1312	784	503 (327-679)	1.67	.001
Respiratory distress syndrome	1847	1571	265 (147-383)	1.18	.002
Intraventricular hemorrhage	443	261	172 (96.5-248)	1.69	.002
Jaundice	12 566	13 443	-1146 (-1907 to -385)	0.93	.012
Hypoglycemia	1930	1915	9.3 (-116 to 135)	1.01	.857
Bronchopulmonary dysplasia	396	274	126 (92.2-160)	1.44	<.001
Wet lung syndrome	4418	4121	310 (189-431)	1.07	.001
APR severity > 2	5570	4613	943 (596-1289)	1.21	.001
Risk of mortality > 1	2655	2036	721 (415-1028)	1.30	.002
Died in hospital	618	400	223 (167-278)	1.54	<.001
Readmission within 28 days	2578	2071	505 (250-760)	1.24	.004

with primarily a managed care–based Medicaid population.<sup>2</sup> With this type of analysis, a lower proportion of uninsured children translates to a more accurate comparison between the private and publicly insured populations. Whereas Colorado's uninsured population made up nearly 50% of the children with public or no insurance in 2006,<sup>3</sup> uninsured children in Michigan composed <20% of this combined population. As in Colorado, in Michigan there appears to be a disparity between public/no insurance and private insurance populations for many ambulatory-sensitive hospitalization outcomes, with significantly higher crude hospitalization rates for asthma (rate ratio, 2.23), diabetes (1.92), vaccine-preventable disease (2.05), and ruptured appendix as a percentage of all appendectomies for appendicitis (1.35) in 2006.

Over the study period, Michigan has consistently had a very high percentage of Medicaid children enrolled in managed care plans<sup>2</sup> and has shown continual yearly improvements in HEDIS performance measurements.<sup>13</sup> Some have suggested that improvements in HEDIS measurements do not necessarily translate directly to improved quality of care or health outcomes,<sup>15,16</sup> and our findings seem to support this statement. Notably, the children with asthma in the public/no insurance group showed a high ambulatory compliance with the prescription for appropriate medication but significantly higher admission rates for asthma than those in the private insurance group. This type of analysis does not permit a cause-and-effect conclusion or clarify how outcomes can be improved. Rather, it describes a growing disparity in hospitalization rates between the recipients of these two methods of providing health insurance and, in doing so, identifies a disconnect between measures being used to gauge health plan performance and the actual health outcomes of children.

Unlike some hospitalizations in the pediatric population, births cannot be viewed as preventable events. However, the disparity in outcome rates associated with hospitalization rates for newborns with public or no health insurance compared with those with private health insurance documented in the present study is consistent with similar disparities noted for older children and adds significantly to the aggregate excess pediatric morbidity and charges (estimated as between \$309.8 and \$401.8 million in Michigan in 2006). At the same time, this calculation clearly underestimates the magnitude of other potential savings resulting from excess ED charges, time off work, lost wages, and decreased parental productivity.

There is an urgent need for more robust and transparent data sources if we are to understand and remedy the causes of these disparities in outcome. Quality improvement depends on accurate measures to distinguish causes from confounders (eg, cultural differences in health-seeking behaviors, geographic access differences, poverty, educational status). Adequate population-based risk-adjustment data (eg, race/ethnicity, sociodemographic factors) are virtually unavailable in large datasets. Up to now, population estimates for the number of Michigan children in all insurance categories could only be approximated from the US Census

Bureau's CPS data. This likely has resulted in overestimates of excess charges and morbidity, considering that some children move in and out of insured status during a given year.<sup>17,18</sup> However, this does not imply that all estimates of hospitalization rates are inherently unreliable. Even when adjusted to a 20% increase in the estimate for public/no coverage and a commensurate decrease in private coverage estimates, our rate ratios for hospitalization rates are still higher in the public/no insurance group and similar to rate ratio disparities for newborns in Michigan with more accurate population estimates. In addition, our results show disparities for hospitalization rates for many ambulatory-sensitive conditions (including ruptured appendix) but not for appendicitis, which could be considered an internal validity control.

Because of these inherent data limitations, it is difficult to precisely predict the impact of approaches to reduce risks, improve outcomes, and reduce avoidable charges. Although some of these differences can be alleviated by improved access to timely preventive and acute primary care, other improvements will require a better understanding of the genetic and cultural differences in disease burden and health-seeking behaviors. The necessary structures and processes need to be committed to providing uniformly high standards of care for all children with accurate outcome measurement and analysis. Until then, disparities in hospitalization rates will remain as some children are subjected to poorer health outcomes at a significantly higher cost to businesses, the state, and the general population. ■

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## 50 Years Ago in *THE JOURNAL OF PEDIATRICS*

### Diamox in Epilepsy

Chao DH, Plumb RL. *J Pediatr* 1961;58:211-8.

Fifty years ago in *The Journal*, Chao and Plumb described 178 children with epilepsy treated with the drug acetazolamide (Diamox) at the Blue Bird Clinic in Houston, Texas. They cited the role of pre-clinical testing and molecular screening in animal models of epilepsy. They also reviewed the development of hypotheses about putative mechanisms of action for the family of drugs tested, sulfonamides. These substances were believed to work either directly via inhibition of carbonic anhydrase or indirectly by inducing a state of relative metabolic acidosis and dehydration. They noted that acetazolamide was rarely effective in mono therapy and most effective in combination. This is an early report about a seizure drug used as what is now commonly called “rational polytherapy.” The outcomes were clearly defined: a good response to treatment was 80% to 100% seizure control (76 children), and a fair response to treatment was 50% to 80% seizure control (44 children). This contrasts with the current view that the best outcome, on the basis of quality-of-life research, means seizure freedom.<sup>1</sup> “Genetic epilepsy” responded better than symptomatic epilepsy, although “in most cases the exact etiological factor causing the epilepsy could not be clearly established.” This will sound familiar to today’s readers.

As with many of our “modern” AEDs, acetazolamide was considered to be “relatively safe,” and “individual susceptibility was a limiting factor...”

Today, despite our much more robust knowledge about the complex mechanisms of epilepsy, we struggle to find new seizure medications that are vastly more effective than long established drugs. Many newer anti-seizure medications are “relatively safe” and have limited cognitive and behavior adverse effects (with “individual susceptibility” still a limiting factor). Rational drug design is impressive in our era, but often is still humbling. Witness the attempt to mimic the chemical structure of gamma amino butyric acid with the drug gabapentin (Neurontin) only to find it does not bind to the gamma amino butyric acid receptor.

We await the golden age of epilepsy treatment, in which linking genetic testing and drug mechanisms allow earlier, more specific treatment with the most effective medication the first time.

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**Table I.** ICD-9 definitions of clinical conditions

Category	ICD-9, MDC, or DRG codes
<b>Pediatric</b>	
Appendectomy for appendicitis	Px: 470, 470.2, 470.9; Dx: 540.0, 540.1, or 540.9
Appendectomy for appendicitis with rupture/peritonitis	Px: 470, 470.2, or 470.9; Dx: 540.0 or 540.1
Vaccine-preventable disease	
Diphtheria	032.x
Pertussis	033, 033.0, 033.9, 484.3
Tetanus	037
<i>Haemophilus influenzae</i>	320.0, 038.41, 041.5, 482.2
Varicella	052.x
Hepatitis A	070.0, 070.1
Hepatitis B	070.2, 070.3
Measles	055.x
<i>Streptococcus pneumoniae</i>	038.2, 041.2, 320.1, 481, 567.1
Psychiatric disease	MDC 19
Asthma	493.x
Diabetes	250.x
<b>Chronic disease</b>	
<b>Neuromuscular</b>	
Brain and spinal cord malformations	740.0-742.9
Mental retardation	318.0-318.2
Central nervous system degeneration and disease	330.0-330.9, 334.0-334.2, 335.0-335.9
Infantile cerebral palsy	343.0-343.9
Muscular dystrophies and myopathies	359.0-359.3
<b>Cardiovascular</b>	
Heart and great vessel malformations	745.0-747.4
Cardiomyopathies	425.0-425.4, 429.1
Conduction disorders	426.0-427.4
Dysrhythmias	427.6-427.9
Respiratory	
Respiratory malformations	748.0-748.9
Chronic respiratory disease	770.7
Cystic fibrosis	277.0
Respiratory malformations	748.0-748.9
Congenital anomalies	753.0-753.9
Chronic renal failure	585
<b>Gastrointestinal</b>	
Congenital anomalies	750.3, 751.1-751.3, 751.6-751.9
Chronic liver disease and cirrhosis	571.4-571.9
Inflammatory bowel disease	555.0-556.9
<b>Hematologic/immunologic</b>	
Sickle cell disease	282.5-282.6
Hereditary anemias	282.0-282.4
Hereditary immunodeficiency	279.00-279.9, 288.1-288.2, 446.1
Acquired immunodeficiency	0420-0421
<b>Metabolic</b>	
Amino acid metabolism	270.0-270.9
Carbohydrate metabolism	271.0-271.9
Lipid metabolism	272.0-272.9
Storage disorders	277.3-277.5
Other metabolic disorders	275.0-275.3, 277.2, 277.4, 277.6, 277.8-277.9
<b>Other congenital or genetic defect</b>	
Chromosomal anomalies	758.0-758.9
Bone and joint anomalies	259.4, 737.3, 756.0-756.5
Diaphragm and abdominal wall	553.3, 756.6-756.7
Other congenital anomalies	759.7-759.9
<b>Malignancy: malignant neoplasms</b>	140.0-208.9, 235.0-239.9
<b>Newborn</b>	
<b>Perinatal conditions</b>	
Very low birth weight	764.01-764.05, 764.11-764.15, 764.21-764.25, 764.91-764.95, 765.01-765.05, 765.11-765.15
Low birth weight	764.01-764.08, 764.11-764.18, 764.21-764.28, 764.91-764.98, 765.01-765.08, 765.11-765.18
Prematurity	DRG 386, 387, 388
Jaundice	774.x
Respiratory distress syndrome	769
Hypoglycemia	775.0, 775.6
Sepsis	038.x, 771.81
Intraventricular hemorrhage	772.10-772.14
Bronchopulmonary dysplasia	7707
Wet lung syndrome	7706

## Appendix

### Health Insurance Grouping Breakdown

**Private.** Blue Cross Blue Shield (BCBS), BCBS HMO/PPO/PPA, managed care type unknown, and other commercial insurance company/HMO/PPO/PPA

**Public/No.** Self-pay, Medicare FFS/managed care/other, Medicaid FFS/managed care/other, Title V, workers compensation, mental health contract, corrections contract, and other government source