

## V.13.2 Special Report: Maternal Hypertension Complicating Pregnancy and Neonatal Outcomes

### I. Introduction

This V13.2 Special Report provides data related to maternal hypertension complicating pregnancy and neonatal outcomes. Hypertensive disorders of pregnancy (HDP) are major causes of maternal and perinatal morbidity and mortality.

### II. Categories of Hypertensive Disorders

The National High Blood Pressure Education Program, a working group convened by the National Heart, Lung and Blood Institute of NIH, has classified hypertensive disorders into categories that identify different epidemiological characteristics, pathophysiology and associated risks.<sup>1</sup> Additions to this have been added by The American College of Obstetricians and Gynecologists through the Task Force on Hypertension in Pregnancy.<sup>2</sup>

- Preeclampsia is defined as a pregnancy-specific syndrome observed after the 20<sup>th</sup> week of pregnancy with systolic blood pressure  $\geq 140$  mmHg or diastolic blood pressure of  $\geq 90$  mmHg, accompanied by proteinuria ( $\geq 300$  mg in 24 hours or prot/Cr ratio of  $\geq 0.3$ ) or thrombocytopenia, impaired liver function, or new onset renal insufficiency without proteinuria.
- Eclampsia is the occurrence of seizures in a woman with preeclampsia that cannot be attributed to other causes.
- Gestational hypertension is defined as a blood pressure elevation detected for the first time after 20 weeks (SBP  $\geq 140$  or DPB  $\geq 90$  on 2 occasions  $> 4$  hours apart) and is distinguished from preeclampsia by the absence of proteinuria. If proteinuria develops and the hypertension resolves after pregnancy, the diagnosis is changed to preeclampsia. If the blood pressure persists after the pregnancy, the diagnosis of chronic hypertension is made.
- Chronic hypertension is an elevation in blood pressure that existed prior to the pregnancy or was identified during the pregnancy prior to 20 weeks. Since this condition may not be recognized prior to the pregnancy it may not be under medical management. The American College of Obstetricians and Gynecologists (ACOG) indicate a diagnosis of chronic hypertension should be made when the onset of hypertension occurs before the 20<sup>th</sup> week of gestation or persists  $> 12$  weeks postpartum. Women with chronic hypertension are at risk of superimposed preeclampsia (25 %), preterm delivery, fetal growth restriction or demise, abruption placentae, congestive heart failure and renal failure. The outcome for mother and infant is worse than for de novo preeclampsia

Severe preeclampsia is confirmed when any of the following criteria<sup>3</sup> are present:

- Systolic blood pressure  $\geq 160$  mmHg
- Diastolic blood pressure  $\geq 110$  mmHg (on two occasions at least 6 hours apart while the patient is on bed rest)

- Cerebral or visual functional disturbances (CNS irritability)
- Pulmonary edema or cyanosis (not due to excessive intravenous fluid replacement)
- Epigastric or right upper quadrant abdominal pain unresponsive to medication
- Progressive renal insufficiency – Cr 1.1mg/dl
- Impaired liver function on laboratory analysis (elevated AST/SGOT, ALT/SGPT, or LDH)
- Thrombocytopenia(platelet count <100,000)
- HELLP Syndrome

The pathophysiology of preeclampsia remains unclear. The placentas of women with preeclampsia are uniformly abnormal. The altered uteroplacental blood flow frequently leads to intrauterine growth restriction.<sup>4</sup> Renal alterations result in reduced GFR and renal blood flow.<sup>5</sup> Reduced renal function is present in nearly half of cases of preeclampsia even before proteinuria is found. The clinical manifestations of preeclampsia reflect widespread endothelial dysfunction with vasoconstriction and end organ ischemia.<sup>6</sup> Risk factors that increase the potential for HDP include diabetes, insulin resistance, renal disease, heart disease, vascular disease, previous preeclamptic pregnancies, first pregnancy, multiple pregnancies, autoimmune diseases, antiphospholipid syndrome, genetic thrombolytic factors or incidents, maternal age, obesity and African American race.<sup>7</sup> Gestational hypertension affects 6-17% of nulliparous women and 2-4% of multiparous women, while preeclampsia affects 5-8% of pregnancies. There is growing evidence of increased risk of cardiac disease, stroke, ischemic heart disease and type 2 diabetes in women with a history of preeclampsia.<sup>8-9</sup> One large cohort study has indicated that women with a history of preeclampsia have up to an eightfold risk for cardiovascular disease as compared to women with no history of preeclampsia.<sup>10</sup>

### III. Management of Hypertensive Disorders

International guidelines related to management of hypertensive disorders of pregnancy vary. There appears to be consensus that women with severe hypertension (defined as sustained systolic blood pressure of  $\geq 160$  mmHg and /or a diastolic blood pressure of  $\geq 110$  mmHg) should be treated with antihypertensive therapy to lower the risk of maternal complications of the central nervous system.<sup>11</sup> The ACOG Committee Opinion from 2011 emphasizes that acute onset, persistent (lasting 15 minutes or more), severe systolic  $\geq 160$  mmHg or severe diastolic  $\geq 110$  mmHg in both pregnant and postpartum women with preeclampsia constitutes a hypertensive emergency.<sup>12</sup> The most commonly used pharmacological agents for treatment are Labetalol, an alpha and beta blocker, Nifedipine, a calcium channel blocker, and Hydralazine, a direct vasodilator.<sup>13</sup>

In contrast, there is not clear evidence when to begin treatment of moderate hypertension to alter the progression of the disease.<sup>14</sup> Concerns exist regarding possible maternal/fetal adverse events from treatment. Treatment for moderate hypertension therefore varies in approach. The Control of Hypertension in Pregnancy Study (CHIPS) is currently underway to determine which approach to treatment of non-severe high blood pressure in pregnancy is best: “less tight” control (DBP of 100 mmHg) or “tight control” (DBP of 85 mmHg).<sup>15</sup> The AGOG Task Force 2013 guidelines suggest timing for delivery at diagnosis after 37 weeks for any preeclampsia or

gestational hypertension and at diagnosis after 34 weeks if severe features present. Prior to 34 weeks corticosteroids are given and timing is individualized. <sup>16</sup>

In summary, hypertensive disorders of pregnancy present significant risks to maternal/fetal wellbeing. Continued investigation related to underlying pathophysiology is essential for early detection and management. Further refinement of guidelines will assist in determining the best treatment approaches to promote the best outcomes for mother and infant.

#### IV. Description of Tables and Graphs

The tables and graphs in this special report provide data related to maternal hypertension complicating pregnancy and neonatal outcomes, including a linked mother-baby analysis. The tables in this Special Report display data for your hospital compared to the six NPIC/QAS subgroup averages and the database average. The columns displaying your hospital, your hospital's subgroup, and the database average are shaded to enhance your ability to view these comparisons. *The report includes data for discharge date range 7/1/12 – 6/30/13 and for the trend period 2008 – Q2 2013.* Medical record numbers for the cases contributing to your hospital's rates are available by emailing [mservices@npic.org](mailto:mservices@npic.org). We are also happy to answer any questions you may have regarding this report.

##### Table 1: Overview

**Section A: Total Deliveries** displays the count of total deliveries, total deliveries coded with 642.xx (hypertension complicating pregnancy, childbirth and the puerperium) and the percent of total deliveries. The average length of stay (ALOS), APR DRG case mix index (CMI), and CMI adjusted length of stay are also shown.

**Section B: Deliveries coded with 642.xx – Hypertension complicating pregnancy, childbirth and the puerperium** includes the number and percent of total deliveries coded with hypertension for codes 642.0x (benign essential hypertension) through 642.9x (unspecified hypertension), except for 642.2x (code with few cases) and 642.8x (not a code).

Codes 642.3 – transient hypertension of pregnancy, 642.4 – mild or unspecified preeclampsia, and 642.5 – severe preeclampsia are **boxed** - maternal comorbidities related to these three conditions are provided in Tables 2 – 4.

*Please note: cases may appear in more than one category, as delivery discharge records may contain more than one hypertension code. As a result, the number of deliveries in these categories sum to more than the total deliveries coded with hypertension (642.xx).*

**Graphs 1 - 3:** provide trendlines for the time period for your hospital and for the trend database for: (Graph 1) Transient hypertension of pregnancy; (Graph 2) Mild or Unspecified Preeclampsia; and (Graph 3) Severe Preeclampsia. An analysis of the stability of the trend is included at the bottom of each graph. If your hospital has not submitted data for the entire period, trendlines will only be displayed for the years that data was submitted.

Below each graph is a table which includes all the data displayed for the trend analysis period: the trend database average rate; the hospital's count of numerator and denominator cases for each year and the hospital's rate with upper and lower confidence intervals.

**Tables 2 - 4:** present the incidence of selected **Maternal Comorbidities/Complications** co-occurring with: Transient Hypertension (Table 2); Mild or Unspecified Preeclampsia (Table 3); and Severe Preeclampsia (Table 4). Each Table is continued onto a second page.

**Section A: Deliveries coded with 642.3x/642.4x/642.5x – Hypertension complicating pregnancy, childbirth and puerperium** displays the count of total deliveries with these codes, and the vaginal delivery rate and c-section delivery rate for this subset of deliveries.

The boxed section specifies the number of delivery cases for each of three categories of hypertension (Table 2: 642.3x Transient Hypertension; Table 3: 642.4x Mild or Unspecified Preeclampsia; and Table 4: 642.5x Severe Preeclampsia) and the percent of total 642.3x – 642.5x delivery cases for the category displayed.

**Section B: Maternal Comorbidities/Complications** illustrates the number of deliveries and the percent of total deliveries impacted by selected maternal comorbidities/ complications, within each of the Table specified category of hypertension. Co-morbidities/complications with a low incidence rate were not included in these tables.

*Please note: cases may appear in more than one category, as delivery discharge records may contain more than one hypertension code. As a result, the number of deliveries in these categories sum to more than the total deliveries coded with hypertension (642.xx). Length of stay may include days of care prior to delivery.*

**Tables 5 - 7: Linked Mother/Baby Analysis** presents the incidence of selected **Neonatal Outcomes** co-occurring with: Transient Hypertension (Table 5); Mild or Unspecified Preeclampsia (Table 6); and Severe Preeclampsia (Table 7).

**Section A: Deliveries coded with 642.3x/642.4x/642.5x – Hypertension complicating pregnancy, childbirth and puerperium** displays the count of total deliveries with these three codes, the number of inborns who could be linked to deliveries with these codes for this analysis, and linked inborns as a percent of the total deliveries with these codes. *The linked percent may be greater than 100% due to multiple births.*

The boxed section specifies the number of inborns linked to a delivery for each of three categories of hypertension (Table 5: 642.3x Transient Hypertension; Table 6: 642.4x Mild or Unspecified Preeclampsia; and Table 7: 642.5x Severe Preeclampsia), and the percent of total linked 642.3x – 642.5x delivery cases for the category displayed.

**Section B: Neonatal Outcomes** illustrates the number of linked inborns with selected neonatal outcomes within each of the specified categories of hypertension and percent of linked inborns within the category with the outcome.

## REFERENCES

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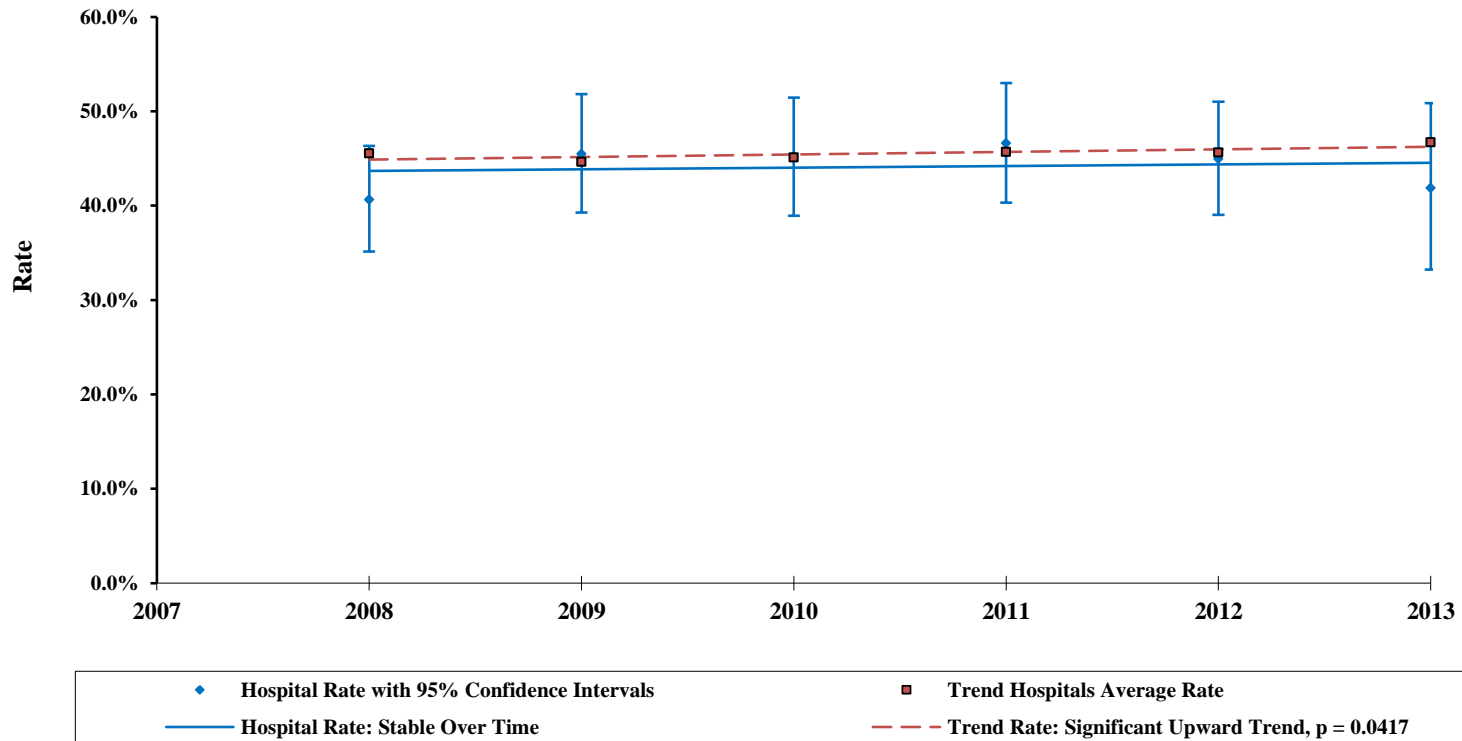
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### Table 1: Overview

	Hospital SAMPLE	Subgroup Averages						Database Average
		AR	AO	C	G	NL	NS	
<b>A. Total Deliveries</b>	2,944	4,141	3,684	8,682	2,654	3,090	770	4,107
Total Deliveries coded with 642.xx - Hypertension complicating pregnancy, childbirth and puerperium	418	561	490	987	437	298	65	500
% of total deliveries	14.2%	13.5%	13.3%	11.4%	16.5%	9.6%	8.4%	12.2%
ALOS	3.0	4.2	4.4	4.3	4.0	3.7	3.1	4.0
APR DRG Case Mix Index	0.6108	0.6095	0.6186	0.5938	0.6285	0.5751	0.5602	0.5985
CMI-Adjusted LOS	4.9	7.0	7.1	7.2	6.4	6.4	5.5	6.7
<b>B. Deliveries coded with 642.xx - Hypertension complicating pregnancy, childbirth and puerperium *</b>	<b>418</b>	<b>561</b>	<b>490</b>	<b>987</b>	<b>437</b>	<b>298</b>	<b>65</b>	<b>500</b>
642.0x - Benign essential hypertension	78	88	65	160	93	47	10	80
% of 642.xx delivery cases	18.7%	15.7%	13.3%	16.2%	21.3%	15.8%	15.4%	16.0%
642.1x - Hypertension secondary to renal disease	1	1	1	2	1	0	0	1
% of 642.xx delivery cases	0.2%	0.2%	0.2%	0.2%	0.2%	0.0%	0.0%	0.2%
<b>642.3x - Transient hypertension of pregnancy</b>	<b>115</b>	<b>207</b>	<b>169</b>	<b>385</b>	<b>132</b>	<b>127</b>	<b>21</b>	<b>187</b>
<b>% of 642.xx delivery cases</b>	<b>27.5%</b>	<b>36.9%</b>	<b>34.5%</b>	<b>39.0%</b>	<b>30.2%</b>	<b>42.6%</b>	<b>32.3%</b>	<b>37.4%</b>
<b>642.4x - Mild or unspecified preeclampsia</b>	<b>88</b>	<b>96</b>	<b>75</b>	<b>203</b>	<b>78</b>	<b>60</b>	<b>19</b>	<b>93</b>
<b>% of 642.xx delivery cases</b>	<b>21.1%</b>	<b>17.1%</b>	<b>15.3%</b>	<b>20.6%</b>	<b>17.8%</b>	<b>20.1%</b>	<b>29.2%</b>	<b>18.6%</b>
<b>642.5x - Severe preeclampsia</b>	<b>57</b>	<b>106</b>	<b>130</b>	<b>168</b>	<b>67</b>	<b>39</b>	<b>9</b>	<b>93</b>
<b>% of 642.xx delivery cases</b>	<b>13.6%</b>	<b>18.9%</b>	<b>26.5%</b>	<b>17.0%</b>	<b>15.3%</b>	<b>13.1%</b>	<b>13.8%</b>	<b>18.6%</b>
642.6x - Eclampsia	5	2	3	4	3	2	1	3
% of 642.xx delivery cases	1.2%	0.4%	0.6%	0.4%	0.7%	0.7%	1.5%	0.6%
642.7x - Preeclampsia or eclampsia superimposed on preexisting hypertension	50	45	43	66	48	15	4	38
% of 642.xx delivery cases	12.0%	8.0%	8.8%	6.7%	11.0%	5.0%	6.2%	7.6%
642.9x - Unspecified hypertension	27	21	18	28	21	11	3	18
% of 642.xx delivery cases	6.5%	3.7%	3.7%	2.8%	4.8%	3.7%	4.6%	3.6%

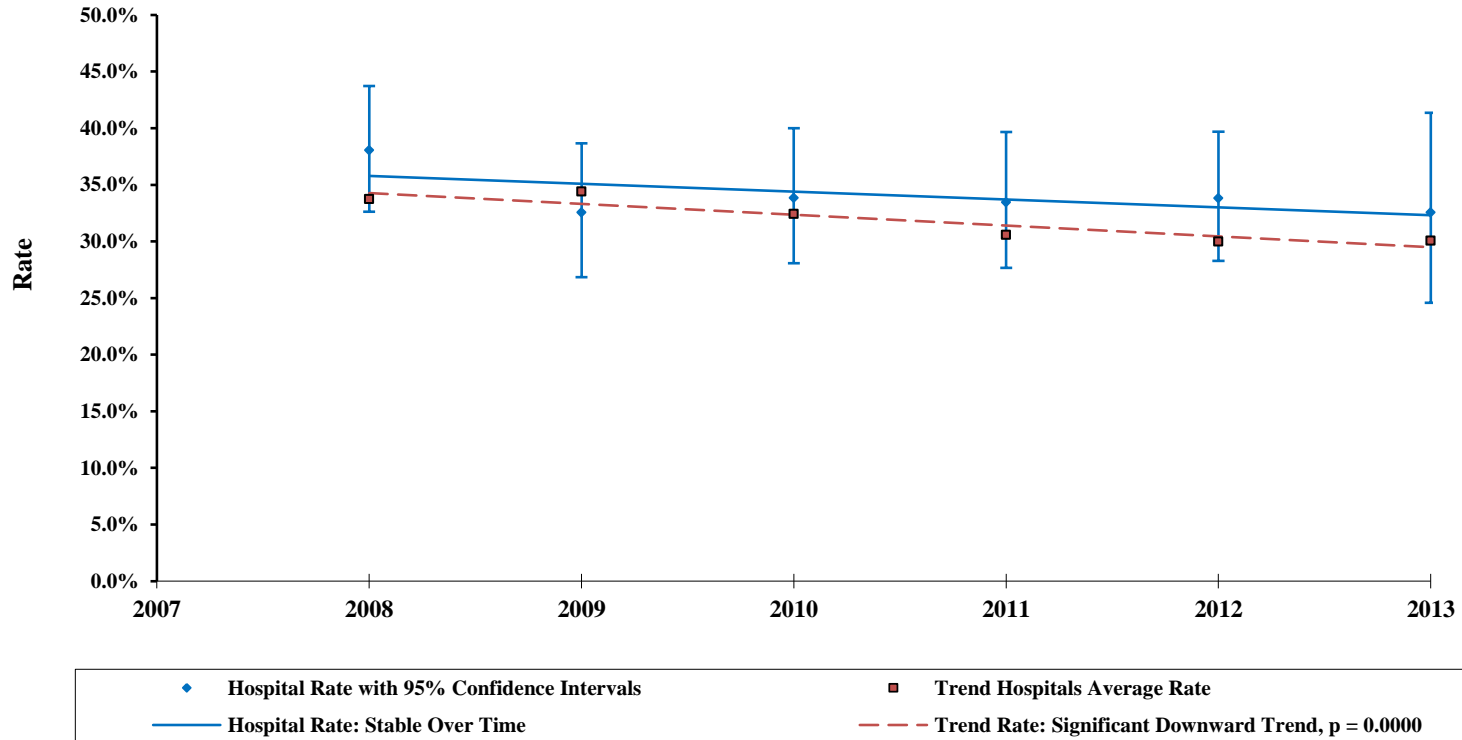
\* Delivery discharge records may contain more than one hypertension code

**Graph 1: Transient hypertension of pregnancy 2008 - 2013 (Q1-Q2) with Trendlines**  
**Percent of deliveries coded with 642.3x/642.4x/642.5x**  
**NPIC ID: SAMPLE**



	2008	2009	2010	2011	2012	2013 (Q1-Q2)
Trend Rate	45.5%	44.6%	45.1%	45.7%	45.6%	46.7%
Hospital Rate	40.6%	45.5%	45.1%	46.6%	45.0%	41.9%
Hospital Numerator	126	116	116	117	125	54
Hospital Denominator	310	255	257	251	278	129
Lower CI	35.1%	39.3%	38.9%	40.3%	39.0%	33.2%
Upper CI	46.3%	51.8%	51.4%	53.0%	51.0%	50.9%

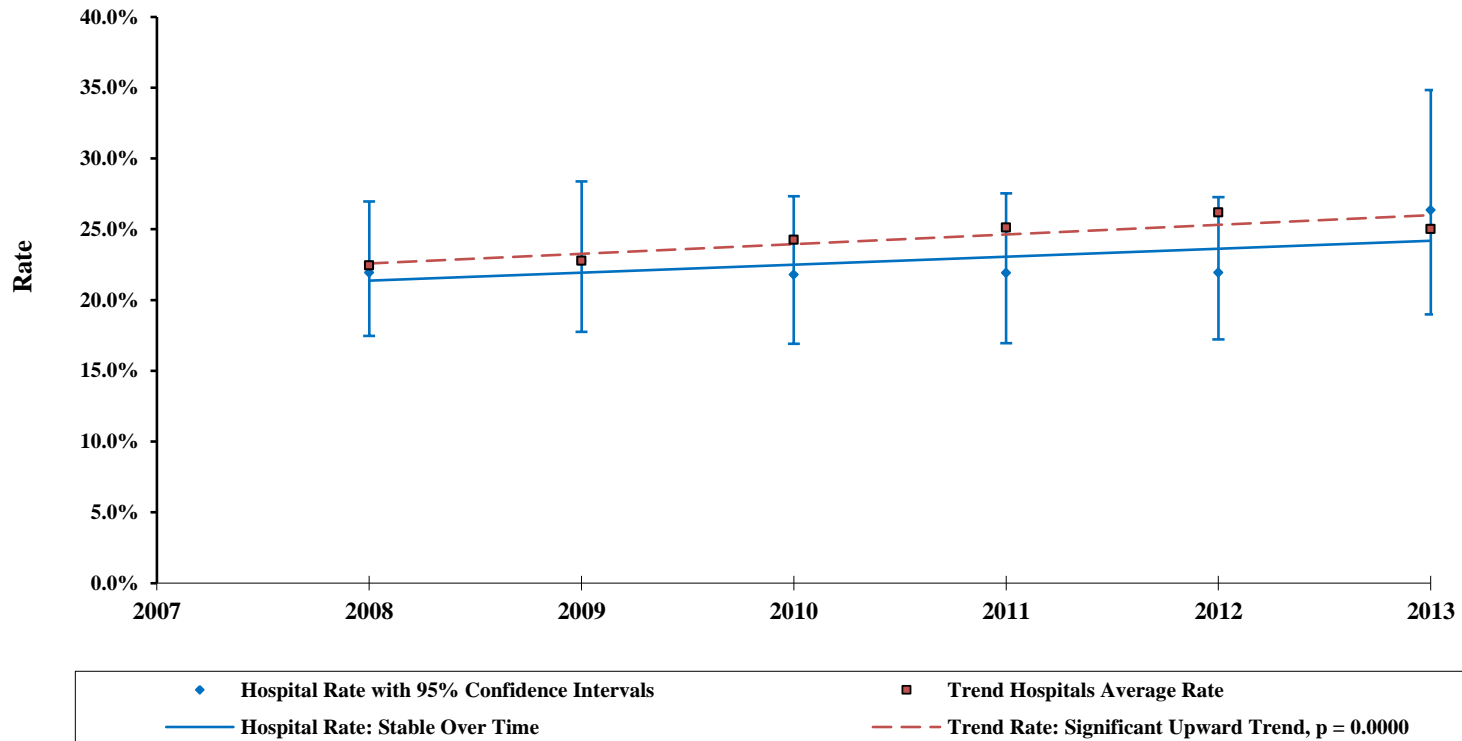
**Graph 2: Mild or Unspecified Preeclampsia 2008 - 2013 (Q1-Q2) with Trendlines**  
**Percent of deliveries coded with 642.3x/642.4x/642.5x**  
**NPIC ID: SAMPLE**



	2008	2009	2010	2011	2012	2013 (Q1-Q2)
Trend Rate	33.7%	34.4%	32.4%	30.6%	30.0%	30.1%
Hospital Rate	38.1%	32.5%	33.9%	33.5%	33.8%	32.6%
Hospital Numerator	118	83	87	84	94	42
Hospital Denominator	310	255	257	251	278	129
Lower CI	32.6%	26.8%	28.1%	27.7%	28.3%	24.6%
Upper CI	43.7%	38.7%	40.0%	39.7%	39.7%	41.4%



**Graph 3: Severe Preeclampsia 2008 - 2013 (Q1-Q2) with Trendlines**  
**Percent of deliveries coded with 642.3x/642.4x/642.5x**  
**NPIC ID: SAMPLE**



	2008	2009	2010	2011	2012	2013 (Q1-Q2)
Trend Rate	22.5%	22.8%	24.3%	25.1%	26.2%	25.0%
Hospital Rate	21.9%	22.7%	21.8%	21.9%	21.9%	26.4%
Hospital Numerator	68	58	56	55	61	34
Hospital Denominator	310	255	257	251	278	129
Lower CI	17.5%	17.7%	16.9%	17.0%	17.2%	19.0%
Upper CI	27.0%	28.4%	27.3%	27.5%	27.3%	34.8%

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### Table 2: Maternal Comorbidities/Complications - Transient Hypertension

	Hospital SAMPLE	Subgroup Averages						Database Average
		AR	AO	C	G	NL	NS	
<b>A. Deliveries coded with 642.3x/642.4x/642.5x - Hypertension complicating pregnancy, childbirth and puerperium</b>	<b>257</b>	<b>405</b>	<b>364</b>	<b>733</b>	<b>274</b>	<b>224</b>	<b>48</b>	<b>364</b>
Vaginal delivery rate	54.5%	54.3%	53.8%	51.4%	47.8%	48.9%	52.1%	51.7%
C-section delivery rate	45.5%	45.8%	46.2%	48.7%	52.2%	51.1%	47.9%	48.3%
642.3x - Transient hypertension of pregnancy	115	207	169	385	132	127	21	187
% of total 642.3x - 642.5x delivery cases *	44.8%	51.1%	46.4%	52.5%	48.2%	56.7%	43.8%	51.4%
<b>B. Maternal Comorbidities/Complications</b>								
Antepartum admission (at least one admission and discharge prior to delivery hospitalization)	2	10	10	17	6	5	0	9
% of total	1.7%	4.8%	5.9%	4.4%	4.5%	3.9%	0.0%	4.8%
Early onset of labor (prior to 37 weeks completed gestation - 644.21)	11	12	10	27	15	7	3	12
% of total	9.6%	5.8%	5.9%	7.0%	11.4%	5.5%	14.3%	6.4%
Placenta abruption (641.2x)	0	3	2	4	2	1	0	2
% of total	0.0%	1.4%	1.2%	1.0%	1.5%	0.8%	0.0%	1.1%
Obesity complicating pregnancy (649.1x)	12	23	29	40	18	15	2	23
% of total	10.4%	11.1%	17.2%	10.4%	13.6%	11.8%	9.5%	12.3%
Anemia (648.2x)	15	33	43	54	29	14	3	31
% of total	13.0%	15.9%	25.4%	14.0%	22.0%	11.0%	14.3%	16.6%
Coagulation defects (649.3x)	5	6	7	13	4	3	0	6
% of total	4.4%	2.9%	4.1%	3.4%	3.0%	2.4%	0.0%	3.2%
Multiple gestation (651.xx)	0	6	3	15	4	4	1	6
% of total	0.0%	2.9%	1.8%	3.9%	3.0%	3.1%	4.8%	3.2%

\* Delivery discharge records may contain more than one hypertension code

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### Table 2: Maternal Comorbidities/Complications - Transient Hypertension

	Hospital SAMPLE	Subgroup Averages						Database Average
		AR	AO	C	G	NL	NS	
<b>B. Maternal Comorbidities/Complications (continued)</b>								
Gestational diabetes (648.8x)	8	18	16	37	10	13	2	17
% of total	7.0%	8.7%	9.5%	9.6%	7.6%	10.2%	9.5%	9.1%
Elderly primagravida (659.5x)	2	6	6	15	1	5	1	6
% of total	1.7%	2.9%	3.6%	3.9%	0.8%	3.9%	4.8%	3.2%
Elderly multigravida (659.6x)	9	23	24	51	9	14	2	23
% of total	7.8%	11.1%	14.2%	13.2%	6.8%	11.0%	9.5%	12.3%
Poor fetal growth (656.5x)	3	7	4	16	5	5	0	7
% of total	2.6%	3.4%	2.4%	4.2%	3.8%	3.9%	0.0%	3.7%
Oligohydramnios (658.0x)	4	8	12	15	4	6	0	8
% of total	3.5%	3.9%	7.1%	3.9%	3.0%	4.7%	0.0%	4.3%
Long LOS (> 2 days vaginal delivery; > 4 days c-section delivery) **	14	98	83	165	44	50	7	82
% of total	12.2%	47.3%	49.1%	42.9%	33.3%	39.4%	33.3%	43.9%
Maternal postpartum readmission within 30 days	3	4	2	7	1	2	0	3
% of total	2.6%	1.9%	1.2%	1.8%	0.8%	1.6%	0.0%	1.6%

\* Delivery discharge records may contain more than one hypertension code

\*\* LOS may include days of care prior to delivery

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**Table 3: Maternal Comorbidities/Complications - Mild or Unspecified Preeclampsia**

	Hospital SAMPLE	Subgroup Averages						Database Average
		AR	AO	C	G	NL	NS	
<b>A. Deliveries coded with 642.3x/642.4x/642.5x - Hypertension complicating pregnancy, childbirth and puerperium</b>	<b>257</b>	<b>405</b>	<b>364</b>	<b>733</b>	<b>274</b>	<b>224</b>	<b>48</b>	<b>364</b>
Vaginal delivery rate	54.5%	54.3%	53.8%	51.4%	47.8%	48.9%	52.1%	51.7%
C-section delivery rate	45.5%	45.8%	46.2%	48.7%	52.2%	51.1%	47.9%	48.3%
642.4x - Mild or unspecified preeclampsia	88	96	75	203	78	60	19	93
% of total 642.3x - 642.5x delivery cases *	34.2%	24.7%	28.2%	28.7%	28.4%	30.4%	44.1%	29.5%
<b>B. Maternal Comorbidities/Complications</b>								
Antepartum admission (at least one admission and discharge prior to delivery hospitalization)	1	7	6	12	6	3	0	6
% of total	1.1%	7.3%	8.0%	5.9%	7.7%	5.0%	0.0%	6.5%
Early onset of labor (prior to 37 weeks completed gestation - 644.21)	17	11	8	22	14	7	2	11
% of total	19.3%	11.5%	10.7%	10.8%	17.9%	11.7%	10.5%	11.8%
Placenta abruption (641.2x)	1	2	2	2	1	1	0	1
% of total	1.1%	2.1%	2.7%	1.0%	1.3%	1.7%	0.0%	1.1%
Obesity complicating pregnancy (649.1x)	11	11	14	20	10	8	2	12
% of total	12.5%	11.5%	18.7%	9.9%	12.8%	13.3%	10.5%	12.9%
Anemia (648.2x)	15	18	14	30	21	9	2	16
% of total	17.1%	18.8%	18.7%	14.8%	26.9%	15.0%	10.5%	17.2%
Coagulation defects (649.3x)	0	4	3	9	3	2	0	4
% of total	0.0%	4.2%	4.0%	4.4%	3.8%	3.3%	0.0%	4.3%
Multiple gestation (651.xx)	8	7	5	16	4	3	0	6
% of total	9.1%	7.3%	6.7%	7.9%	5.1%	5.0%	0.0%	6.5%

\* Delivery discharge records may contain more than one hypertension code

**V13.2 Special Report: Maternal Hypertension Complicating Pregnancy and Neonatal Outcomes**  
**Table 3: Maternal Comorbidities/Complications - Mild or Unspecified Preeclampsia**

	Hospital SAMPLE	Subgroup Averages						Database Average
		AR	AO	C	G	NL	NS	
<b>B. Maternal Comorbidities/Complications (continued)</b>								
Gestational diabetes (648.8x)	12	12	9	24	6	6	2	11
% of total	13.6%	12.5%	12.0%	11.8%	7.7%	10.0%	10.5%	11.8%
Elderly primagravida (659.5x)	5	4	4	9	1	3	1	4
% of total	5.7%	4.2%	5.3%	4.4%	1.3%	5.0%	5.3%	4.3%
Elderly multigravida (659.6x)	12	10	10	27	6	7	1	11
% of total	13.6%	10.4%	13.3%	13.3%	7.7%	11.7%	5.3%	11.8%
Poor fetal growth (656.5x)	3	4	2	9	4	3	1	4
% of total	3.4%	4.2%	2.7%	4.4%	5.1%	5.0%	5.3%	4.3%
Oligohydramnios (658.0x)	2	3	3	6	3	2	1	3
% of total	2.3%	3.1%	4.0%	3.0%	3.8%	3.3%	5.3%	3.2%
Long LOS (> 2 days vaginal delivery; > 4 days c-section delivery) **	15	58	47	111	37	30	7	52
% of total	17.1%	60.4%	62.7%	54.7%	47.4%	50.0%	36.8%	55.9%
Maternal postpartum readmission within 30 days	3	2	2	5	2	1	0	2
% of total	3.4%	2.1%	2.7%	2.5%	2.6%	1.7%	0.0%	2.2%

\* Delivery discharge records may contain more than one hypertension code

\*\* LOS may include days of care prior to delivery

**V13.2 Special Report: Maternal Hypertension Complicating Pregnancy and Neonatal Outcomes**  
**Table 4: Maternal Comorbidities/Complications - Severe Preeclampsia**

	Hospital SAMPLE	Subgroup Averages						Database Average
		AR	AO	C	G	NL	NS	
<b>A. Deliveries coded with 642.3x/642.4x/642.5x - Hypertension complicating pregnancy, childbirth and puerperium</b>	<b>257</b>	<b>405</b>	<b>364</b>	<b>733</b>	<b>274</b>	<b>224</b>	<b>48</b>	<b>364</b>
Vaginal delivery rate	54.5%	54.3%	53.8%	51.4%	47.8%	48.9%	52.1%	51.7%
C-section delivery rate	45.5%	45.8%	46.2%	48.7%	52.2%	51.1%	47.9%	48.3%
642.5x - Severe preeclampsia	57	106	130	168	67	39	9	93
% of total 642.3x - 642.5x delivery cases *	22.2%	28.0%	29.7%	24.4%	25.9%	16.4%	19.2%	24.1%
<b>B. Maternal Comorbidities/Complications</b>								
Antepartum admission (at least one admission and discharge prior to delivery hospitalization)	3	7	10	10	4	2	0	6
% of total	5.3%	6.6%	7.7%	6.0%	6.0%	5.1%	0.0%	6.5%
Early onset of labor (prior to 37 weeks completed gestation - 644.21)	30	32	23	59	31	15	3	28
% of total	52.6%	30.2%	17.7%	35.1%	46.3%	38.5%	33.3%	30.1%
Placenta abruption (641.2x)	3	4	4	5	3	1	0	3
% of total	5.3%	3.8%	3.1%	3.0%	4.5%	2.6%	0.0%	3.2%
Obesity complicating pregnancy (649.1x)	6	12	17	18	10	6	1	11
% of total	10.5%	11.3%	13.1%	10.7%	14.9%	15.4%	11.1%	11.8%
Anemia (648.2x)	4	19	49	31	20	7	1	22
% of total	7.0%	17.9%	37.7%	18.5%	29.9%	17.9%	11.1%	23.7%
Coagulation defects (649.3x)	1	8	12	15	5	3	1	8
% of total	1.8%	7.5%	9.2%	8.9%	7.5%	7.7%	11.1%	8.6%
Multiple gestation (651.xx)	2	9	8	19	3	3	1	8
% of total	3.5%	8.5%	6.2%	11.3%	4.5%	7.7%	11.1%	8.6%

\* Delivery discharge records may contain more than one hypertension code

**V13.2 Special Report: Maternal Hypertension Complicating Pregnancy and Neonatal Outcomes**  
**Table 4: Maternal Comorbidities/Complications - Severe Preeclampsia**

	Hospital SAMPLE	Subgroup Averages						Database Average
		AR	AO	C	G	NL	NS	
<b>B. Maternal Comorbidities/Complications (continued)</b>								
Gestational diabetes (648.8x)	5	10	14	19	4	4	1	9
% of total	8.8%	9.4%	10.8%	11.3%	6.0%	10.3%	11.1%	9.7%
Elderly primagravida (659.5x)	3	4	4	8	1	2	0	4
% of total	5.3%	3.8%	3.1%	4.8%	1.5%	5.1%	0.0%	4.3%
Elderly multigravida (659.6x)	4	14	19	24	3	5	0	12
% of total	7.0%	13.2%	14.6%	14.3%	4.5%	12.8%	0.0%	12.9%
Poor fetal growth (656.5x)	5	16	11	24	16	5	1	12
% of total	8.8%	15.1%	8.5%	14.3%	23.9%	12.8%	11.1%	12.9%
Oligohydramnios (658.0x)	1	5	6	8	4	1	0	4
% of total	1.8%	4.7%	4.6%	4.8%	6.0%	2.6%	0.0%	4.3%
Long LOS (> 2 days vaginal delivery; > 4 days c-section delivery) **	23	75	92	113	43	23	5	63
% of total	40.4%	70.8%	70.8%	67.3%	64.2%	59.0%	55.6%	67.7%
Maternal postpartum readmission within 30 days	3	3	4	5	2	1	0	3
% of total	5.3%	2.8%	3.1%	3.0%	3.0%	2.6%	0.0%	3.2%

\* Delivery discharge records may contain more than one hypertension code

\*\* LOS may include days of care prior to delivery

**V13.2 Special Report: Maternal Hypertension Complicating Pregnancy and Neonatal Outcomes**  
**Table 5: Linked Mother/Baby Analysis - Transient Hypertension of Pregnancy**

	Hospital SAMPLE	Subgroup Averages						Database Average
		AR	AO	C	G	NL	NS	
<b>A. Deliveries coded with 642.3x/642.4x/642.5x - Hypertension complicating pregnancy, childbirth and puerperium</b>	<b>257</b>	<b>405</b>	<b>364</b>	<b>733</b>	<b>274</b>	<b>224</b>	<b>48</b>	<b>364</b>
Inborns linked to a delivery coded with 642.3x/642.4x/642.5x	252	395	366	733	252	222	50	366
Linked inborns as a percent of total deliveries coded with 642.3x/642.4x/642.5x <sup>1</sup>	98.1%	97.5%	100.5%	100.0%	92.0%	99.1%	104.2%	100.5%
Inborns linked to a delivery coded with 642.3x - Transient hypertension of pregnancy	111	203	169	385	124	127	24	188
% of total linked 642.3x - 642.5x delivery cases	44.1%	51.4%	46.2%	52.5%	49.2%	57.2%	48.0%	51.4%
<b>B. Neonatal outcomes</b>								
Inborns delivered < 37 completed weeks gestation	17	19	15	42	14	13	3	19
% of inborns linked to deliveries with 642.3x	15.3%	9.4%	8.9%	10.9%	11.3%	10.2%	12.5%	10.1%
Inborns delivered < 2500 grams	11	18	15	43	17	13	3	19
% of inborns linked to deliveries with 642.3x	9.9%	8.9%	8.9%	11.2%	13.7%	10.2%	12.5%	10.1%
Inborns admitted to special care nursery	26	34	23	60	18	14	3	28
% of inborns linked to deliveries with 642.3x	23.4%	16.7%	13.6%	15.6%	14.5%	11.0%	12.5%	14.9%
Respiratory Distress Syndrome (769)	3	5	2	7	3	2	0	4
% of inborns linked to deliveries with 642.3x	2.7%	2.5%	1.2%	1.8%	2.4%	1.6%	0.0%	2.1%
Slow growth and fetal malnutrition (764)	5	9	6	17	4	5	1	8
% of inborns linked to deliveries with 642.3x	4.5%	4.4%	3.6%	4.4%	3.2%	3.9%	4.2%	4.3%
Birth asphyxia (768.3x-768.9x)	0	0	0	1	1	0	0	0
% of inborns linked to deliveries with 642.3x	0.0%	0.0%	0.0%	0.3%	0.8%	0.0%	0.0%	0.0%
Intraventricular hemorrhage (772.1x)	0	1	0	1	0	1	0	1
% of inborns linked to deliveries with 642.3x	0.0%	0.5%	0.0%	0.3%	0.0%	0.8%	0.0%	0.5%
Hyperbilirubinemia (774.2x)	7	9	6	20	7	6	2	9
% of inborns linked to deliveries with 642.3x	6.3%	4.4%	3.6%	5.2%	5.6%	4.7%	8.3%	4.8%

<sup>1</sup> May be greater than 100% due to multiple births



**V13.2 Special Report: Maternal Hypertension Complicating Pregnancy and Neonatal Outcomes**  
**Table 6: Linked Mother/Baby Analysis - Mild or Unspecified Preeclampsia**

	Hospital SAMPLE	Subgroup Averages						Database Average
		AR	AO	C	G	NL	NS	
<b>A. Deliveries coded with 642.3x/642.4x/642.5x - Hypertension complicating pregnancy, childbirth and puerperium</b>	<b>257</b>	<b>405</b>	<b>364</b>	<b>733</b>	<b>274</b>	<b>224</b>	<b>48</b>	<b>364</b>
Inborns linked to a delivery coded with 642.3x/642.4x/642.5x	252	395	366	733	252	222	50	366
Linked inborns as a percent of total deliveries coded with 642.3x/642.4x/642.5x <sup>1</sup>	98.1%	97.5%	100.5%	100.0%	92.0%	99.1%	104.2%	100.5%
Inborns linked to a delivery coded with 642.4x - Mild or Unspecified Preeclampsia	94	95	77	209	72	60	19	95
% of total linked 642.3x - 642.5x delivery cases	37.3%	24.1%	21.0%	28.5%	28.6%	27.0%	38.0%	26.0%
<b>B. Neonatal outcomes</b>								
Inborns delivered < 37 completed weeks gestation	25	22	16	41	17	12	3	20
% of inborns linked to deliveries with 642.4x	26.6%	23.2%	20.8%	19.6%	23.6%	20.0%	15.8%	21.1%
Inborns delivered < 2500 grams	20	16	15	41	16	11	3	18
% of inborns linked to deliveries with 642.4x	21.3%	16.8%	19.5%	19.6%	22.2%	18.3%	15.8%	18.9%
Inborns admitted to special care nursery	33	27	21	47	16	11	3	23
% of inborns linked to deliveries with 642.4x	35.1%	28.4%	27.3%	22.5%	22.2%	18.3%	15.8%	24.2%
Respiratory Distress Syndrome (769)	5	4	4	7	4	1	0	4
% of inborns linked to deliveries with 642.4x	5.3%	4.2%	5.2%	3.3%	5.6%	1.7%	0.0%	4.2%
Slow growth and fetal malnutrition (764)	5	6	4	15	4	5	1	6
% of inborns linked to deliveries with 642.4x	5.3%	6.3%	5.2%	7.2%	5.6%	8.3%	5.3%	6.3%
Birth asphyxia (768.3x-768.9x)	0	0	0	0	0	0	0	0
% of inborns linked to deliveries with 642.4x	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Intraventricular hemorrhage (772.1x)	1	1	0	1	0	0	0	0
% of inborns linked to deliveries with 642.4x	1.1%	1.1%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%
Hyperbilirubinemia (774.2x)	9	13	10	21	9	5	1	10
% of inborns linked to deliveries with 642.4x	9.6%	13.7%	13.0%	10.0%	12.5%	8.3%	5.3%	10.5%

<sup>1</sup> May be greater than 100% due to multiple births

**V13.2 Special Report: Maternal Hypertension Complicating Pregnancy and Neonatal Outcomes**  
**Table 7: Linked Mother/Baby Analysis - Severe Preeclampsia**

	Hospital SAMPLE	Subgroup Averages						Database Average
		AR	AO	C	G	NL	NS	
<b>A. Deliveries coded with 642.3x/642.4x/642.5x - Hypertension complicating pregnancy, childbirth and puerperium</b>	<b>257</b>	<b>405</b>	<b>364</b>	<b>733</b>	<b>274</b>	<b>224</b>	<b>48</b>	<b>364</b>
Inborns linked to a delivery coded with 642.3x/642.4x/642.5x	252	395	366	733	252	222	50	366
Linked inborns as a percent of total deliveries coded with 642.3x/642.4x/642.5x <sup>1</sup>	98.1%	97.5%	100.5%	100.0%	92.0%	99.1%	104.2%	100.5%
Inborns linked to a delivery coded with 642.5x - Severe preeclampsia	50	102	130	163	59	37	9	91
% of total linked 642.3x - 642.5x delivery cases	19.8%	25.8%	35.5%	22.2%	23.4%	16.7%	18.0%	24.9%
<b>B. Neonatal outcomes</b>								
Inborns delivered < 37 completed weeks gestation	37	60	53	97	37	23	5	50
% of inborns linked to deliveries with 642.5x	74.0%	58.8%	40.8%	59.5%	62.7%	62.2%	55.6%	54.9%
Inborns delivered < 2500 grams	30	51	47	89	38	20	5	45
% of inborns linked to deliveries with 642.5x	60.0%	50.0%	36.2%	54.6%	64.4%	54.1%	55.6%	49.5%
Inborns admitted to special care nursery	33	56	55	87	36	18	3	46
% of inborns linked to deliveries with 642.5x	66.0%	54.9%	42.3%	53.4%	61.0%	48.6%	33.3%	50.5%
Respiratory Distress Syndrome (769)	7	16	14	26	17	7	1	14
% of inborns linked to deliveries with 642.5x	14.0%	15.7%	10.8%	16.0%	28.8%	18.9%	11.1%	15.4%
Slow growth and fetal malnutrition (764)	4	15	15	28	8	5	1	13
% of inborns linked to deliveries with 642.5x	8.0%	14.7%	11.5%	17.2%	13.6%	13.5%	11.1%	14.3%
Birth asphyxia (768.3x-768.9x)	0	0	1	1	0	0	0	0
% of inborns linked to deliveries with 642.5x	0.0%	0.0%	0.8%	0.6%	0.0%	0.0%	0.0%	0.0%
Intraventricular hemorrhage (772.1x)	0	4	3	5	2	1	0	3
% of inborns linked to deliveries with 642.5x	0.0%	3.9%	2.3%	3.1%	3.4%	2.7%	0.0%	3.3%
Hyperbilirubinemia (774.2x)	14	36	31	58	26	13	2	30
% of inborns linked to deliveries with 642.5x	28.0%	35.3%	23.8%	35.6%	44.1%	35.1%	22.2%	33.0%

<sup>1</sup> May be greater than 100% due to multiple births