

Adverse Maternal Outcomes for Women with Different Health Insurance Statuses in Nevada

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Abstract

Objective. Nevada women with unfavorable health insurance status may face greater barriers than women in the rest of the nation, since the development of healthcare infrastructure in Nevada is running behind population growth. This study examines the relationship between health insurance status and adverse maternal outcomes in Nevada.

Methods. Hospital discharge information of 33,149 women aged 13 or older who delivered in 2004 was abstracted from the 2004 State Inpatient Data for Nevada. A total of 13 measures of complications associated with pregnancy were identified, including preterm labor, hypertensive disorders of pregnancy, gestational diabetes, ante-partum hemorrhage, membrane disorders, cesarean section, prolonged labor, postpartum hemorrhage, and fetal death. Multiple logistic regression was applied for data analysis.

Results. As compared to women covered by private insurance, women with Medicaid were more likely to have abruptio placenta (OR [95% confidence interval (CI)] 1.67 [1.24, 2.26]), prolonged labor (OR [CI] 1.16 [1.03, 1.31]), and fetal death (OR [CI] 1.59 [1.11, 2.27]). Uninsured women had a higher risk of having prolonged labor (OR [CI] 1.20 [1.01, 1.42]) and fetal death (OR [CI] 1.70 [1.05, 2.74]), but had a lower risk of experiencing pre-eclampsia (OR [CI] 0.72 [0.53, 0.98]), pregnancy-induced hypertension (OR [CI] 0.70 [0.56, 0.88]), gestational diabetes (OR [CI] 0.75 [0.57, 0.98]), and a cesarean section (OR [CI] 0.69 [0.62, 0.77]).

Conclusion. Policies promoting prenatal care and case management programs for female Medicaid recipients can help to reduce the risk of maternal

complications. Joint efforts by policy makers, public health advocates, social support groups, and health care practitioners to offer integrated programs to help both Medicaid and uninsured women are likely to succeed in improving maternal outcomes.

Keywords: maternal outcome, Medicaid, uninsured

Health insurance status serves as one of the key enabling factors that relate to health care (Anderson & Newman 1973). Persons with unfavorable health insurance status face substantial financial and social barriers to access health services and to achieve desired outcomes (Mueller, Patil, & Boilesen 1998; Schoen & DesRoches 2000). Health insurance related disparities in health and health care have been well documented. Affiliation with Medicaid or being uninsured contribute to reduced access to high-quality care and increased likelihood of poor clinical outcomes (Institute of Medicine 2002; Shi 2001). Empirical studies demonstrate that Medicaid and uninsured patients are less likely to receive needed care and more likely to experience poorer outcomes than other patients (Bradbury, Golec, & Steen 2001; Hadley, Steinberg, & Feder 1991; Institute of Medicine 2002; Shen, Wan, & Perlin 2001; Sudore, et al 2006).

Despite widely reported discrepancies associated with many clinical conditions across insurance subgroups, few studies have examined insurance-related disparities in maternal complications. Adverse maternal outcomes related to pregnancy are a significant public health problem. Antepartum hospitalization for pregnancy-related complications is common, with 15 to 25 admissions per hundred deliveries with greater risks for socioeconomically disadvantaged women. The annual costs of these hospitalizations are estimated to exceed one billion dollars (Bennett, et al 1998; Laditka, Laditka, & Probst 2006). With the exclusion of those with caesarean delivery, about one-third of women experience morbidity during labor and delivery (Danel, Berg, Johnson, & Atrash 2003). The most frequently occurring complications include pregnancy-induced hypertension, hemorrhage, and infection. Preterm labor and gestational diabetes are also common complications (Martin, et al 2002). In addition, complications of operative delivery may pose a threat to the health of the mother or the infant (National Center for Health Statistics 1998). Those pregnancy-related complications affect many women and infants (Bennett et al., 1998; Danel, Berg, Johnson, & Atrash 2003; Laditka, et al 2005; Saftlas, Lawson, & Atrash 1994), but they are most likely to affect those women and infants with unfavorable

health insurance status and lower socioeconomic status.

Nevada women with unfavorable health insurance status may face even greater barriers to receiving quality health care than women in the rest of the nation, since the development of healthcare infrastructure in Nevada is running behind population growth. The fast-growth of the Nevada population has been accompanied by increases in the percentages of minorities, especially Hispanics/Latinos and the uninsured (Moseley & Sotero 2006). For example, it has been reported that Medicaid and uninsured patients with diabetes in Nevada tend to experience poorer outcomes than those with private insurance (Shen 2007). Nevertheless, it is unclear whether this is the case in regard to maternal outcomes. The purpose of this study, therefore, is to examine whether adverse maternal outcomes differ by health insurance status in women who delivered in Nevada hospitals. Findings of the study can aid state policy makers and private sector providers in identifying vulnerable subgroups and, in turn, improving maternal care for them.

Methods

Data were abstracted from the 2004 State Inpatient Data (SID) for Nevada that was available through the HealthCare Cost and Utilization Project (HCUP). This data is maintained and disseminated by the Agency for Healthcare Research and Quality (AHRQ). Based on the International Classification of Diseases, Ninth Edition, Clinical Modification (ICD-9-CM) Diagnostic codes identified by another study (Shen, Tymkow, & MacMullun 2005), a total of 33,149 pregnant women aged 13 or older who delivered in 2004 were selected for study. Multiple gestations were included, because they could not be identified within the SID.

Adverse outcome measures used in this study were complications associated with pregnancy. These outcomes were used in prior studies (Liu, et al 2001; Shen, Tymkow, & MacMullun 2005; McMullen, Tymkow, & Shen 2006). A total of 13 measures were used including preterm labor, hypertensive disorders of pregnancy (including three measures, preeclampsia, transient hypertension of pregnancy, and pregnancy induced hypertension), gestational diabetes, ante-partum hemorrhage (including two measures, placenta previa and abruptio placenta), membrane disorders (including two measures, premature rupture of membranes and infection of the amniotic cavity), cesarean section, prolonged labor, postpartum hemorrhage, and fetal death. Each of the

13 measures was coded as a dichotomous variable with the value "1" indicating an adverse outcome and the value "0" indicating no adverse outcome.

The main independent variable was the patient's health insurance status based on payer sources. It was categorized as Medicare, Medicaid, private insurance, including prepaid health plans, and the uninsured, including self pay and no charge, and other insurance. The privately insured were used as the reference group in the multivariable analysis. Ninety three discharges with missing values for health insurance were excluded, which left 33,056 discharges for data analysis. Due to the focus of this study, results for Medicare women (0.7% of the women) and women with other insurance (3.7% of the women) were not presented, although they were included in the multivariable analysis.

Logistic regression was applied to examine the relationship between health insurance status and each of the 13 maternal outcome measures identified in Table 1. The odds ratio (OR) was used to approximate the association between insurance status and the outcomes (Hosmer & Lemeshow 2000). Using the example of abruptio placenta hemorrhage as an outcome to compare the uninsured with those with private insurance coverage; if women with private insurance coverage are used as the reference group, an estimated OR = 2 indicates that abruptio placenta hemorrhage is twice as likely to occur among uninsured women than among women covered by private insurance.

In the logistic regression model, maternal age and certain comorbidities were controlled (Liu, et al 2001; McMullen, Tymkow, & Shen 2006; Shen, Tymkow, & MacMullen 2005). For the purpose of expanding the age variable to a meaningful interval, we created six dummy variables to reflect six age groups (younger than 15 years old, 15-19, 20-24, 30-34, 35-39, and equal or older than 40 years), and the age group 25-29 was used as a reference group. Several other covariates were also controlled. To adjust for potential geographic barriers to health care access, the patient's residence was categorized as: large metropolitan areas with at least one million residents, small metropolitan areas with less than one million residents, micropolitan areas, and non-urban areas, (Laditka, Laditka, & Probst 2006; Miller, Clarke, Albrecht, & Farmer 1996). In addition, hospital characteristics, such as size (i.e., large, medium, and small with small hospitals being the reference), ownership (public, not-for-profit, and investor-owned with not-for-profit hospitals being the reference), and teaching hospital status, were also controlled. The

hospital variables were abstracted from the 2004 American Hospital Association (AHA) annual survey data that was merged with the SID data. Overall, the goodness-of-fit for the multivariable model for all of the 13 dependent variables was greater than 0.05, indicating that the model fit was good.

Results

Table 1 shows the unadjusted descriptive results. Thirty-two percent, 55%, and 8% of the women were Medicaid beneficiaries, covered by private insurance, and uninsured, respectively. Overall, among the three insurance groups, Medicaid women were the youngest (24.5 years old), whereas the women covered by private insurance were the oldest (28.7 years old). It is important to point out that both the Medicaid and the uninsured groups had substantially higher percentages of teenage mothers than did the private insurance group. In addition, the uninsured group had the highest percentage of women (82.5%) who resided in large urban areas. The Medicaid and uninsured groups had markedly higher percentages of women (43.1% and 31.6%, respectively) who delivered in public hospitals, as compared to those with private insurance (4.9%). The Medicaid and uninsured groups also had sizably higher percentages of women (77.9% and 67.0%, respectively) who delivered in large hospitals than that of the private insurance group (48.3%).

Table two shows the adjusted adverse maternal outcomes for women with Medicaid and without insurance as compared with patients with private insurance. Women with Medicaid were more likely to have abruptio placenta (OR [95% confidence interval (CI)] 1.67 [1.24, 2.26]), prolonged labor (OR [CI] 1.16 [1.03, 1.31]), and fetal death (OR [CI] 1.59 [1.11, 2.27]). Uninsured women had a higher risk of having prolonged labor (OR [CI] 1.20 [1.01, 1.42]) and fetal death (OR [CI] 1.70 [1.05, 2.74]), but had a lower risk of experiencing pre-eclampsia (OR [CI] 0.72 [0.53, 0.98]), pregnancy-induced hypertension (OR [CI] 0.70 [0.56, 0.88]), gestational diabetes (OR [CI] 0.75 [0.57, 0.98]), and a cesarean section (OR [CI] 0.69 [0.62, 0.77]).

Discussion

Both the Medicaid and the uninsured women experienced poorer outcomes for some of the 13 adverse maternal complications than did women covered by private insurance. As expected, Medicaid women in Nevada experienced three poorer maternal outcomes, abruptio placenta, prolonged labor, and fetal death. Poverty, lack of education, lack of social support (e.g., unmarried, single mother), and the presence of comorbidities (e.g., diabetes,

hypertension, and obesity) are possible contributing factors (Laditka, Laditka, & Probst 2006). All of these factors, except for the comorbidities, may contribute to a lack of adequate prenatal care among the Medicaid recipients which, in turn, is associated with maternal complications.

Similarly, the uninsured women also had two poor outcomes, prolonged labor and fetal death, which is also consistent with previous research that has examined other clinical conditions (Hadley, Steinberg, & Feder 1991; Institute of Medicine 2002; Shen, Wan, & Perlin 2001). Further investigation is needed to determine why both Medicaid and uninsured women had higher risks for prolonged labor and fetal death, especially since fetal death is an extreme adverse outcome.

It was, to some extent, surprising that the uninsured women had lower risks for three complications (i.e., pre-eclampsia, pregnancy-induced hypertension, and gestational diabetes) than did women covered by private insurance. One possible explanation is that the uninsured women were more likely to be Hispanic, since about 20% of the Nevada population is Hispanic, and Hispanics are more likely to be uninsured than other racial and ethnic groups (Flores, Abreu, & Tomany-Korman 2006; Holahan, Cook, & Dubay 2007). The lower risks for some of the maternal complications among Hispanic women may be attributed to the association between Hispanic ethnicity and better maternal outcomes despite lower use of health services (Albrecht & Miller 1996; Gazmarian, Arrington, & Bailey 1999; Laditka, et al 2005; Laditka, Laditka, & Probst 2006; Moore & Hepworth 1994). Nevertheless, further studies are merited to investigate interactions between health insurance status and race on maternal outcomes.

In addition, the finding that the uninsured were less likely to have received a cesarean section is probably due to the fact that hospitals may be less willing to provide a relatively expensive procedure to those patients who are less able to pay for it (Shen, Wan, & Perlin 2001).

The study had several limitations. First, the Nevada SID data did not allow us to identify racial/ethnic groups. This is an important limitation, given a highly possible interaction between health insurance status and race/ethnicity. In addition, prenatal care information, which is one of the most important determining factors for maternal outcomes, was not available from the SID data. Third, information about the patient's life style (e.g., diet and physical

activities) was also not available, which may relate to maternal complications.

Policy makers along with private sector providers need to adapt integrated approaches to strengthen prenatal services for high risk Medicaid and uninsured women. Given the high correlation between prenatal care and maternal complications, prenatal care for Medicaid recipients should particularly stress the case management approach to better manage the pregnancy in order to reduce the risks of experiencing complications. Research has demonstrated that improvements in birth outcomes can be achieved by using locally developed case management programs for women in higher risk groups (Griffin, Hogan, Buechner, & Leddy 1999).

Both public and private sectors can also make efforts to provide more support services to Medicaid and uninsured women. Research has recommended that support services for low-income women be provided along three dimensions, psycho-social, health education, and nutrition. Programs that offer support in these areas demonstrate better outcomes (Horman & Korenbrot 1998). These types of support programs would be particularly helpful for adolescent or teenage mothers, who are more likely to be Medicaid recipients or uninsured (Laditka, Laditka, & Probst 2006). Research has shown that programs offering social support to unmarried women, or women who are not in supportive relationships, can improve pregnancy outcomes (Norbeck & DeJoseph 1996).

Furthermore, public health and health promotion efforts can benefit pregnant women, particularly Medicaid and uninsured women who may lead less healthy lifestyles due to economic hardship (Ayanian, et al 2000; Centers for Disease Control and Prevention 1998). Health care providers have opportunities to encourage and advise pregnant women on certain lifestyle changes (e.g., having more physical activities) that could be effective in reducing the probability of complications during pregnancy (Dempsey, Butler, & Williams 2005).

Finally, the Nevada legislature needs to consider making race/ethnicity information available in the SID dataset to facilitate research on the health and health care of socioeconomically disadvantaged populations, particularly research on interactions between multiple socioeconomic factors. Among 39 states participating in the HCUP project, 32 provide race/ethnicity information. As the Nevada population becomes more diverse, strengthening research on health disparities can have a positive impact on the

improvement in the level of public health and health care of entire state.

Acknowledgements

We thank an anonymous reviewer and Tim Bungum for their comments on earlier drafts of this paper.

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Table 1. Patients' Demographic, Clinical, and Hospitalization Characteristics*

| | Medicaid (n = 10,593) | Private Insurance (n = 18,267) | Uninsured (n = 2,687) | Total** (n = 33,056) |
|--|-----------------------------|---|-----------------------------|----------------------------|
| Demographics | | | | |
| Average age, year (St.d) | 24.5 (5.7) | 28.7 (5.8) | 26.6 (6.2) | 27.0 (6.1) |
| Age group | | | | |
| < 15 | 41 (0.4) 2091 | 11 (0.1) | 8 (0.3) | 61 (0.2) |
| 15 - 19 | (19.7) 3973 | 972 (5.3) 3626 | 348 (12.0) | 3621 (11.0) |
| 20 - 24 | (37.5) 2458 | (19.9) 5544 | 748 (27.8) | 8868 (26.8) |
| 25 - 29 | (23.2) 1329 | (30.4) 5074 | 723 (26.9) | 9107 (27.6) |
| 30 - 34 | (12.6) 2510 | (27.8) 13.7 | 535 (19.9) | 7188 (21.7) |
| 35 - 39 | 557 (5.3) | (13.7) | 266 (9.9) | 3457 (10.5) |
| >= 40 | 144 (1.4) | 530 (2.9) | 59 (2.2) | 754 (2.3) |
| Area of residence | | | | |
| Large metropolitan >= 1 million residents | 7914 (74.7) | 13705 (75.0) | 2217 (82.5) | 24312(73.6) |
| Small metropolitan < 1 million residents | 1735 (16.4) | 3274 (17.9) | 251 (9.3) | 6076 (18.4) |
| Metropolitan areas | 544 (5.1) | 723 (4.0) | 124 (4.6) | 1516 (4.6) |
| Non-urban | 368 (3.5) | 533 (2.9) | 77 (2.9) | 1067 (3.2) |
| Maternal outcomes | | | | |
| Pre-term labor | 392 (3.7) | 493 (2.7) | 99 (3.7) | 1041 (3.2) |
| Hypertensive disorders of pregnancy | | | | |
| Pre-eclampsia | 291 (2.8) | 433 (2.4) | 52 (1.9) | 807 (2.4) |
| Transient hypertension of pregnancy | 158 (1.5) | 4374 (2.4) | 41 (1.5) | 658 (2.0) |
| Pregnancy-induced hypertension | 524 (5.0) | 990 (5.4) | 102 (3.8) | 1676 (5.1) |
| Gestational diabetes | 323 (3.1) | 625 (3.4) | 63 (2.3) | 1058 (3.2) |
| Antepartum hemorrhage | | | | |
| Placenta previa | 46 (0.4) | 111 (0.6) | 10 (0.4) | 172 (0.5) |
| Abruptio placenta | 164 (1.6) | 215 (1.2) | 31 (1.2) | 425 (1.3) |
| Membrane disorders | | | | |
| Premature rupture of membrane | 368 (3.5) | 560 (3.1) | 82 (3.1) | 1057 (3.2) |
| Infection of the amniotic cavity | 234 (2.2) | 203 (1.1) | 35 (1.3) | 486 (1.5) |
| Mode of Delivery | | | | |
| Cesarean section | 2772 (26.2) | 6193 (33.9) | 610 (22.7) | 9965 (30.2) |
| Others | | | | |
| Prolonged labor | 1294 (12.2) | 1165 (6.4) | 277 (10.3) | 2854 (8.6) |
| Postpartum hemorrhage | 223 (2.1) | 419 (2.3) | 60 (2.2) | 728 (2.2) |
| Fetal death | 49 (0.5) | 59 (0.3) | 14 (0.5) | 128 (0.4) |
| Hospitalization | | | | |
| Average length of stay, day (St.d.) | 2.1 (1.9) | 2.3 (2.2) | 1.8 (1.2) | 2.2 (2.1) |
| Median total charges, \$ (St.d) | 8200 (7727) | 9001 (6998) | 7394 (4873) | 8575 (7039) |
| Teaching hospital | 7381 (69.7) | 4745 (26.0) | 1513 (56.3) | 14527 (44.0) |
| Ownership | | | | |
| Public hospital | 4565 (43.1) | 897 (4.9) | 848 (31.6) | 6366 (19.3) |
| Not-for-profit hospital | 2768 (26.1) | 6866 (37.6) | 438 (16.3) | 11076 (33.5) |
| Investor-owned hospital | 3260 (30.1) | 10504 (57.5) | 1401 (52.1) | 15614 (47.2) |
| Size | | | | |
| Small hospital | 2061 (19.5) | 7149 (39.1) | 824 (30.7) | 10505 (31.8) |
| Medium hospital | 277 (2.6) | (12.6) | 63 (2.3) | 2653 (8.0) |
| Large hospital | 8255 (77.9) | 8816 (48.3) | 1800 (67.0) | 19898 (60.2) |

Std. - standard deviation

* Data are expressed as number and percentage unless otherwise indicated

** Results of Medicare patients and those with other insurance status were not presented

Table 2. Relationships between Health Insurance Status and Adverse Maternal Outcomes of Women (n = 33,056)

| Dependent Variable | Private Insurance | Medicaid | Uninsured | Goodness-Of-Fit p-Value |
|--------------------------------------|-------------------|--------------|--------------|-------------------------|
| Pre-term labor† | 1.00 | 1.01 | 1.12 | 0.50 |
| | | (0.83, 1.24) | (0.85, 1.48) | |
| Hypertensive disorders of pregnancy | 1.00 | 0.96 | 0.72 | 0.98 |
| | | (0.79, 1.16) | (0.53, 0.98) | |
| Pre-eclampsia‡ | 1.00 | 0.85 | 0.77 | 0.78 |
| | | (0.68, 1.06) | (0.55, 1.07) | |
| Transient hypertension of pregnancy‡ | 1.00 | 0.92 | 0.70 | 0.95 |
| | | (0.81, 1.06) | (0.56, 0.88) | |
| Pregnancy-induced hypertension‡ | 1.00 | 1.16 | 0.75 | 0.87 |
| | | (0.98, 1.37) | (0.57, 0.98) | |
| Gestational diabetes§ | 1.00 | 1.06 | 0.72 | 0.64 |
| | | (0.72, 1.56) | (0.39, 1.32) | |
| Antepartum hemorrhage | 1.00 | 1.67 | 1.07 | 0.76 |
| | | (1.24, 2.26) | (0.67, 1.72) | |
| Placenta previa | 1.00 | 0.97 | 0.91 | 0.09 |
| | | (0.79, 1.19) | (0.68, 1.23) | |
| Abruptio placenta‡ | 1.00 | 1.18 | 0.80 | 0.18 |
| | | (0.88, 1.59) | (0.51, 1.26) | |
| Membrane disorders | 1.00 | 1.00 | 0.69 | 0.33 |
| | | (0.93, 1.07) | (0.62, 0.77) | |
| Premature rupture of membrane‡ | 1.00 | 1.16 | 1.20 | 0.24 |
| | | (1.03, 1.31) | (1.01, 1.42) | |
| Infection of the amniotic cavity‡ | 1.00 | 0.89 | 0.93 | 0.85 |
| | | (0.73, 1.07) | (0.71, 1.22) | |
| Mode of Delivery | 1.00 | 1.59 | 1.70 | 0.60 |
| | | (1.11, 2.27) | (1.05, 2.74) | |
| Cesarean section¶ | 1.00 | 1.16 | 1.20 | 0.24 |
| | | (1.03, 1.31) | (1.01, 1.42) | |
| Others | 1.00 | 0.89 | 0.93 | 0.85 |
| | | (0.73, 1.07) | (0.71, 1.22) | |
| Prolonged labor | 1.00 | 1.59 | 1.70 | 0.60 |
| | | (1.11, 2.27) | (1.05, 2.74) | |
| Postpartum hemorrhage | 1.00 | 1.16 | 1.20 | 0.24 |
| | | (1.03, 1.31) | (1.01, 1.42) | |
| Fetal death | 1.00 | 0.89 | 0.93 | 0.85 |
| | | (0.73, 1.07) | (0.71, 1.22) | |

† adjusted for maternal age.

‡ adjusted for maternal age, gestational diabetes, pre-existing diabetes, and pre-existing hypertension.

§ adjusted for maternal age, gestational diabetes, and pre-existing hypertension.

¶ Risk Ratio, adjusted for ‡, plus pregnancy-induced hypertension, preterm labor, placenta previa, abruptio placenta, premature, rupture of membrane, and infection of the amniotic cavity.

|| adjusted for maternal age, coagulation disorders, uterine tumor, and cesarean section.