Differences in Timing of Delivery Among Rural Women in America

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Title: Differences in Timing of Delivery Among Rural Women in America

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Objective: National safety and quality efforts have aimed to optimize delivery timing at 39 weeks. The 39 week rule was the result of evidence suggesting reduced neonatal morbidity and mortality with delivery at 39 weeks or beyond when compared to deliveries in the early term period (defined as 37+0-38+6 weeks). Studies show broad compliance with this effort nationally; however, it is unclear if differences in compliance to the 39 week rule exist for rural women. We sought to determine the differences in timing of delivery of rural women in America.

Study Design: We conducted a retrospective cohort study using United States restricted-use linked vital statistics-infant death data (2015) from the National Center of Health Statistics (NCHS). In addition to the publicly available data, the data files we utilized included unmasked geographic identifiers including maternal county of residence and the delivering hospital location by county. We included all singleton, non-anomalous pregnancies within the gestational ages of 36-41 weeks. We further excluded individuals with pre-existing diabetes, gestational diabetes, chronic hypertension and gestational hypertension in order to identify a low risk cohort without identifiable conditions for which medical induction of labor would be recommended. This study was deemed exempt from full review by the Oregon health & Science University Institutional Review Board (IRB).

We used chi-square tests to compare demographics between rural and non-rural residents. We compared deliveries at each gestational age between rural and non-rural residents using chi-square tests. Multinomial logistic regression analyses were performed using gestational age as dependent variable. Relative risk ratios were examined to explore the influence of the rural location and demographics variables on the delivery at various gestational ages, using 39 weeks.
as the base outcome. The variance inflation factor (VIF) was performed to detect multicollinearity between the explanatory variables. The mean VIF score of less than 2 confirmed the non-existence of multicollinearity. All statistical analyses were performed using Stata/SE 17 (Stata Corp LP, College Station, TX). Statistical significance was set at 0.05.

Results: We identified 3,010,183 women of which 338,093 (11.2%) had rural residence. Overall, rural women were more likely to deliver at 36 weeks (3.2% vs 2.9%; p<0.001), 37 weeks (7.9% vs 7.6%; p<0.001), 38 weeks (16.2% vs 16.1%; p<0.001) than non-rural women. Rural women were less likely to deliver at 39 weeks to 41 weeks gestation (72.7% vs 73.4%; p<0.001) when compared to non-rural women. The relative risk ratio of delivery at 36 weeks compared to 39 weeks increased by a factor of 1.03 in rural women (RRR=1.03; 95% CI:1.00-1.05); while the relative risk ratio of delivery at 40 weeks decreased by a factor of 0.83 among rural residents (RRR=0.83 (0.82-0.84)) Table 1.

Conclusion: Differences in the distribution of deliveries exist between rural and non-rural women. It is unclear if these differences are the result of medical necessity, differences in timing of spontaneous delivery, or variance in application of the 39 week rule. Additional research is needed to identify the source of these differences and any associated adverse effect is warranted.
References:


Table 1: Relative risk ratios (RRR) after multinomial logistic regression, using gestational age as the outcome and 39 weeks as the base outcome

<table>
<thead>
<tr>
<th></th>
<th>RRR</th>
<th>95% CI**</th>
</tr>
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<tbody>
<tr>
<td>36</td>
<td>1.03</td>
<td>1.01-1.05</td>
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<tr>
<td>37</td>
<td>0.99</td>
<td>0.98-1.01</td>
</tr>
<tr>
<td>38</td>
<td>0.98</td>
<td>0.97-0.99</td>
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<tr>
<td>39</td>
<td>Reference Group</td>
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<td>0.82-0.84</td>
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<tr>
<td>41</td>
<td>0.67</td>
<td>0.66-0.68</td>
</tr>
</tbody>
</table>

*Controlling for maternal race, age, education, body mass index, marital status, parity, insurance, and smoking status.

**RRR- Relative risk ratio, CI- Confidence interval