Effects of Depressive Symptoms on HIV Suppression at Delivery and Postpartum in P1025

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Introduction

- Women living with HIV (WLH) represent 25% of people living with HIV (PLH) in the United States\(^1\)
- Approximately 8,687 WLH give birth every year\(^2\)
- A significant proportion of women do not achieve viral suppression at delivery and many experience poor retention and viral suppression postpartum (Fig.1)

\(^1\)CDC; \(^2\)Whitmore et al. *J Acquir Immune Defic Syndr.* 2011;57(3):218-222.
Depression disproportionately affects WLH

- Prevalence of depression among women is almost twice that of men\(^1\)
- WLH are disproportionately affected by depression compared to men with HIV\(^2\)
- Depression is even higher among pregnant and postpartum WLH\(^3\)

\(^1\)Substance Abuse and Mental Health Services Administration. (2017) https://www.samhsa.gov/data/;  
Depressive Symptoms and Mortality among WLH

WLH who have depressive symptoms are at elevated risk for death, n=765

Depression was measured using the Center for Epidemiologic Studies Depression Scale (CES-D)

How much does depression contribute to these findings?

HIV Care Continuum Postpartum

- HIV Care During Pregnancy: 92%
- Suppression at delivery: 51%
- HIV Care within 3 months of delivery: 38%
- Retention 1 Year Postpartum: 39%
- Suppression 1 Year Postpartum: 31%
- Retention 2 Years Postpartum: 25%
- Suppression 2 Years Postpartum: 33%

Purpose of the Study

The association between prenatal depressive symptoms and viral suppression at birth and postpartum has not been previously examined in a prospective study.

• **Question 1**: Do prenatal depressive symptoms predict viral suppression at delivery and postpartum?
• **Question 2**: How is this relationship mediated by adherence?
Data Source

• P1025 is a prospective multicenter cohort of mother-infant pairs, 2002-2013
  • Multicenter observational study in the United States
  • Designed to assess use and outcomes of ART in pregnancy
  • n=2756 mother-infant pairs, entry in pregnancy and followed up to 24 weeks postpartum
  • WLH, age≥13, with a viable pregnancy of ≥ 8 weeks gestation

• Analysis limited to women with a VL at delivery and 24 weeks postpartum, n=1,367
Proposed model by which depressive symptoms impact maternal and pediatric outcomes
Methods—Depressive symptoms

Mental health Inventory-5 (MHI-5)\(^1,2\)

Participants rate the frequency of each item from 1 ("none of the time") to 6 ("all of the time") over the past month

- Have you felt calm or peaceful?
- Have you felt down-hearted and blue?
- Have you been a happy person?
- Did you have trouble keeping your attention on any activity for long?
- Did you have difficulty reasoning and solving problems

Average score obtained in pregnancy

## Study Variables

<table>
<thead>
<tr>
<th>Outcome: Viral Suppression</th>
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<tbody>
<tr>
<td>VL&lt;400 copies/ml at delivery and at 24 weeks postpartum</td>
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<table>
<thead>
<tr>
<th>Mediator: Self-reported adherence to ART in pregnancy</th>
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<tbody>
<tr>
<td>Any missed doses in the past 4 weeks versus no missed doses</td>
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<table>
<thead>
<tr>
<th>Co-variates</th>
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<tbody>
<tr>
<td>Age: &lt;21, 21-29, 30-35, &gt;35</td>
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<tr>
<td>Multiparity: having ≥ 1 birth prior to current pregnancy</td>
</tr>
<tr>
<td>Race: White, non-Hispanic; Black, non-Hispanic; Hispanic</td>
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<tr>
<td>Education: &lt;11th grade; High school diploma; some college or more</td>
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<tr>
<td>Substance use: Any substance use in the past month other than tobacco, alcohol, and marijuana</td>
</tr>
</tbody>
</table>
Analyses

- Multiple imputation using chained equations (MICE) to impute missing data for depressive symptoms (22%)

- Multiple logistic regression models to evaluate the effects of prenatal depressive symptoms on viral suppression at L&D
  - **Model 1**: Dep Sxs association with viral suppression at L&D, adjusted for confounders (age, race, multiparity, education, substance use)
  - **Model 2**: Everything in Model 1 + Adherence in pregnancy

Effects of prenatal depressive symptoms on viral suppression postpartum

- **Model 1**: Dep Sxs association with viral suppression postpartum, adjusted for confounders
- **Model 2**: Everything in Model 1 + Adherence in pregnancy
## Results

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Values</th>
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<tbody>
<tr>
<td>Depressive symptoms, average (SD)</td>
<td></td>
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<tr>
<td>Lowest tertile</td>
<td>12.6 (4.6)</td>
</tr>
<tr>
<td>Middle tertile</td>
<td>7.6 (1.3)</td>
</tr>
<tr>
<td>Highest tertile</td>
<td>11.7 (1.3)</td>
</tr>
<tr>
<td></td>
<td>17 (3.0)</td>
</tr>
<tr>
<td>Age, &lt;21, n (%)</td>
<td></td>
</tr>
<tr>
<td>21-29</td>
<td>151 (11)</td>
</tr>
<tr>
<td>30-35</td>
<td>650 (48)</td>
</tr>
<tr>
<td>&gt;35</td>
<td>332 (24)</td>
</tr>
<tr>
<td></td>
<td>234 (17)</td>
</tr>
<tr>
<td>&gt;1 previous birth, n (%)</td>
<td>196 (14)</td>
</tr>
<tr>
<td>Race: Black n (%)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>797 (58)</td>
</tr>
<tr>
<td>White</td>
<td>418 (31)</td>
</tr>
<tr>
<td></td>
<td>152 (11)</td>
</tr>
<tr>
<td>Education: &lt;11th grade, n (%)</td>
<td></td>
</tr>
<tr>
<td>High school, GED</td>
<td>516 (38)</td>
</tr>
<tr>
<td>some college or more</td>
<td>575 (42)</td>
</tr>
<tr>
<td></td>
<td>276 (20)</td>
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<tr>
<td>Substance use, n (%)</td>
<td>58 (4)</td>
</tr>
</tbody>
</table>
Results

Adherence and Viral Suppression at L&D and Postpartum in P1025

Adherence
- Prenatal: 64%
- Postpartum: 42%

Viral suppression
- Prenatal: 71%
- Postpartum: 47%

* p<0.05
## Regression Models at L&D and Postpartum

<table>
<thead>
<tr>
<th></th>
<th>Viral Suppression at L&amp;D</th>
<th>Viral Suppression Postpartum</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
</tr>
<tr>
<td><strong>Depressive Sx Tertiles</strong> , <em>ref: lowest</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle</td>
<td>0.9 [0.6,1.3]</td>
<td>0.9 [0.6,1.4]</td>
</tr>
<tr>
<td>Highest</td>
<td>0.6** [0.4,0.8]</td>
<td>0.6* [0.4,0.9]</td>
</tr>
<tr>
<td><strong>Adherence, prenatal</strong> , <em>ref: no missed doses in &gt; 4 weeks</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missed dose in last 1-4 wks</td>
<td>0.6** [0.5,0.9]</td>
<td>0.4*** [0.3,0.6]</td>
</tr>
</tbody>
</table>

* p<0.05, ** p<0.01, *** p<0.001

Prenatal adherence mediates 8% of the effect of depressive sx on suppression at L&D
Prenatal adherence mediates 15% of the effect of depressive sx on suppression at 24 weeks postpartum
Strengths and Limitations

• First study to prospectively evaluate the relationship between prenatal depressive symptoms and viral suppression during pregnancy and postpartum
• Findings based on WLH in the United States

• Selection bias: study participants had to enroll in the cohort, findings can not be extrapolated to all WLH
• Missing data, addressed with multiple imputation
• Depressive symptoms and adherence measures could have been more comprehensive
Conclusions

• Adherence and viral suppression significantly dropped postpartum
• Women in the highest tertile for depressive symptoms were significantly less likely to be suppressed at delivery; this effect was no longer significant postpartum
• Women with missed prenatal ART doses were significantly less likely to be suppressed at delivery and postpartum but the effect was strongest on postpartum viral suppression
Policy Implications

• Findings suggest that investing in the prenatal period, when women engage highly in care to prevent perinatal HIV transmission, can yield long term health benefits for the new mother

• This can be done by:
  • Universally screening WLH for depression in pregnancy
  • Treating women with a diagnosis of depression
  • Investing in programs and interventions to encourage prenatal adherence to ART

• Addressing these issues postpartum can be more challenging and bring less impact on postpartum suppression
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• Statistical Data Analysis Center
  • Deborah Kacanek, ScD
  • Shirley Traite, MSW
• P1025 patients