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Pre-procedural asymptomatic COVID-19 in obstetric and surgical units

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KEY WORDS: COVID-19, SARS-CoV-2, asymptomatic pre-procedural infection
OBJECTIVE

Asymptomatic severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection remains a challenge, accounting for nearly half of all infections.\textsuperscript{1} Infectivity of asymptomatic patients can extend past 14 days, and samples isolated from their respiratory tracts have similar viral loads to symptomatic patients.\textsuperscript{1,2} To mitigate surgical risk to patients and exposure of healthcare workers (HCW), universal testing for SARS-CoV-2 has been suggested for all patients prior to planned procedures,\textsuperscript{3} including delivery,\textsuperscript{4} regardless of symptoms. Pre-procedural asymptomatic infection (PAI) rates in Obstetrics have been reported has high as 14%,\textsuperscript{4} but is unknown in the general surgical population. We sought to compare SARS-CoV-2 PAI rates between the obstetric unit (OU) and surgical units (SU) in one urban tertiary center.

STUDY DESIGN

We conducted a retrospective cohort study of universal pre-procedural SARS-CoV-2 tests performed before any surgery or delivery at Barnes-Jewish Hospital from May 28 - July 22, 2020, after resumption of elective cases. The study was deemed exempt as a quality improvement initiative. The primary outcome was rate of SARS-CoV-2 PAI, compared between an 18-bed OU and 72-room SU. All positive cases underwent chart review to confirm asymptomatic presentation. Multivariable logistic regression was used to adjust for confounders including age and race. Statistical analyses were conducted in R v4.0.2.\textsuperscript{5}

RESULTS

5543 pre-procedural tests were performed: 532 (9.7%) obstetric and 5011 (90.4%) surgical (Table a). Obstetric patients were younger (median age 29.0 vs 56.0, p<0.001), with a greater proportion of females (100% vs 50.4%, p<0.001) and Black (40.4% vs 22.7%) or Hispanic (9.4% vs 1.5%) race (p<0.001). Overall, there were 39 (0.7%) cases of PAI (25/532,
4.7% OU vs. 14/5011, 0.3% SU; p<0.001). After adjusting for age and race, obstetric patients had significantly higher odds of SARS-CoV-2 PAI compared to surgical patients (aOR 4.7, 95% CI 2.3-10.6). After excluding males, the odds of PAI remained significantly higher in the OU (aOR 9.6, 95% CI 92.8-48.3, Table b).

CONCLUSION

The SARS-CoV-2 PAI rate is 15.7 times higher on the OU (4.7%) compared to the SU (0.3%) in one hospital. A significant difference persists after accounting for age, race, and sex. As hospitals resume normal surgical volume and enact universal pre-procedural testing policies, testing capacity remains limited and rationing of supplies is necessary. Our results emphasize the need to prioritize testing and personal protective equipment in OUs, where higher rates of asymptomatic infection increase the potential of spread, particularly during the second stage of labor with prolonged HCW exposure in an aerosol-heavy environment. Whether different background characteristics of obstetric and surgical patients can fully account for the discordance of PAI rates, or whether pregnancy-induced immunomodulation increases the likelihood of asymptomatic infection, is an important question that requires further investigation.

Our study is limited by generalizability due to sampling in one hospital. However, the significant difference between the OU and SU underscores the importance of surveillance in populations who are at increased risk for disease. Focused SARS-CoV-2 obstetric studies could generate valuable information regarding asymptomatic infection, which remains a poorly understood but critically important component of the pandemic.
REFERENCES


Table. Background characteristics of patients undergoing pre-procedural testing for SARS-CoV-2 (a) and asymptomatic positive results of pre-procedural testing (b) compared between the obstetrical and surgical units.

<table>
<thead>
<tr>
<th>Background characteristic</th>
<th>Obstetric unit (N=532)</th>
<th>Surgical unit (N=5011)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age in years</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median (SD)</td>
<td>29.0 (6.0)</td>
<td>56.0 (18.1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>&lt;18 (%)</td>
<td>6 (1.1)</td>
<td>41 (8.2)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>18-45 (%)</td>
<td>525 (98.7)</td>
<td>1349 (26.9)</td>
<td></td>
</tr>
<tr>
<td>&gt;45 (%)</td>
<td>1 (0.2)</td>
<td>3621 (72.2)</td>
<td></td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female (%)</td>
<td>532 (100.0)</td>
<td>2524 (50.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Race (%)</strong></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>White</td>
<td>245 (46.2)</td>
<td>3708 (74.0)</td>
<td></td>
</tr>
<tr>
<td>Black or African American</td>
<td>214 (40.4)</td>
<td>1136 (22.7)</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>13 (2.4)</td>
<td>47 (0.9)</td>
<td></td>
</tr>
<tr>
<td>Pacific Islander</td>
<td>3 (0.6)</td>
<td>4 (0.1)</td>
<td></td>
</tr>
<tr>
<td>American Indian or Alaska Native</td>
<td>1 (0.2)</td>
<td>4 (0.1)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>50 (9.4)</td>
<td>73 (1.5)</td>
<td></td>
</tr>
<tr>
<td>Unable to Answer</td>
<td>3 (0.6)</td>
<td>21 (0.4)</td>
<td></td>
</tr>
<tr>
<td>Declined</td>
<td>3 (0.6)</td>
<td>18 (0.4)</td>
<td></td>
</tr>
</tbody>
</table>

b. Asymptomatic positive results of universal pre-procedural testing

<p>| Overall Asymptomatic Positive (%) | 25 (4.7) | 14 (0.3) | &lt;0.001 |</p>
<table>
<thead>
<tr>
<th></th>
<th>OR (95% CI)</th>
<th>aOR† (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>13.2 (6.9-25.2)</td>
<td>4.7 (2.3-10.6)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Median (SD)</th>
<th>&lt;18 (%)</th>
<th>18-45 (%)</th>
<th>&gt;45 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30.0 (5.9)</td>
<td>1 (4.0)</td>
<td>24 (96.0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td></td>
<td>38.0 (19.8)</td>
<td>1 (7.1)</td>
<td>9 (64.3)</td>
<td>4 (28.6)</td>
</tr>
</tbody>
</table>

| Female (%)           | 25 (100)        | 5 (36)        |                | <0.001        |

<table>
<thead>
<tr>
<th>Race (%)</th>
<th>White</th>
<th>Black or African American</th>
<th>Asian</th>
<th>Pacific Islander</th>
<th>American Indian or Alaska Native</th>
<th>Hispanic</th>
<th>Unable to Answer</th>
<th>Declines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 (0.0)</td>
<td>2 (8.0)</td>
<td>10 (40.0)</td>
<td>0 (0.0)</td>
<td>1 (4.0)</td>
<td>0 (0.0)</td>
<td>11 (44.0)</td>
<td>1 (4.0)</td>
</tr>
<tr>
<td></td>
<td>4 (28.6)</td>
<td>9 (64.3)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Surgical Service (%)</th>
<th>Obstetrics</th>
<th>Orthopaedic Surgery</th>
<th>Ophthalmology</th>
<th>Acute Critical Care Surgery</th>
<th>Minimally Invasive Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25 (100.0)</td>
<td>7 (50.0)</td>
<td>2 (14.2)</td>
<td>4 (28.6)</td>
<td>1 (7.1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Asymptomatic Positive, Men excluded (%)</th>
<th>OR (95% CI)</th>
<th>aOR† (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25 (4.7)</td>
<td>9.6 (2.8-48.3)</td>
</tr>
</tbody>
</table>

|                | 24.8 (9.4-65.1) | 9.6 (2.8-48.3) |

|                | --             | --             | <0.001        |

|                |                |                | <0.001        |
SARS-CoV-2: Severe acute respiratory syndrome coronavirus 2

OR: odds ratio; aOR: adjusted odds ratio; SD: standard deviation; CI: confidence interval

† Adjusted for age (as categorical variable) and race

Statistically significant results bolded
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Manuscript title: Pre-procedural asymptomatic COVID-19 in obstetric and surgical units

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Authors may either sign the same form or submit individually

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