

Journal Pre-proof

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PII: S0002-9378(20)31102-9

DOI: <https://doi.org/10.1016/j.ajog.2020.09.023>

Reference: YMOB 13500

To appear in: *American Journal of Obstetrics and Gynecology*

Received Date: 14 September 2020

Accepted Date: 18 September 2020

Please cite this article as: KELLY JC, RAGHURAMAN N, PALANISAMY A, STOUT MJ, CARTER EB, Pre-procedural asymptomatic COVID-19 in obstetric and surgical units, *American Journal of Obstetrics and Gynecology* (2020), doi: <https://doi.org/10.1016/j.ajog.2020.09.023>.

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TITLE:

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

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The authors report no conflicts of interest.

Financial support for research: none

WORD COUNT: 498

24 **CONDENSATION:** N/A

25 **SHORT TITLE:** Asymptomatic pre-procedural COVID-19

26

27 **ABSTRACT:** N/A

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

29

OBJECTIVE

Asymptomatic severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection remains a challenge, accounting for nearly half of all infections.¹ Infectivity of asymptomatic patients can extend past 14 days, and samples isolated from their respiratory tracts have similar viral loads to symptomatic patients.^{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,³ including delivery,⁴ regardless of symptoms. Pre-procedural asymptomatic infection (PAI) rates in Obstetrics have been reported as high as 14%,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 v4.0.2.⁵

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.⁴ 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.

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TABLES

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.

a. Baseline characteristics of patients undergoing universal pre-procedural testing			
Background characteristic	Obstetric unit (N=532)	Surgical unit (N=5011)	p-value
Age in years			
Median (SD)	29.0 (6.0)	56.0 (18.1)	<0.001
<18 (%)	6 (1.1)	41 (8.2)	<0.001
18-45 (%)	525 (98.7)	1349 (26.9)	
>45 (%)	1 (0.2)	3621 (72.2)	
Sex			
Female (%)	532 (100.0)	2524 (50.4)	<0.001
Race (%)			<0.001
White	245 (46.2)	3708 (74.0)	
Black or African American	214 (40.4)	1136 (22.7)	
Asian	13 (2.4)	47 (0.9)	
Pacific Islander	3 (0.6)	4 (0.1)	
American Indian or Alaska Native	1 (0.2)	4 (0.1)	
Hispanic	50 (9.4)	73 (1.5)	
Unable to Answer	3 (0.6)	21 (0.4)	
Declined	3 (0.6)	18 (0.4)	
b. Asymptomatic positive results of universal pre-procedural testing			
Overall Asymptomatic Positive (%)	25 (4.7)	14 (0.3)	<0.001

OR (95% CI)	13.2 (6.9-25.2)	--	
aOR† (95% CI)	4.7 (2.3-10.6)	--	
Age			
Median (SD)	30.0 (5.9)	38.0 (19.8)	<0.001
<18 (%)	1 (4.0)	1 (7.1)	0.006
18-45 (%)	24 (96.0)	9 (64.3)	
>45 (%)	0 (0)	4 (28.6)	
Female (%)	25 (100)	5 (36)	<0.001
Race (%)			
White	0 (0.0)	4 (28.6)	0.036
Black or African American	2 (8.0)	9 (64.3)	
Asian	10 (40.0)	0 (0.0)	
Pacific Islander	0 (0.0)	0 (0.0)	
American Indian or Alaska Native	1 (4.0)	0 (0.0)	
Hispanic	0 (0.0)	1 (7.1)	
Unable to Answer	11 (44.0)	0 (0.0)	
Declines	1 (4.0)	0 (0.0)	
Surgical Service (%)			<0.001
Obstetrics	25 (100.0)		
Orthopaedic Surgery		7 (50.0)	
Ophthalmology		2 (14.2)	
Acute Critical Care Surgery		4 (28.6)	
Minimally Invasive Surgery		1 (7.1)	
Asymptomatic Positive, Men excluded (%)	25 (4.7)	5 (0.1)	<0.001
OR (95% CI)	24.8 (9.4-65.1)	--	
aOR† (95% CI)	9.6 (2.8-48.3)	--	

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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