Prenatal COVID-19 Vaccine Recommendations: Physician Behaviors, Comfort, and Perceived Patient Receptiveness

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Abstract

Numerous professional organizations and obstetric associations endorse prenatal COVID-19 vaccination. Whereas there are no safety concerns for receiving a COVID-19 vaccination during pregnancy, COVID-19 infection at delivery can cause devastating maternal and fetal outcomes. In this study, we assessed physicians' behaviors of discussing and recommending COVID-19 vaccinations to their pregnant patients. We recruited a sample of prenatal physicians ($n = 201$) in June 2021 via an online survey panel. We assessed the proportion of providers discussing and recommending the COVID-19 vaccine to their pregnant patients, physician comfort in recommending the COVID-19 vaccination to their pregnant patients, and their perception of their patients' receptiveness of the COVID-19 vaccine. We used R for conducting bivariate analyses. Most providers discussed (85%) and recommended (83%) the COVID-19 vaccine to over half of their prenatal patients. Providers reported overall comfort in recommending the vaccine to prenatal patients and reported prenatal patients were open and receptive to receiving the vaccine. High recommending providers (those who discussed and recommended the COVID-19 with more than half of their prenatal patients) reported feeling more confident than providers who discussed ($p < .001$) and recommended ($p < .001$) the vaccine to less than half of their patients (low recommending providers). Similarly, compared to low recommending providers, high discussing ($p < .001$) and low recommending providers ($p < .001$) perceived their prenatal patients were more open and receptive to receiving the COVID-19 vaccine. Findings indicate that skill-building and decision-aid tools for providers' vaccine recommendations are warranted. Future studies should focus on provider recommendations that can support pregnant patients in informed decision-making.

Keywords: SARS CoV-2; COVID-19; vaccination; prenatal; pregnancy

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Introduction

By July 2022, the Centers for Disease Control and Prevention reported over 225,000 COVID-19 cases in pregnant people in the United States (U.S.) (Centers for Disease Control and Prevention [CDC], 2022). With 306 deaths and almost 35,000 hospitalizations reported in pregnant women from January 2020 to July 2022, evidence

amassed that pregnancy increases the likelihood of serious illnesses associated with COVID-19. Pregnant people infected with COVID-19, compared to their non-pregnant counterparts, were more likely to be admitted to an intensive care unit and die (Zambrano et al., 2020). A COVID-19 infection at delivery was found to be associated with preeclampsia, preterm birth, and maternal mortality, compared to delivery without infection (Jering et al., 2021). Risk for stillbirth, especially after the emergence of the B.1.617.2 (Delta) variant, is higher in deliveries with a COVID-19 infection (DeSisto, 2021). COVID-19 vaccines were made available to the general public in December 2020 (U.S. Food and Drug Administration, 2020), but vaccine uptake was limited in pregnant people. Of pregnant people hospitalized in 2021, 97% with a COVID-19 infection were unvaccinated (CDC, 2021). Vaccines can prevent illness complications from occurring during pregnancy; however, hesitation and doubt plague patients contemplating prenatal vaccination.

In August 2021, the CDC reaffirmed their recommendation and support of prenatal COVID-19 vaccination, which was also endorsed by the American College of Obstetrics and Gynecologists (ACOG) and the Society for Maternal Fetal Medicine (CDC, 2021). In general, vaccine uptake among pregnant people has been lower compared to non-pregnant people (Razzaghi et al., 2021) and research has constructed a conflicting demographic profile of the pregnant person predisposed to COVID-19 vaccine uptake. Pregnant people surveyed from mid-December 2020 to mid-January 2021 that refused vaccination were likely to be young, Black or African American, of Hispanic ethnicity, a non-college graduate, and additionally refused the annual influenza vaccine (Levy, Singh, Riley, & Prabhu, 2021). Pregnant people surveyed in a

December 2020 to March 2022 cohort demonstrated significant differences in COVID-19 vaccine acceptance among similar demographic breakdowns and receipt of Tdap and influenza vaccines (Ha et al., 2023), and these trends have persisted in booster dose uptake among pregnant persons (Razzaghi et al., 2022).

Conversely, an international survey, including the U.S., conducted between late October 2020 to mid-November 2020 found all countries shared the following factors associated with COVID-19 vaccination acceptance while pregnant: confidence in COVID-19 vaccine safety and effectiveness, belief in vaccination importance, confidence in routine childhood vaccines, worry about COVID-19, trust of public health agencies and science, and compliance with face-mask guidelines (Skjefte et al., 2021). Whereas factors associated with vaccine acceptance transcend international borders, the strength of these convictions – trust and belief in public health and science – fluctuates between nations, with the U.S. ranking amongst the lowest in vaccine acceptance among pregnant surveillants (Skjefte et al., 2021). A cohort of south Florida pregnant persons demonstrated a significantly higher average of vaccine uptake among persons born in another country, compared to persons born in the U.S. (Agasse, Rodriguez, Vilariño, Galli, & Potter, 2024).

As researchers attempt to define the determinants of COVID-19 vaccine acceptance during pregnancy, we turn to physicians to approach all patients with education and rapport building best practices. Vaccine counseling typically consists of discussing the benefits of the vaccine, addressing misconceptions and fears, and describing, now with the CDC's endorsement, that the benefits outweigh any potential harms for COVID-19 vaccination during pregnancy (Chavan, Qureshi, Karnati, & Kollikonda, 2021). Vaccine counseling

considers the risk factors unique to each patient – the physician assesses the likelihood of a patient contracting a COVID-19 infection based on use of mitigation strategies and recurring exposures, and considers any secondary chronic diseases that increase the risk for severe illness from a COVID-19 infection (Kalafat et al., 2021).

Given the rapidly changing COVID-19 vaccine context, providing pregnant patients with "professionally responsible vaccine counseling" is essential (Chervenak et al., 2021). Provider recommendation is a key factor in prenatal vaccine decision-making (Lutz, Carr, Cohn, & Rodriguez, 2018; Myers, 2016; Poliquin, Greyson, & Castillo, 2019; Wilson, Paterson, Jarrett, & Larson, 2015; Yuen & Tarrant, 2014), and specific COVID-19 vaccine guidelines from professional organizations recommend physicians provide their prenatal patients with information about the safety and efficacy of the vaccine (ACOG, 2020) and respectfully address vaccine hesitancy (Chervenak et al., 2021). However, with these emergent recommendations, there is a lack of information about the best practices to incorporate COVID-19 vaccine recommendations into clinical practice and little information about current prenatal physician behaviors related to COVID-19 vaccine recommendations. Specifically, there is a need to examine the ways in which the vaccine recommendation is occurring and presented to patients. Thus, the purpose of this study is to assess the proportion of patients that prenatal providers discuss and recommended the COVID-19 vaccine to, physician comfort in discussing and recommending the vaccine, and perceived patient receptiveness to the vaccine. This study is guided by the Cabana Framework, a framework that addresses factors that influence provider adoption of guidelines (Cabana et al., 1999) – in this case, COVID

vaccine recommendations and guidelines for pregnant people.

Methods

Conceptual Framework

The Cabana Framework posits that there is a sequence to provider guideline adherence, which requires knowledge of the guideline, attitudes about the guideline, and the ultimate behavior, which leads to changes in patient outcomes (Cabana et al., 1999). In each step of this sequence, there are factors related to guideline adherence we have conceptualized in this study (Table 1). We have also incorporated vaccine discussion frameworks into this study, as healthcare provider recommendation is a predictor of vaccine uptake and strong recommendations can reduce vaccine hesitancy (Fisher et al., 2023). Vaccine frameworks often utilize two approaches to vaccine communication: presumptive and participatory. A presumptive vaccine recommendation involves clearly and explicitly recommending a vaccine (Jacobson, St Sauver, Griffin, MacLaughlin, & Finney Rutten, 2020), for example: "You're due for the COVID-19 vaccine, we'll give it at the end of your visit." Participatory approaches engage the patient in the conversation and often involve a discussion (Opel et al., 2013), for example: "What are you planning to do about the COVID-19 vaccine?" Here, we examine both participatory approaches and presumptive approaches to understand current communication strategies utilized to recommend COVID-19 vaccines to prenatal patients.

Sample and Procedure

The target population for this study was prenatal providers in the U.S. Participants were recruited using Dynata, an online

Table 1

Cabana Framework application and operationalization in the study

	Cabana Framework Stage			
	Attitudes	**Behavior**	**Guideline Adoption**	
Barriers to Guideline Adherence (from Cabana Framework)	Agreement, outcome expectancy, self-efficacy, motivation	Patient factors: inability to reconcile patient preferences with guidelines; Guideline factors: guideline characteristics; Environmental factors: lack of time	Vaccine counseling behaviors	
Conceptualized in this study	Self-efficacy	Patient factors and preferences	Discussing vaccine with patients (Participatory Approach)	Recommending vaccine to patients (Presumptive Approach)
Operationalized in this study	**Predictor Variable:** Comfort recommending COVID vaccination to pregnant patients	**Predictor Variable**: Provider perception of pregnant patient's openness/receptiveness to COVID vaccination	**Outcome Variable:** % of prenatal patients discussed the COVID vaccination	**Outcome Variable:** % of prenatal patients recommended the COVID vaccine
Response Options	1-10, not at all comfortable to extremely comfortable	1-10, not at all receptive to extremely receptive	- 0-50%: low discussing providers - 51%-100%: high discussing providers	- 0-50%: low recommending providers - 51%-100% high recommending providers

Note.

*Knowledge is an additional Cabana Framework Stage not addressed in this study.

survey panel company, over a weeklong period in June 2021, prior to the official CDC recommendation in August 2021. An email invitation was sent to potential participants, with a link to the study description, and an informed consent document. If the participant agreed to the consent, they were forwarded to the screening items. Inclusion criteria and screening items were: (1) provide prenatal healthcare (*Do you provide prenatal care you patients?* yes/no); (2) trained as a physician (*Which of the following best describes you?* MD/DO/Other); (3) currently licensed to practice in the U.S. (*Are you licensed to provide healthcare in the U.S.?* yes/no). From that point, if participants met the inclusion criteria, they were directed to complete the online survey, hosted by Qualtrics. Participants received incentives through Dynata, which could include credits, points, or donations. The survey took approximately 15 minutes to complete.

Measures

Outcome variables. The outcome variables are two behaviors: provider discussion and recommendation of the COVID-19 vaccine, which align with participatory and presumptive recommendation strategies. Physicians rated themselves in quartiles for what percentage of their prenatal patients they *discuss* COVID-19 vaccination with (participatory approach), and what percentage of their prenatal patients they *recommend* the COVID-19 vaccine to (presumptive approach; 0%-25%, 26%-50%, 51%-75%, 76%-100%). Given the distribution of responses, these items were dichotomized into low (0%-50%; called low discussing or low recommending providers) and high (51%-100%; high discussing/recommending providers) categories.

Predictor variables. Physicians rated themselves on how *comfortable* they were recommending COVID-19 vaccination to their pregnant patients using a 1 to 10 scale, equivocal to "not at all comfortable" to "extremely comfortable." Using the same scale, they also rated how open and *receptive* to the COVID-19 vaccine they perceived their pregnant patients to be. Three respondents did not answer the *comfort* question and two respondents did not answer the *receptive* question.

Demographics. Measures related to demographics included organization-level factors, such as identification as a federally qualified health center (FQHC; yes/no), affiliation with an academic/teaching organization (yes/no), and organization part of a larger clinic network (yes/no). Physicians were asked to identify their current practice setting (community clinic, outpatient clinic hospital, private practice, health department, birthing center, other), which was collapsed into private practice, outpatient clinic hospital, or other, given the sample distribution. Physicians were also asked to identify membership in professional organizations (yes/no). Individual physician characteristics included years in practice (categorical), gender identity (woman, man, transgender, non-binary, other), ethnicity (Hispanic/Latinx, Not-Hispanic/Not-Latinx), and race (American Indian/Alaska Native, Asian, Black, Native Hawaiian/Pacific Islander, White, Another race). Due to answer distributions, we collapsed gender identity into woman or man, years in practice into less than one year to 10 years, 11 to 15 years, or 16 or more years, and race into White, Black, Asian, or other.

Data Analysis

We performed statistical analyses in R version 4.1.0 and reported on percent

frequency, mean, and standard deviations across demographic and COVID-19 questions. Fisher's exact test and chi-square test were applied to the data, based on sample sizes, to determine if a relationship existed between physician characteristics and the outcome variables of *discussion* and *recommendation* of the COVID-19 vaccine. We used one-way analysis of variance (ANOVA) tests to compare physician characteristics (organization-level factors, current practice setting, demographic identities) and variables of *comfort* and *receptiveness* of patients. We used ANOVA to compare outcome variables and predictor variables. We considered a *p*-value of $< .05$ as statistically significant.

Results

Physician Characteristics

We analyzed the responses of 201 physicians licensed to provide healthcare in the U.S., and currently provide prenatal care to patients. Approximately three-fourths (75.8%) of respondents identified as White, 5.5% physicians described themselves as Hispanic or Latinx and 94.5% as Not Hispanic or Latinx (Table 2). Most responding physicians identified as male (59.0%). All the respondents specialized in obstetrics/gynecology and most of the respondents (73.3%) had been in practice for 16 years or more. For participant practice setting, 39.3% work for an organization with an affiliation to an academic/teaching establishment, 19.0% work for an FQHC, and 39.3% described their organization as part of a larger network of clinics.

COVID-19 Vaccination – Discussion and Recommendation

Most of the sampled physicians (84.6%, 95% confidence interval [CI]: 78.8%-89.0%)

indicated that they discuss the COVID-19 vaccine with the majority (51%-100%; high discussing providers) of their prenatal patients. Furthermore, 82.6% (95% CI: 76.7%-87.3%) of sampled physicians were high recommending providers (recommend the COVID-19 vaccine to 51%-100% of their prenatal patients; Table 3). Chi-square results for discussing the vaccine with prenatal patients revealed a significant difference by physician's practice setting ($p = .003$; Table 4). Ninety percent of physicians in private practice were high discussing providers, and the proportion was 82% in outpatient clinics and 67% in other settings. We found no statistically significant associations between demographic variables and physician recommending the COVID-19 vaccine to prenatal patients.

COVID-19 Vaccination – Comfort and Patient Reception

On a 1 to 10 scale, physicians rated their comfort recommending the COVID-19 vaccination to pregnant patients with an average of 8.51, inclined towards extreme comfort ($SD = 2.42$; Table 3). Average scores of comfort in recommending the COVID-19 vaccine to pregnant patients were not significantly different by physician's demographic characteristics or practice setting.

Sampled physicians rated the average receptiveness of pregnant patients to the COVID-19 vaccine as 6.39 ($SD = 2.42$), midrange between not at all receptive and extremely receptive. The average rating for the receptiveness of pregnant patients towards the COVID-19 vaccine did not differ by physician's years in practice, practice setting, affiliation to an academic establishment, or affiliation to a FQHC (Table 5). Providers who are men perceived a higher receptivity among their prenatal patients for COVID-19 vaccination

Table 2

Frequencies of sociodemographic factors in a national sample of prenatal physicians (n = 201).

	n %
Race (*n* = 198)	
White	150 (75.7)
Black or African American	6 (3.0)
Asian	37 (18.7)
Another race	5 (2.5)
Ethnicity (*n* = 199)	
Hispanic or Latinx	11 (5.5)
Not Hispanic or Latinx	188 (94.5)
Gender identity (*n* = 200)	
Woman	81 (40.5)
Man	119 (59.5)
Years in practice (*n* = 195)	
Less than one year to 10 years	30 (15.4)
11 to 15 years	22 (11.3)
16 years or more	143 (73.3)
Practice setting	
Private Practice	130 (64.7)
Outpatient clinic hospital	38 (18.9)
Other	33 (16.4)
Organization part of a large network of clinics	
Yes	79 (39.3)
No	122 (60.7)
Organization affiliated with an academic/teaching organization	
Yes	79 (39.3)
No	122 (60.7)
Organization is a Federally Qualified Health Center (FQHC)	
Yes	39 (19.4)
No	162 (80.6)
Degree type	
MD	193 (96.0)
DO	8 (4.0)

Table 3
Discussion and recommendation of COVID-19 vaccination in a national sample of prenatal physicians (n = 201)

	N (%)	95% CI
What percentage of your prenatal patients do you discuss COVID vaccination with?		
0-50% - Low discussing providers	31 (15.4)	11.0-21.2
51%-100% - High discussing providers	170 (84.6)	78.8-89.0
What percentage of your prenatal patients do you recommend the COVID vaccine to?		
0-50% - Low recommending providers	35 (17.4)	12.7-23.3
51%-100% - High recommending providers	166 (82.6)	76.7-87.3
	Mean (SD)	**CI**
Comfort recommending COVID vaccination to pregnant patients (*N* = 198)	8.51 (2.42)	8.2-8.8
Pregnant patient's openness/receptiveness to COVID vaccination (*N* = 199)	6.39 (2.42)	6.0-6.7

compared to providers who are women, $F_{(1,196)} = 5.116$, $p = .025$. Physicians within large clinic networks perceived a higher receptivity among their pregnant patients for COVID-19 vaccination compared to physicians not in these types of networks, $F_{(1,197)} = 4.32$, $p = .039$.

Discussion, Recommendation, Comfort, and Patient Reception

Providers who discussed vaccination with a high proportion of patients (51%-100%) were significantly more *comfortable* recommending the vaccine to their patients (Figure 1) than providers who discussed vaccination with a low proportion of patients, $F_{(1,196)} = 30.39$, $p < .001$. Providers who recommended vaccination to a high proportion of patients (51%-100%) reported more *comfort* recommending the vaccine compared to those who recommended vaccination to a lower proportion of patients (0-50%), $F_{(1,196)}=117.79$, $p < .001$.

Similarly, compared to providers who discussed vaccination with a low proportion of patients, providers who discussed vaccination with a high proportion of patients rated their patients as more *receptive* to receiving COVID-19 vaccine information, $F_{(1,197)} = 17.96$, $p < .001$. Providers who recommended vaccination to a high proportion of patients (51%-100%) felt their patients were more *receptive* to receiving this information compared to those who recommended vaccination to a lower proportion, $F_{(1,197)} = 26.52$, $p < .001$.

Discussion

This study provides an overview of prenatal provider practice behaviors, in the context of the Cabana Framework and two vaccine communication approaches. We examined discussion and recommendation of COVID-19 vaccination to prenatal patients and variables that may be associated with these outcomes, including perceived patient receptivity and provider comfort. Overall, the majority of prenatal providers were discussing and recommending COVID-19 vaccination to their pregnant patients and reported being comfortable doing so. Physicians who were more comfortable recommending COVID-19 vaccination were more likely to discuss and recommend the COVID-19 vaccine to their pregnant patients. Providers reported moderate patient receptivity to COVID-19 vaccine discussions, and this was associated with the

Table 4

Discussion and recommendation of COVID-19 vaccination by physician demographic variables in a national sample of prenatal physicians (n = 201)

	What percentage of your prenatal patients do you *discuss* COVID vaccination with?			What percentage of your prenatal patients do you *recommend* the COVID vaccine to?		
	0-50%	51%-100%		0-50%	51%-100%	
	n (%)	*n (%)*	*p*-value	*n (%)*	*n (%)*	*p*-value
Gender identity						
Male	19 (15.97)	100 (84.03)	.825	21 (17.65)	98 (82.35)	.947
Female	12 (14.81)	69 (85.19)		14 (17.28)	67 (82.72)	
Years in Practice						
< One year to 10 years	6 (20.00)	24 (80.00)		4 (13.33)	26 (86.67)	
11 to 15 years	4 (18.18)	18 (81.82)	.507[†]	5 (22.73)	17 (77.27)	.702[†]
16 or more years	19 (13.29)	124 (86.71)		24 (16.78)	119 (83.22)	
Practice setting						
Private practice	13 (10.00)	117 (90.00)		21 (16.15)	109 (83.85)	
Outpatient clinic hospital	7 (18.42)	31 (81.58)	.003*	4 (10.53)	34 (89.47)	.091[†]
Other	11 (33.33)	22 (66.67)		10 (30.30)	23 (69.70)	
Organization part of a large network of clinics						
Yes	13 (16.46)	66 (83.54)	.744	15 (18.99)	64 (81.01)	.664
No	18 (14.75)	104 (85.25)		20 (16.39)	102 (83.61)	
Organization affiliated with an academic/teaching organization						
Yes	11 (13.92)	68 (86.08)	.636	10 (12.66)	69 (87.34)	.153
No	20 (16.39)	102 (83.61)		25 (20.49)	97 (79.51)	
Organization a Federally Qualified Health Center (FQHC)						
Yes	4 (10.26)	35 (89.74)	.459[†]	7 (17.95)	32 (82.05)	.922
No	27 (16.67)	135 (83.33)		28 (17.28)	134 (82.72)	

Note.

* = Significant at *p* < .05

† = Fisher's Exact Test

Table 5

Comfort and receptiveness to COVID-19 vaccination by physician demographic variables in a national sample of prenatal physicians

	Comfortable recommending COVID vaccination to pregnant patients (*n* = 198)				Receptivity of pregnant patients to COVID vaccination (n=199)			
	Mean (SD)	df	F	*p*	Mean (SD)	df	F	*p*
Gender Identity								
Male	8.52 (2.49)	[1,195]	0.019	.891	6.71 (2.48)	[1,196]	5.116	.025*
Female	8.47 (2.36)				5.93 (2.27)			
Years in Practice								
< One year to 10 years	9.03 (1.32)				6.43 (2.33)			
11 to 15 years	8.24 (2.51)	[3,188]	0.696	.555	7.19 (2.11)	[3,189]	1.034	.379
16 or more years	8.42 (2.61)				6.20 (2.48)			
Practice Setting								
Private practice	8.44 (2.56)				6.44 (2.47)			
Outpatient clinic hospital	8.39 (2.21)	[2,195]	0.482	.618	6.35 (2.14)	[2,196]	0.11	.896
Other	8.90 (2.12)				6.22 (2.56)			
Organization part of a large network of clinics								
Yes	8.65 (2.28)	[1,196]	0.475	.491	6.83 (2.36)	[1,197]	4.32	.039*
No	8.40 (2.53)				6.11 (2.42)			
Organization affiliated with an academic/teaching organization								
Yes	8.66 (2.21)	[1,196]	0.562	.454	6.70 (2.36)	[1,197]	2.14	.145
No	8.40 (2.56)				6.19 (2.44)			
Organization a Federally Qualified Health Center (FQHC)								
Yes	8.21 (2.90)	[1,196]	0.667	.415	5.95 (2.85)	[1,197]	1.56	.213
No	8.57 (2.31)				6.49 (2.30)			

Note.

* = Significant at *p* < .05

Figure 1

Comfort and receptiveness to COVID-19 vaccination by physician COVID-19 vaccine behavior in a national sample of prenatal physicians
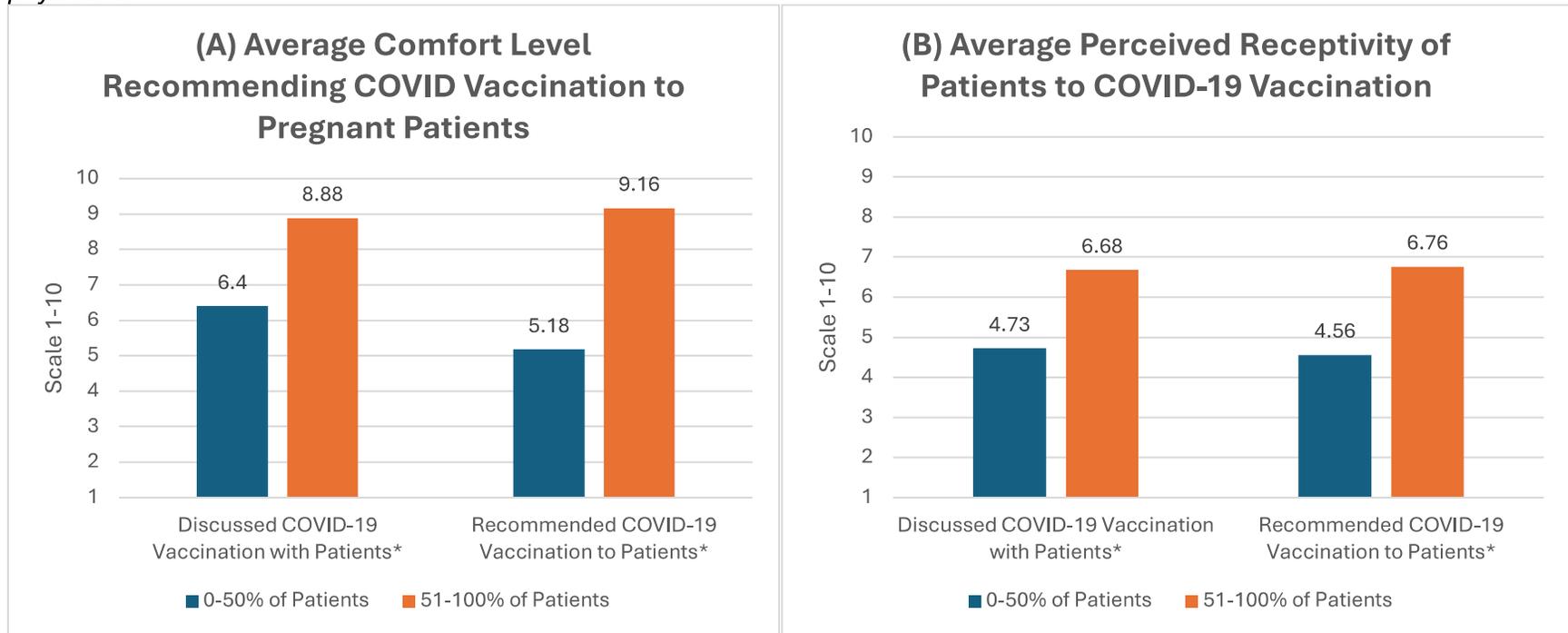
Note.
* = Significant at p < .05
10 = high comfort; 1 = low comfort

proportion of patients to which the vaccine was discussed and recommended.

In this current study, there were statistically significant associations between provider comfort with recommending COVID-19 vaccination and the discussion and recommendation of COVID-19 vaccination to prenatal patients. One method of alleviating discomfort among providers is through having strong, uniform national guidelines. Several national professional organizations, such as the CDC (August 2021), ACOG, and the Society for Maternal Fetal Medicine (individual recommendations December 2020; joint recommendation, January 2021), have recently supported COVID-19 vaccination during pregnancy based on the strong evidence of potential benefits of reducing COVID-related harm outweighing potential vaccination risk (Bowman et al., 2021; Goldshtein et al., 2021; Nguyen, 2021; Woodworth et al., 2020). Previous qualitative studies on provider comfort with recommending other vaccines during pregnancy (i.e., influenza and Tdap) identified lack of awareness of national recommendations and lack of provider recommendation as two of several substantial barriers to prenatal vaccines (Leddy et al., 2009; Panda, Stiller, & Panda, 2011; Swamy & Heine, 2015). It is critical that recommended guidelines for COVID-19 vaccination in pregnancy not only map onto evidence-based safety and effectiveness research but also provide clear, direct recommendations that facilitate guideline dissemination and translation into clinical practice. From this study, it appears that providers are currently using multiple strategies, presumptive and participatory, to provide these recommendations. Given the September 2023 recommendation that individuals ages 5 years and older (including those who are pregnant, breastfeeding, or might become pregnant in the future) receive 1 dose of updated (2023-2024 Formula) mRNA COVID-19 vaccine (U.S. Food and Drug Administration, 2023), implementation strategies to incorporate these recommendations into prenatal care are essential, particularly those focusing on provider communication.

These findings should be considered in the context of the study limitations. First, these data are derived from a convenience sample with an online survey panel. As such, sampling bias may be introduced to this study. Moreover, given the ever-changing COVID-19 landscape, the date of data collection must be recognized as practice guidelines or vaccine recommendations may continue to change after these data were collected. The timing of our survey – June 2021 – occurred shortly before the unified change in guidance by the CDC, ACOG, and the Society for Maternal-Fetal Medicine, at the end of July, 2021 (Grunebaum & Chervenak, 2023). Physician discussion and recommendation of the COVID-19 vaccine may have been tapered by the existing recommendations of professional organizations at this time. Next, this study measured perceived practice behavior rather than actual practice behaviors. There is a possibility of misclassification bias in how prenatal physicians report some of these outcomes, as well as social desirability bias. We assessed some contextual factors, such as practice type, but did not include information about rurality or region of the country in which providers practice, both of which may have societal and practice norms that influenced provider behaviors. Finally, this was a cross-sectional survey. We cannot disentangle whether behavior is influenced by comfort level or receptivity of patients, or vice versa. Future studies should utilize longitudinal designs and linkage to electronic medical record data to address these biases.

Implications for Health Behavior Research

This study has implications for health behavior research as it presents information on the receptivity of patients and how it may influence physician behavior. Discourse on patient refusal continues to shift as evidence of vaccine beneficence and associated risks of a delivery with a COVID-19 infection solidifies. The ACOG previously recommended that "…pregnant patients who refuse the vaccine should be supported in their decision" (Chervenak et al., 2021); however, their current guidelines suggest that physicians "should address ongoing questions and concerns and offer vaccination again" in subsequent visits (ACOG, 2020). COVID-19 vaccine guidelines phrased to "encourage" eligible pregnant patients to be vaccinated (Chervenak et al., 2021) may not adequately give providers the necessary insight on initiating this conversation with prenatal patients, particularly when patients are hesitant. Assessing the strategies and interventions to improve these provider behaviors may be a starting point for expanding this line of health behavior research within the prenatal context. Examining the content of the discussion and recommendation from providers may guide areas of future intervention, and exploring patient perceptions to these approaches can inform next steps.

In addition to examining traditional health behavior theories that may guide provider behavior change, the 4 C's framework may be helpful for providers to address vaccine hesitancy in pregnant patients (Shook, Kishkovich, & Edlow, 2022). The 4 C's include confidence (in recommendations and in efficacy and safety data), complacency (individual risk perception), convenience (reducing individual barriers), and compassion (recognizing and validating feelings) (Shook et al., 2022). Future research should investigate how to improve behaviors associated with provider comfort in recommending the COVID-19 vaccine through stronger guideline support and addressing other behavioral barriers such as vaccine hesitancy and how to contend with patient refusal compassionately. More specific methods of behavior change could include provider training on accurate and timely resources, methods of providing strong recommendations, and resources for hesitancy and other patient education materials – coupled with an organizational- or clinic-level intervention (Finney Rutten et al., 2021). As prenatal care providers increasingly view vaccine counseling and administration in their purview, so do they view their level of training less than adequate and that their practice would benefit from continuing education (Leddy et al., 2009).

Our research demonstrated a significant relationship between a contextual factor, a physician's practice setting and the discussion of the COVID-19 vaccine, but not with recommendation of the vaccine. This could be due to the popularity of the participatory or shared decision-making approach, in which physician's provide information on the benefits and risks of a choice without specifically providing an endorsement or supplying a recommendation (Chervenak et al., 2021). Additionally, current ACOG guidelines suggest that physicians document the discussion in the patient's medical record (ACOG, 2020). Furthermore, the significant relationship with practice setting and the discussion of the COVID-19 vaccine and participatory approaches may stem from organizational infrastructure, such as electronic health records and point-of-care prompts and reminders that can bolster vaccination rates (Finney Rutten et al., 2021). Ultimately, future work around this process should consider the larger behavioral context in which these recommendations are occurring,

along with the resources available within the organization.

Conclusions

Overall, our examination of prenatal physicians' discussion and recommendation of COVID-19 vaccination to pregnant patients is timely given the ongoing COVID-19 pandemic and may provide insight into the translation of recent vaccine recommendations into practice. Prenatal physicians are now at the frontline for recommending the COVID-19 vaccine, and this study indicates that skill building in provider recommendation for the vaccine may be warranted. Moreover, frameworks, guidance, decision-aid tools, or other resources may assist prenatal providers who need added support in making strong, evidence-based recommendations to their patients. Continued surveillance of COVID-19 vaccination uptake among pregnant persons is needed, as well as the healthcare provider recommendations that can support pregnant patients in informed decision-making.

Discussion Questions

During the COVID-19 pandemic, information and recommendations were translated rapidly into practice and clinical care. What mechanisms and leverage points can be used to rapidly dissemination changes in vaccine guidelines to healthcare providers to improve implementation?

What strategies can be utilized to improve patient-provider vaccine discussions as guidelines and recommendations continue to evolve in the future?

The change in vaccine perspectives that occurred during COVID-19 may be longstanding – what might be the impact of these changing perspectives on the health of pregnant people over time?

Ethical Approval Statement

No identifying information was collected from participants, and this study was approved by the University of North Texas Institutional Review Board.

Conflict of Interest Statement

The authors report no conflicts of interest.

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