CANADIAN SURVEILLANCE OF COVID-19 IN PREGNANCY: EPIDEMIOLOGY, MATERNAL AND INFANT OUTCOMES

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Maternal and Infant Outcomes (March 3 2020 to December 31 2022) from 9 Canadian Provinces and Territories

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(See appendix 1 for list of collaborators)

Funders: Public Health Agency of Canada*, COVID-19 Immunity Task Force, the Canadian Institutes for Health Research, and the BC Women's Health Foundation
*The views expressed herein do not necessarily represent the views of the Public Health Agency of Canada.

SUMMARY

1. Rates of hospitalization and ICU admission have declined since December 31, 2021.
2. Preterm birth and NICU admission rates are similar between pre-Delta, Delta, and Omicron variant periods of the pandemic.
3. Risk of hospitalization, ICU admission, preterm birth, and infant NICU admission are significantly lower for those with ≥2 vaccinations compared to the unvaccinated.

1.0 BACKGROUND

The Canadian Surveillance of COVID-19 in Pregnancy project (CANCOVID-Preg) has been central to understanding the evolving epidemiology of COVID-19 in pregnancy. Previously published CANCOVID-Preg data have confirmed international findings that pregnant women/persons were at increased risk of severe illness from SARS-CoV-2, including the need for maternal hospitalization and admission to an intensive care unit (ICU).[1-18] We are now monitoring disease severity in both vaccinated (i.e., 2+ doses) and unvaccinated (i.e., no doses) pregnant women/persons over time with variant emergence. By identifying pregnant women/persons who are most at risk for adverse maternal and infant outcomes, CANCOVID-Preg data can be used to inform public health and the clinical management of this population. This report highlights interim findings from nine provinces and territories [British Columbia (BC), Ontario (ON), Manitoba (MB), Quebec (QC), New Brunswick (NB), Nova Scotia (NS), Prince Edward Island (PE), Yukon Territory (YT) and Alberta (AB)], participating in the CANCOVID-Preg Project.

2.0 METHODS

On behalf of public health officials, with support from the Public Health Agency of Canada, the COVID-19 Immunity Task Force, the Canadian Institutes for Health Research, and the BC Women's Health Foundation, this national, prospective, surveillance project was initiated in order to monitor pregnancy outcomes throughout the pandemic. This initiative is supported by central coordination at the University of British Columbia, based at the Women's Health Research Institute in Vancouver, BC.

Data on laboratory-confirmed, SARS-CoV-2 PCR positive cases during pregnancy were obtained through public health agencies and/or provincial databases in each participating province until December 2021, when PCR testing in Canada declined. From January 2022 to December 2022, pregnant women/persons with either a positive PCR or rapid antigen test (RAT) were reported to CANCOVID-Preg by physicians and midwives across the country, and included in the dataset. Data were abstracted and entered directly into a Research Electronic Data Capture (REDCap) database, which utilizes a robust data confidentiality and security protocol. Data abstraction is ongoing and complete datasets have not yet been entered for all cases in the time period reported on. In ON, data were entered at the point of care into a data collection tool and securely transferred to the BORN Information System (where it was linked with the corresponding pregnancy or birth record). Public health laboratory notifications were also submitted to BORN Ontario for linkage to the BORN Information System. Data from ON were therefore exempt from the revised protocol and included a nearly full dataset for all patients.

In this report we present data from BC, MB, NB, NS, PEI, QC, YT, ON, and AB for cases identified within the date ranges described in Table 1. Like our previous reports, only high-level summary data were amalgamated (manuscript in preparation). Available data for this report are from 32,811 cases detected between March 1st 2020 and December 31st 2022. Variant time period analyses were based on the following estimates of variant dominance in Canada for pre-Delta: 2020-03-03 to 2021-04-04, Delta: 2021-04-04 to 2021-12-19, and Omicron: 2021-12-19 and onwards.[19]

Table 1. Case counts by province, including date range for SARS-CoV-2 diagnosis.

Province	N	Diagnosis Date Ranges
BC	2,531	2020-03-06 to 2022-12-30
MB	694	2020-03-21 to 2022-12-25
NB	326	2020-03-28 to 2022-09-14
NS	255	2020-03-16 to 2022-12-27
PEI	86	2021-12-20 to 2022-03-30
QC	2,717	2020-03-03 to 2022-12-29
YT	29	2021-02-26 to 2022-07-15
ON	20,338	2020-03-04 to 2022-12-31
AB	5,835	2020-03-16 to 2023-02-27
TOTAL	32,811	2020-03-03 to 2023-02-27

3.0 RESULTS

3.1 Demographic and Clinical Summaries

The majority of pregnancies with a positive SARS-CoV-2 diagnosis had a maternal age less than 36 (80%), a BMI less than 30 (77%), and a gravidity of 2 or more (67%). Approximately 1% of cases had pre-existing hypertension, and similarly 1% of cases had pre-existing type 1 or 2 diabetes.

Table 2. Demographic and clinical summaries.

		N	Denominator
Age	<30	10,238 (35%)	28,953
	30-35	12,997 (45%)	
	≥ 36	5,718 (20%)	
BMI*	< 18.5	755 (4%)	18,860
	18.5 - 24	8,564 (45%)	
	25 - 29	5,120 (27%)	
	≥ 30	4,421 (23%)	
Gravida	1	8,709 (33%)	26,653
	2+	17,944 (67%)	
Hypertension (chronic)*	Yes	298 (1%)	25,276
Diabetes (type 1 or 2)*	Yes	373 (1%)	25,276

*Does not include data from AB.

3.2 Pregnancy Outcomes

In this sample, 9% of pregnant women/persons diagnosed with SARS-CoV-2 infection experienced a preterm birth, with the majority of preterm births (~72%) being late preterm (between 34 and 37 weeks). The majority of labours were spontaneous (54%), and vaginal deliveries (66%), with stillbirth rates below 1%. Singleton pregnancies accounted for 97% of all pregnancies.

Table 3. Pregnancy outcomes.

		N	Denominator
Multiple Pregnancy	Multiple	767 (2.8%)	27,719
	Singleton	26,952 (97.2%)	
Pregnancy Outcome*	Live Birth	26,018 (99.0%)	26,292
	Stillbirth	156 (0.6%)	
	Loss^	106 (1.6%)	6,437
Mode of Delivery*	Caesarean	8,460 (33.7%)	25,107
	Vaginal	16,647 (66.3%)	
Labour	Induced	4,725 (17.6%)	26,873
	No Labour	7,547 (28.1%)	
	Spontaneous	14,501 (54.0%)	
Gestational Age at Delivery	Preterm (< 37 weeks)	2,549 (9.2%)	27,767
	Term (≥ 37 weeks)	25,218 (90.8%)	

*Data from AB only available prior to October 2021.
^Data not available from ON or AB.

3.3 Infant Outcomes

The majority of infants exhibited a 5-minute Apgar score greater than or equal to 7 (97%) and were within the normal weight range of 2500g - 4000g (84%). NICU admission rates were relatively high at approximately 13%.

Table 4. Infant outcomes.

		N	Denominator
Apgar 5	<7	826 (3%)	27,187
	≥7	26,361 (97%)	
Birth Weight (g)	<2500	1,976 (7%)	26,989
	2500-4000	22,696 (84%)	
	>4000	2,317 (9%)	
NICU admission*	Yes	3,164 (13%)	25,182

* Data from AB only available prior to October 2021.

3.4 Adverse Outcomes Over Time

The Omicron era saw a dramatic decline in hospitalizations and ICU admissions. Hospitalization rates fell from a peak of 7.6% during the Delta time period to just under 2.0% during Omicron, with ICU admission rates similarly falling from 2.2% during Delta to 0.1% during Omicron. However, there were similar rates of NICU admission across all time periods (12.3%, 13.1%, and 11.8%, respectively for pre-Delta, Delta, and Omicron), as well as a slight decline in preterm birth rates (9.7%, 8.9%, and 8.6%, respectively).

	Pre-Delta	Delta	Omicron
Hospitalization rate	5.0%	7.6%	2.0%
ICU admission rate	1.3%	2.2%	0.1%
Preterm birth rate	9.7%	8.9%	8.6%
NICU admission rate	12.3%	13.1%	11.8%

3.5 Vaccination

The risk of hospitalization and ICU admission were both significantly lower among pregnant women/persons that received 2 or more COVID-19 vaccine doses. The relative risk (RR) of hospitalization was 0.26 (95% CI: 0.22-0.31) for those who received ≥2 doses versus none, while the RR of ICU admission was 0.10 (95% CI: 0.04-0.25). This was also the case, in a less pronounced manner, for infant NICU admission (RR: 0.87, 95% CI: 0.81-0.95) and preterm birth (RR: 0.86, 95% CI: 0.78-0.94). When looking only at the Omicron time period, this relationship between vaccination and reduced risk of adverse outcomes (hospitalization, ICU admission, preterm birth, and NICU admission) remains true.

4.0 DISCUSSION

The data presented in this report demonstrate findings that are fairly consistent with prior reports. Relatively high rates of admission to the NICU (12.5%) were observed (11.1% pre-pandemic).[20] Rates of stillbirth (0.6%) are in keeping with background rates (0.8%)[21] in the general population. Updated numbers for preterm birth exhibit relatively average rates of 9%.

With many additional data from the Omicron era now incorporated, this report demonstrates a decline in ICU admission and hospitalization in pregnant women/persons since June 2021. These findings highlight the lessening severity of disease associated with the passage of time and suggest that new variant emergence (i.e., Omicron) and/or vaccination is associated with reduced disease severity among pregnant women/persons and improved early infant outcomes. This highlights the ongoing value of vaccination in pregnancy to reduce risk of severe disease in pregnancy and to provide passive protection to the newborn.

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