COVID-19 in pregnancy

Presented by:

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Speaker disclosure

- I have received a speaker honoraria from Bayer, Pfizer , Gilead
- I do intend to make therapeutic recommendations for medications that have not received regulatory approval (i.e. “off-label” use of medication).

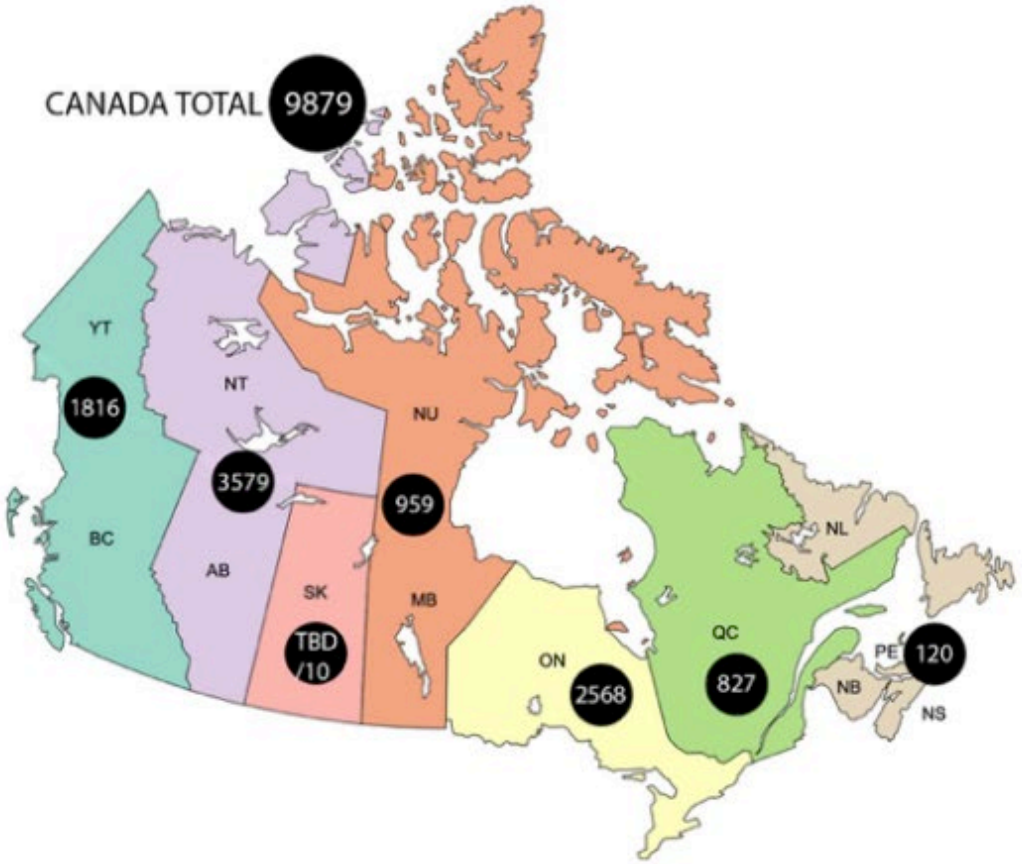
Mitigating potential bias

- The ACSC planning committee has reviewed all available presentations to be given at the conference to ensure the scientific validity and objectivity of the content and therefore has deemed there to be little potential for bias or conflict of interest in relation to the speaker(s) declaration(s) and the event content.

Learning objectives

- After this session, participants will be able to:
- Understand COVID-19 outcomes in pregnancy
- Understand the role of vaccination in pregnancy against COVID-19
- Discuss the changing landscape of therapeutics for COVID-19 in pregnancy

Canadian Surveillance of COVID-19 in Pregnancy: Epidemiology, Maternal and Infant Outcomes – (as of January 2022)



Last updated
BC + Yukon: Jan 7th, 2022
Alberta + NWT: Jan 4th, 2022
Saskatchewan: TBD/Nov 11, 2020
Manitoba + Nunavut: Jan 4th, 2022
Ontario: Oct 31, 2021
Quebec: Dec 14, 2020
The Atlantic Provinces: Dec 29, 2021

WOMEN'S HEALTH RESEARCH INSTITUTE AT BC WOMEN'S

Public Health Agency of Canada | Agence de la santé publique du Canada

UBC

JAMA | Original Investigation

Association of SARS-CoV-2 Infection During Pregnancy With Maternal and Perinatal Outcomes

- Gestational Age at diagnosis
  - 2nd, 3rd trimester
- Vaccination status
  - 1.3% were vaccinated

Table 1. Demographic and Clinical Summaries for Pregnant Persons Diagnosed as Having SARS-CoV-2 Infection in Canada

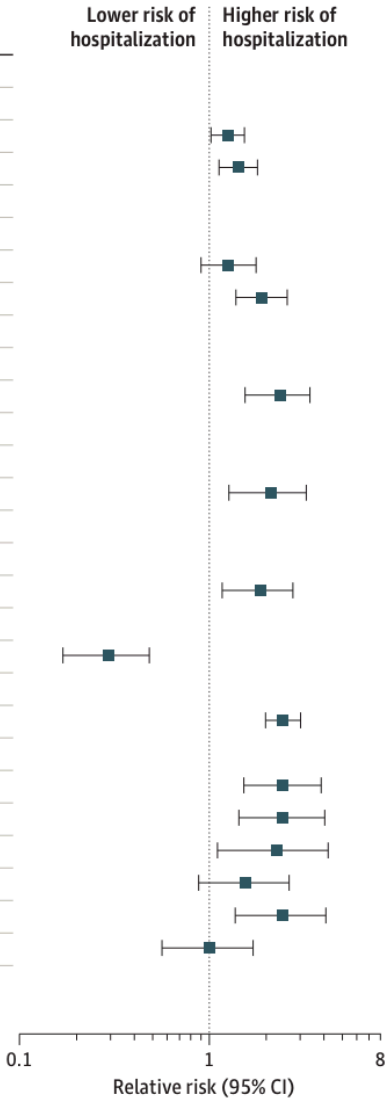
Characteristics	Estimate
Age, y	
No. (%)	n = 5993
<30	2419 (40.4)
30-35	2381 (39.7)
≥36	1193 (19.9)
Median (IQR)[a]	31 (28-35) [n = 1418]
Race and ethnicity, No. (%)[b,c]	n = 2031
African, Black, or Caribbean	245 (12.1)
East Asian or Southeast Asian	169 (8.3)
Hispanic or Latinx	91 (4.5)
Middle Eastern	145 (7.1)
Other (including Indigenous)	240 (11.8)
South Asian	374 (18.4)
White	767 (37.8)
Gestational age at diagnosis, No. (%), wk	n = 5967
≤14	1080 (18.1)
15-27	2084 (34.9)
28-37	2148 (35.7)
≥38	666 (11.1)
Days between diagnosis and delivery, median (IQR)[b]	73 (20-140) [n = 3367]
Preexisting hypertension, No. (%)[d]	140 (3.4) [n = 4130]
Type 1 or 2 diabetes, No. (%)[d]	108 (2.6) [n = 4130]
Asthma, No. (%)[d]	147 (3.6) [n = 4130]
Body mass index, No. (%)[b]	n = 2711
<25	1285 (47.5)
25-29	764 (28.3)
≥30	656 (24.3)
Vaccination, No. (%)[b]	n = 3361
0 Doses	3318 (98.7)
1 Dose	28 (0.8)
≥2 Doses	15 (0.5)

Risk of hospitalization in pregnancy

- Advanced maternal age >35
- BMI >30
- Medical Co-morbidities
  - DM
  - Asthma
  - Hypertension
- Gestational age at diagnosis

Figure 1. Bivariable Log-Binomial Models of Relative Risks for Hospitalization

Variables	No. (%) of patients: Not hospitalized	No. (%) of patients: Hospitalized	Absolute risk difference, % (95% CI)	Relative risk (95% CI)
Age, y				
<30	2262 (93.51)	157 (6.49)	[Reference]	1 [Reference]
30-35	2185 (91.77)	196 (8.23)	1.7 (0.3 to 3.2)	1.25 (1.02-1.53)
≥36	1082 (90.70)	111 (9.30)	2.8 (0.9 to 4.7)	1.42 (1.13-1.8)
Body mass index				
<25	1209 (94.23)	74 (5.77)	[Reference]	1 [Reference]
25-29	708 (92.67)	56 (7.33)	1.6 (-0.7 to 3.8)	1.26 (0.9-1.77)
≥30	585 (89.18)	71 (10.82)	5.1 (2.4 to 7.8)	1.89 (1.38-2.58)
Preexisting hypertension				
No	5343 (92.60)	427 (7.40)	[Reference]	1 [Reference]
Yes	197 (84.19)	37 (15.81)	8.4 (3.7 to 13.1)	2.36 (1.54-3.4)
Type 1 or 2 diabetes				
No	5309 (92.52)	429 (7.48)	[Reference]	1 [Reference]
Yes	231 (86.84)	35 (13.16)	5.7 (1.6 to 9.8)	2.12 (1.27-3.25)
Asthma				
No	3697 (92.82)	286 (7.18)	[Reference]	1 [Reference]
Yes	127 (86.39)	20 (13.61)	6.4 (0.8 to 12)	1.86 (1.17-2.76)
Gestational age at diagnosis, wk				
<14	1064 (98.52)	16 (1.48)	-3.5 (-4.7 to -2.3)	0.3 (0.17-0.48)
14-27	1980 (95.01)	104 (4.99)	[Reference]	1 [Reference]
≥28	2462 (87.83)	341 (12.17)	7.2 (5.6 to 8.7)	2.44 (1.98-3.03)
Race and ethnicity				
African, Black, or Caribbean	216 (88.16)	29 (11.84)	7 (2.7 to 11.3)	2.45 (1.52-3.89)
East Asian or Southeast Asian	149 (88.17)	20 (11.83)	7 (1.9 to 12.1)	2.45 (1.43-4.07)
Hispanic or Latinx	81 (89.01)	10 (10.99)	6.2 (-0.4 to 12.8)	2.28 (1.1-4.24)
Middle Eastern	128 (88.28)	17 (11.72)	6.9 (1.4 to 12.4)	1.55 (0.88-2.64)
Other (including Indigenous)	222 (92.50)	18 (7.50)	2.7 (-1 to 6.3)	2.43 (1.37-4.12)
South Asian	356 (95.19)	18 (4.81)	0 (-2.7 to 2.6)	1 (0.56-1.7)
White	730 (95.18)	37 (4.82)	[Reference]	1 [Reference]



Adverse Pregnancy Outcomes

- CS
- Prematurity
  - Largest group 34-36 weeks
- SB* not increasec

Table 2. Adverse Pregnancy Outcomes Among Pregnant Persons Diagnosed as Having SARS-CoV-2 During the Pandemic Compared With Pregnant Persons Not Diagnosed as Having SARS-CoV-2 in Canada

Outcomes	No./total (%)		Absolute risk difference (95% CI)	Relative risk (95% CI)	*P* value
	Persons with SARS-CoV-2 diagnosed during pregnancy[a]	Persons without SARS-CoV-2 diagnosed during pregnancy[b]			
Preeclampsia[c]	91/1260 (7.22)	33201/428 813 (7.74)	−0.52 (−1.95 to 0.91)	0.93 (0.75-1.12)	.53
Cesarean delivery	1965/5696 (34.50)	138 918/428 813 (32.40)	2.10 (0.86 to 3.34)	1.06 (1.03-1.10)	.001
Preterm delivery <37 wk[d]	635/5746 (11.05)	28 394/419 937 (6.76)	4.29 (3.48 to 5.10)	1.63 (1.52-1.76)	<.001
Late preterm (34-36 wk)	480 (8.35)	21 638 (5.15)	3.20 (2.48 to 3.92)	1.62 (1.48-1.76)	<.001
Moderate preterm (32-33 wk)	84 (1.46)	2957 (0.70)	0.86 (0.45 to 1.07)	2.08 (1.64-2.53)	<.001
Very preterm (28-31 wk)	41 (0.71)	2269 (0.54)	0.17 (−0.05 to 0.39)	1.32 (0.93-1.74)	.08
Extremely preterm (20-27 wk)	30 (0.52)	1530 (0.36)	0.16 (−0.03 to 0.34)	1.43 (0.95-1.97)	.60
Stillbirth[e]	35/5743 (0.61)	3695/443 184 (0.83)	−0.22 (−0.43 to −0.02)	0.73 (0.50-0.99)	.07

[a] From the Canadian Surveillance of COVID-19 in Pregnancy (CANCOVID-Preg) program.

[b] From the Canadian Institute for Health Information Discharge Abstract Database.

[c] Data not available from Alberta and Ontario.

[d] Not including stillbirth or intrauterine fetal demise among the total number of fetuses in pregnancies continuing for 20 weeks or longer.

[e] Among the total number of fetuses in pregnancies continuing for 20 weeks or longer or weighing at least 500 g. Includes intrauterine and intrapartum fetal demise. Does not include neonatal mortality.

Clinical manifestations, risk factors, and maternal and perinatal outcomes of coronavirus disease 2019 in pregnancy: living systematic review and meta-analysis

- N=926 232

Risk factor/ outcome	Studies	Pregnant women with outcome and risk factor n/N	Pregnant women with outcome and without risk factor n/N	Odds ratio (95% CI)	I^2 (%) (P value)
Age					
Severe disease	15	2550*	9126*	1.56 (1.19 to 2.04)	66 (0.00)
ICU admission	7	619*	113 624*	1.82 (1.53 to 2.17)	0 (0.89)
Invasive ventilation	5	154*	113 525*	2.37 (1.69 to 3.33)	0 (0.51)
Maternal death	5	303*	119 217*	1.09 (0.48 to 2.48)	87.5 (0.00)
Multiparity					
Severe disease	9	225/1515	122/927	1.25 (0.78 to 1.99)	58.5 (0.01)
ICU admission	3	34/501	17/314	1.34 (0.72 to 2.49)	0 (0.70)
Invasive ventilation	1	1/227	0/135	1.87 (0.08 to 46.30)	NE
Body mass index					
Severe disease	15	2635*	10 046*	1.84 (1.46 to 2.31)	54.9 (0.01)
ICU admission	4	605*	113 056*	3.08 (1.10 to 8.68)	78.7 (0.00)
Invasive ventilation	4	143*	112 974*	7.20 (4.02 to 12.91)	0 (0.87)
Maternal death	5	239*	118 631*	2.27 (1.36 to 3.78)	0 (0.88)
Non-white ethnicity					
Severe disease	9	1607/7732	555/2983	1.13 (0.92 to 1.38)	34.6 (0.14)
ICU admission	4	479/72027	217/36 807	1.71 (1.17 to 2.51)	54.5 (0.09)
Invasive ventilation	2	112/71774	61/36 601	2.15 (1.50 to 3.10)	0 (0.88)
Maternal death	3	165/72155	47/36 605	2.07 (1.23 to 3.48)	37.4 (0.20)
Any comorbidity					
Severe disease	9	813/3041	1424/7377	1.48 (1.19 to 1.85)	46.4 (0.06)
ICU admission	5	219/12416	370/101 664	3.57 (1.89 to 6.74)	56.3 (0.06)
Invasive ventilation	4	94/12409	47/101 240	12.87 (5.86 to 28.24)	30.5 (0.23)
Maternal death	4	113/14389	188/105 032	2.29 (1.31 to 4.00)	73.9 (0.01)
Chronic hypertension					
Severe disease	14	116/412	1950/10 114	1.75 (1.40 to 2.20)	0 (0.97)
ICU admission	5	23/703	562/112 920	5.33 (2.84 to 10.00)	13.8 (0.33)
Invasive ventilation	3	9/685	121/112 404	19.72 (3.13 to 124.32)	57.9 (0.09)
Maternal death	4	10/781	163/115 420	4.30 (2.17 to 8.53)	0 (0.71)
Pre-existing diabetes					
Severe disease	11	129/356	1073/6268	2.90 (1.93 to 4.34)	37.4 (0.10)
ICU admission	6	61/1312	532/112 351	5.36 (1.88 to 15.27)	54.6 (0.05)
Invasive ventilation	4	26/1296	105/111 824	15.10 (3.95 to 57.68)	45.6 (0.14)
Maternal death	4	37/1501	263/117 970	5.35 (1.66 to 17.24)	84 (0.00)

Fig 6 | Risk factors associated with severe coronavirus disease 2019 (covid-19) and all cause maternal death in pregnant and recently pregnant women (part 1). ICU=intensive care unit; NE=not estimable. Cut-off threshold is ≥35 years for age and ≥30 for body mass index. *Includes one or more studies with continuous measurement of risk factor

Risk factor/ outcome	Studies	Pregnant women with outcome and risk factor n/N	Pregnant women with outcome and without risk factor n/N	Odds ratio (95% CI)	I^2 (%) (P value)
Asthma					
Severe disease	12	47/213	938/4567	1.40 (0.99 to 1.98)	0 (0.59)
ICU admission	1	2/9	8/91	2.96 (0.53 to 16.74)	NE
Maternal death	4	10/182	111/6287	2.60 (1.35 to 5.03)	0 (0.62)
Smoking					
Severe disease	7	12/103	306/2425	1.38 (0.75 to 2.54)	0 (0.60)
ICU admission	2	1/4	17/138	2.92 (0.35 to 24.23)	0 (0.63)
Invasive ventilation	2	0/62	60/5825	1.32 (0.18 to 10.01)	0 (0.76)
Gestation ≥28 weeks					
Severe disease	7	775/3569	698/3252	1.14 (0.69 to 1.90)	47 (0.08)
ICU admission	1	7/135	1/105	5.69 (0.69 to 46.97)	NE
Maternal death	3	81/3132	45/2839	1.16 (0.65 to 2.08)	43.5 (0.17)
Gestational diabetes					
Severe disease	10	173/681	1667/8351	1.62 (1.01 to 2.61)	58.2 (0.01)
ICU admission	2	11/81	31/696	3.27 (1.55 to 6.89)	0 (0.98)
Pre-eclampsia					
Severe disease	7	12/42	145/1037	5.19 (2.22 to 12.13)	0 (0.75)
ICU admission	1	6/6	2/36	179.40 (7.69 to 4186.05)	NE
Multiple pregnancy					
Severe disease	2	52/262	117/454	0.59 (0.12 to 2.93)	56.6 (0.13)
ICU admission	3	4/32	57/1624	5.09 (1.77 to 14.65)	0 (0.68)
Invasive ventilation	1	0/4	1/346	25.59 (0.91 to 717.14)	NE
Maternal death	2	0/71	40/4311	1.63 (0.22 to 12.23)	0 (0.62)
Maternal hypertension					
Severe disease	7	129/531	1521/7479	1.42 (0.71 to 2.81)	49.9 (0.06)

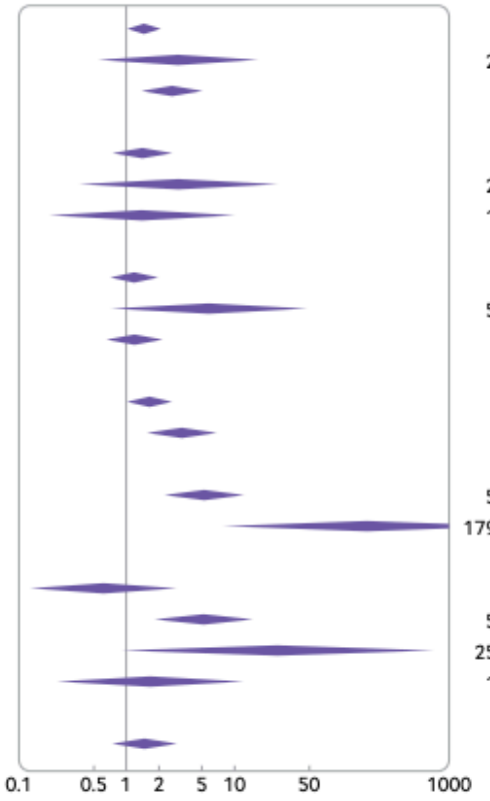
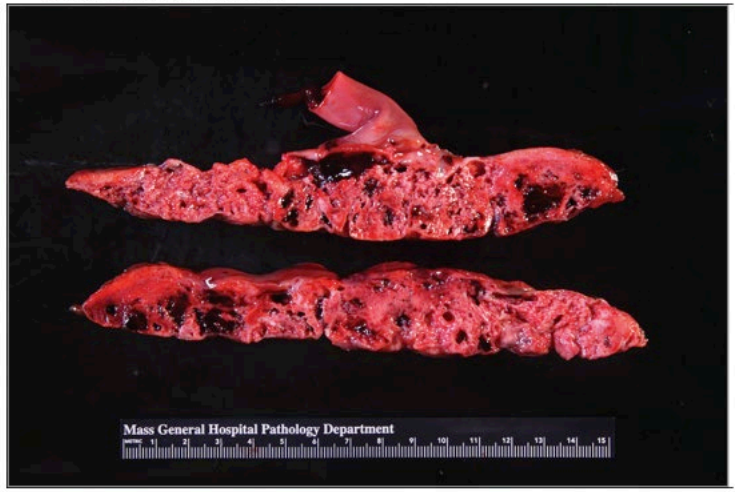


Fig 7 | Risk factors associated with severe coronavirus disease 2019 (covid-19) and all cause maternal death in pregnant and recently pregnant women (part 2). ICU=intensive care unit; NE=not estimable

A word on stillbirth

A Gross photograph of slab sections of the placenta showing multiple thrombohematomas



Research Letter | Infectious Diseases

SARS-CoV-2 Placentitis and Intraparenchymal Thrombohematomas Among COVID-19 Infections in Pregnancy

Anh Huynh, MD; Jennifer K. Sehn, MD; Ilona Telefus Goldfarb, MD; Jaclyn Watkins, MD, MS; Vanda Torous, MD; Amy Heerema-McKenney, MD; Drucilla J. Roberts, MD, MS

Table. Clinical Characteristics of 47 Patients With SARS-CoV-2 Placentitis From January 1, 2020, to November 4, 2021

Characteristics	No. (%)						
	Thrombohematomas, 2021						Thrombohematomas absent, 2020 (n = 8)[a]
	Present (n = 29)			Absent (n = 10)			
	Stillbirth	Morbidity other than stillbirth[b]	No morbidity or mortality[c]	Stillbirth	Morbidity other than stillbirth[b]	No morbidity or mortality[c]	No morbidity or mortality[c]
All	21 (72)	2 (7)	6 (21)	1 (10)	4 (40)	5 (50)	8 (100)

COVID-19 Vaccines in Pregnancy

SOGC Statement on COVID-19 Vaccination in Pregnancy

POLIQUIN, V; CASTILLO, E; BOUCOIRAN, I; WONG, J; WATSON, H; YUDIN, M; MONEY, D; VAN SCHALKWYK, J; ELWOOD, C on behalf of the Infectious Disease Committee of the Society of Obstetricians and Gynaecologists of Canada

Original date: December 18th, 2020
Revised and reaffirmed date: March 14th, 2022

CONSENSUS STATEMENTS:

1. **COVID-19 vaccination is *recommended* during pregnancy in any trimester and while breastfeeding**
2. **All available COVID-19 vaccines approved in Canada can be used during pregnancy and breastfeeding. Presently, preference is given for the use of mRNA vaccinations during pregnancy as more data on safety and efficacy during pregnancy is available for these vaccines.**
3. **The SOGC recommends following provincial and territorial guidelines on type of vaccine to prioritize for pregnant and breastfeeding individuals.**
4. **Individuals should not be precluded from vaccination based on pregnancy status or breastfeeding.**
5. **Given that pregnant people are at increased risk of morbidity from COVID-19 infection, all pregnant persons should be prioritized to receive a COVID-19 vaccination.**

Key Concepts about counselling for COVID-19 and other Vaccines in Pregnancy

- Maternal Benefit
  - Reduction in mortality and hospitalization amongst all comers who receive a COVID-19 vaccine
  - Influenza vaccine is similar and for maternal benefit
- Fetal Benefit
  - Antibody transfer occurs across the placenta (greatest 28-36w)
  - If a vaccine is for maternal benefit, then there should be no delay in vaccinating for fetal benefit
  - If vaccinating for fetal benefit (eg pertussis) then timing is key
- Breast Feeding
  - Breast milk antibodies (predominantly IgG) are found in breast milk, however the most effective form of infant protection is vaccinating during pregnancy

COVID-19 Vaccines in Pregnancy

- mRNA Vaccines
- Adenovirus Vaccine platforms
- Novovax-recombinant SARS-CoV2-spike protein
- Medicago Covifenz –plant based viral particle with SARS-CoV2-spike protein

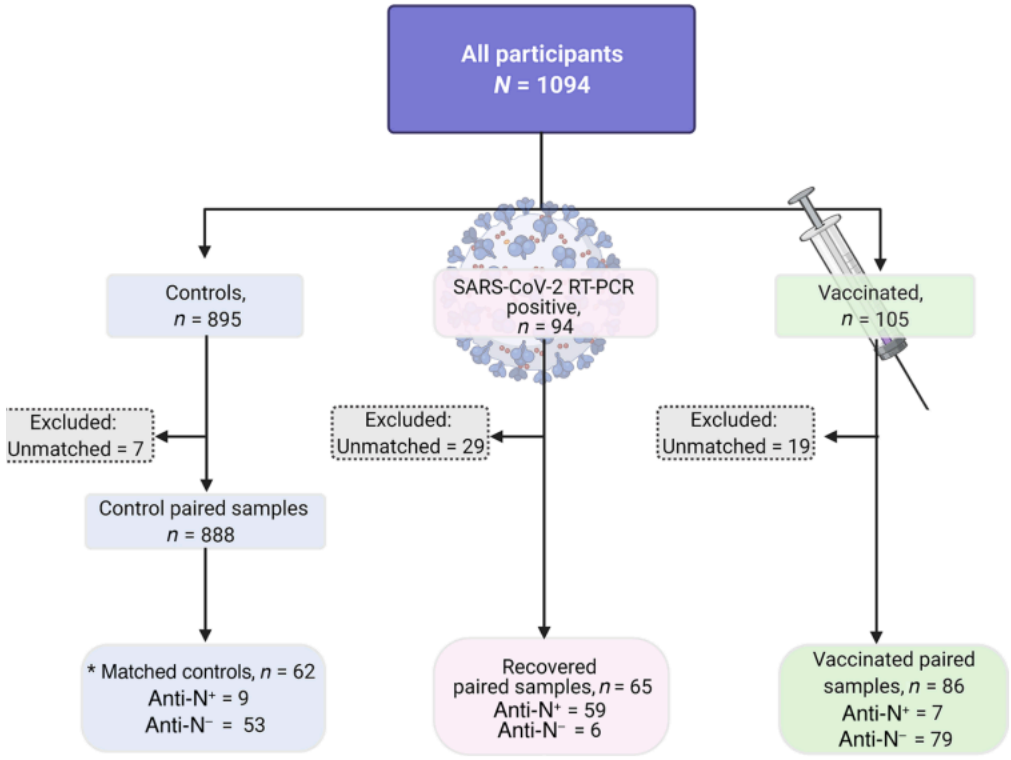
Pregnancy and Infant Outcomes in Published Studies vs V-safe Pregnancy Registry Participants.

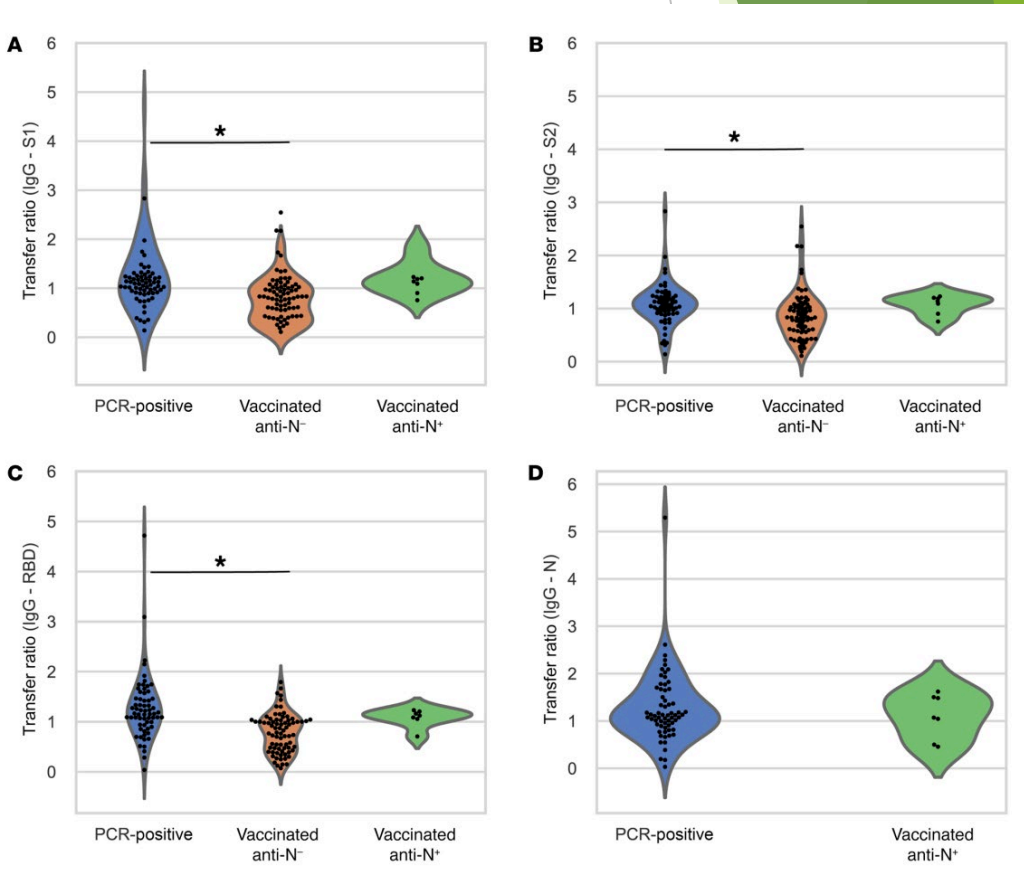
Table 4. Pregnancy Loss and Neonatal Outcomes in Published Studies and V-safe Pregnancy Registry Participants.

Participant-Reported Outcome	Published Incidence*	V-safe Pregnancy Registry†
	%	*no./total no. (%)*
Pregnancy loss among participants with a completed pregnancy		
Spontaneous abortion: <20 wk[15-17]	10–26	104/827 (12.6)‡
Stillbirth: ≥ 20 wk[18-20]	<1	1/725 (0.1)§
Neonatal outcome among live-born infants		
Preterm birth: <37 wk[21,22]	8–15	60/636 (9.4)¶
Small size for gestational age[23,24]‖	3.5	23/724 (3.2)
Congenital anomalies[25]**	3	16/724 (2.2)
Neonatal death[26]††	<1	0/724

Neonatal Protection

Efficient maternal to neonatal transfer of antibodies against SARS-CoV-2 and BNT162b2 mRNA COVID-19 vaccine





Effectiveness of Maternal Vaccination with mRNA COVID-19 Vaccine During Pregnancy Against COVID-19–Associated Hospitalization in Infants Aged <6 Months — 17 States, July 2021–January 2022

- N=176 with COVID-19 and n-230 without COVID-19
- Maternal vaccination effectiveness against COVID-19 hospitalization was 61%
- 2 dose regimen of mRNA vaccine
- Delta variant

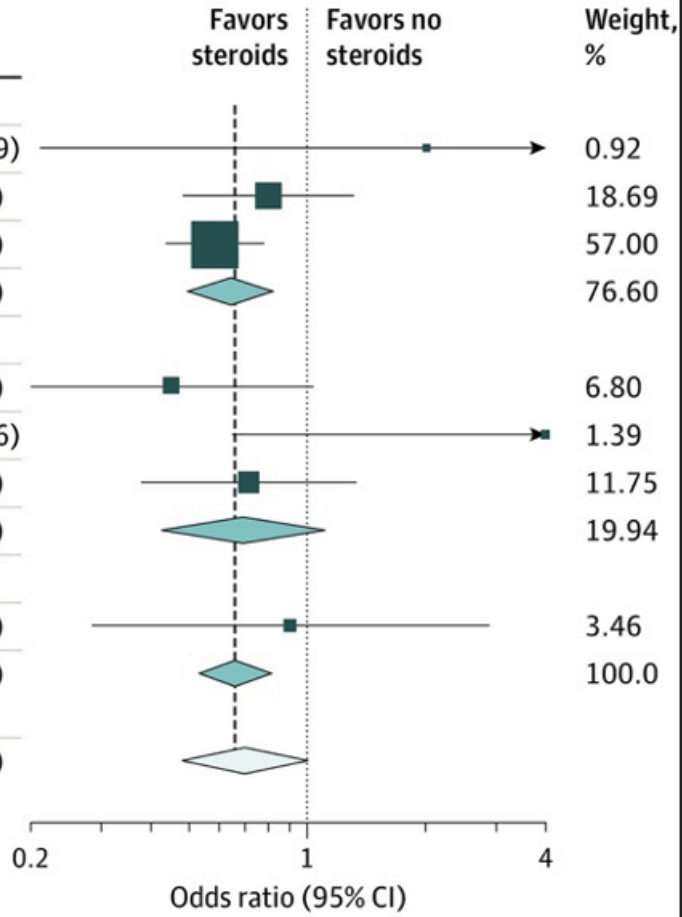
The EVER CHANGING world of therapeutics

- Is it the standard of care outside of pregnancy?
- Is there a real safety concern with its use in pregnancy?
- Is there a theoretical risk with its use in pregnancy?
  - What is that risk?
  - Are there specific prescribing issues?
- What is the direct benefit ?

Anticoagulation in Pregnancy

- Prophylactic anticoagulation with either LMWH or heparin for moderate or severe COVID-19
- Therapeutic anticoagulation is less clear……less evidence for efficacy AND there is the potential for requirement for delivery

Drug and trial	ClinicalTrials.gov identifier	Initial dose and administration	No. of deaths/total No. of patients		Odds ratio (95% CI)	Weight, %
			Steroids	No steroids		
Dexamethasone						
DEXA-COVID 19	NCT04325061	High: 20 mg/d intravenously	2/7	2/12	2.00 (0.21-18.69)	0.92
CoDEX	NCT04327401	High: 20 mg/d intravenously	69/128	76/128	0.80 (0.49-1.31)	18.69
RECOVERY	NCT04381936	Low: 6 mg/d orally or intravenously	95/324	283/683	0.59 (0.44-0.78)	57.00
Subgroup fixed effect			166/459	361/823	0.64 (0.50-0.82)	76.60
Hydrocortisone						
CAPE COVID	NCT02517489	Low: 200 mg/d intravenously	11/75	20/73	0.46 (0.20-1.04)	6.80
COVID STEROID	NCT04348305	Low: 200 mg/d intravenously	6/15	2/14	4.00 (0.65-24.66)	1.39
REMAP-CAP	NCT02735707	Low: 50 mg every 6 h intravenously	26/105	29/92	0.71 (0.38-1.33)	11.75
Subgroup fixed effect			43/195	51/179	0.69 (0.43-1.12)	19.94
Methylprednisolone						
Steroids-SARI	NCT04244591	High: 40 mg every 12 h intravenously	13/24	13/23	0.91 (0.29-2.87)	3.46
Overall (fixed effect)			222/678	425/1025	0.66 (0.53-0.82)	100.0
$P = .31$ for heterogeneity; $I^2 = 15.6\%$						
Overall (random effects[a])			222/678	425/1025	0.70 (0.48-1.01)	



Treatments in Pregnancy

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Early Treatment for Covid-19 with SARS-CoV-2 Neutralizing Antibody Sotrovimab

- Ongoing multi-centered randomized placebo-controlled trial –interim analysis
- Sotrovimab –monoclonal antibody
- Non-hospitalized symptomatic COVID infection of </= 5 days with at least one risk factor for disease progression
- Randomized to single infusion 500mg Sotromivab IV vs placebo
- Outcome was hospitalization (>24h) or any cause death within 29d
- Intention to treat analysis 291 mAb vs 292 placebo
- 3 patients (1%) mAb group, as compared with 21 patients (7%) in the placebo group, had disease progression leading to hospitalization or death
- (relative risk reduction, 85%; 97.24% confidence interval, 44 to 96; P = 0.002).
- 5 in placebo group in ICU, one death
- No safety signals identified

Anil Gupta et al., N Engl J Med 2021;385:1941-50.

Use of monoclonal Ab treatment in pregnancy

Table 1: Characteristics of monoclonal antibody biologics and indications for use

Biologic type	Drug name	Structure	Indication for use*
Anti-TNFα	Infliximab	Chimeric anti-TNFα IgG1	Rheumatoid arthritis, ankylosing spondylitis, Crohn disease, ulcerative colitis, plaque psoriasis
	Adalimumab	Recombinant humanized anti-TNFα IgG1	Rheumatoid arthritis, polyarticular JIA, psoriatic arthritis, ankylosing spondylitis, Crohn disease, ulcerative colitis, hidradenitis suppurativa, plaque psoriasis, uveitis
	Golimumab	Humanized anti-TNFα IgG1	Rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, nonradiographic axial spondyloarthritis, ulcerative colitis
	Certolizumab pegol	Recombinant, humanized antibody to the antigen-binding fragment to anti-TNFα	Rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, plaque psoriasis
	Etanercept	Human recombinant TNFα receptor/IgG1-Fc fusion protein	Ankylosing spondylitis, rheumatoid arthritis, polyarticular JIA, psoriatic arthritis, plaque psoriasis
Anticytokine	Ustekinumab	Anti-IL-12 and IL-23 humanized IgG1	Plaque psoriasis, psoriatic arthritis, Crohn disease, ulcerative colitis
	Tocilizumab	Anti-IL-6 receptor humanized IgG1	Rheumatoid arthritis, polyarticular and systemic JIA, giant cell arteritis
	Canakinumab	Anti-IL-1β human IgG1	CAPS, TRAPS, HIDS, MKD, FMF, systemic JIA
Anti-integrin	Vedolizumab	Humanized anti- α4β7 integrin IgG1	Ulcerative colitis, Crohn disease
	Natalizumab	Anti-integrin α4 subunit humanized IgG4	Multiple sclerosis
Anti-B cell	Rituximab	Anti-CD20 IgG1	Rheumatoid arthritis, non-Hodgkin lymphoma, chronic lymphocytic leukemia, granulomatosis with polyangiitis
	Belimumab	Anti-B-cell activating factor human IgG1	Systemic lupus erythematosus

Note: CAPS = cryopyrin-associated periodic syndromes, FMF = familial Mediterranean fever, HIDS = hyperimmunoglobulin D syndrome, Ig = immunoglobulin, IL = interleukin, JIA = juvenile idiopathic arthritis, MKD = mevalonate kinase deficiency, TNF = tumour necrosis factor, TRAPS = tumour necrosis factor receptor associated periodic syndrome.
*Off-label use not listed.

CMAJ 2021 July 26;193:E1129-36.

IgG monoclonal antibodies
Cross placenta
- No transfer in first trimester
- Increased transfer in 2nd and 3rd trimesters
- Minimal amount in breastmilk

No evidence of adverse pregnancy outcomes

All exposed infants should receive scheduled inactivated vaccines
- Avoid live attenuated vaccines for 6-12 mos
- Evolving evidence suggests Rotavirus vaccine safe if infant has had immune function assessed by specialist

Sotrovimab use in Pregnancy

Anti-Spike Monoclonal Antibody Therapy in Pregnant Women With Mild-to-Moderate Coronavirus Disease 2019 (COVID-19)

Thilagar, Bright P. MD; Ghosh, Aditya K. MD; Nguyen, Jerome BS; Theiler, Regan N. MD, PhD; Wick, Myra J. MD, PhD; Hurt, Ryan T. MD, PhD; Razonable, Raymund R. MD; Ganesh, Ravindra MBBS, MD

- 51 pregnancies
- Ambulatory mild – moderate COVID
- 28 day follow-up no hospitalizations
- No Safety signal

- No data on sotrovimab in pregnancy

- Obstetrics & Gynecology: January 13, 2022 - 10.1097

- COVID in pregnancy associated with increased rates of hospitalization, ICU admission, preterm birth and NICU admission
- 2021 FDA recommended its use in pregnancy with mild-moderate COVID-19 disease
- NIH and ACOG suggest consideration of mAb for treatment of COVID in pregnancy where benefits outweigh potential risks
- Lactation not a contraindication for mAb

Paxlovid Trial Data

- Interim analysis of phase II-III Randomized placebo-controlled data 1219
- Outcome hospitalization/death at 28 days post infection
- Of those treated within 3 days of symptom onset
- 3/389 (0.8%) Paxlovid admitted to hospital with no deaths, 27/385 (7%) Placebo admitted to hospital with 7 deaths
- If treated within 5 days of symptom onset
- 6/607 (1%) Paxlovid admitted to hospital with no deaths and 41/612 (6.7%) in the placebo group with 10 deaths.
- No difference in adverse events between groups

BMJ 2021;375:n2713

PAXLOVID in pregnancy

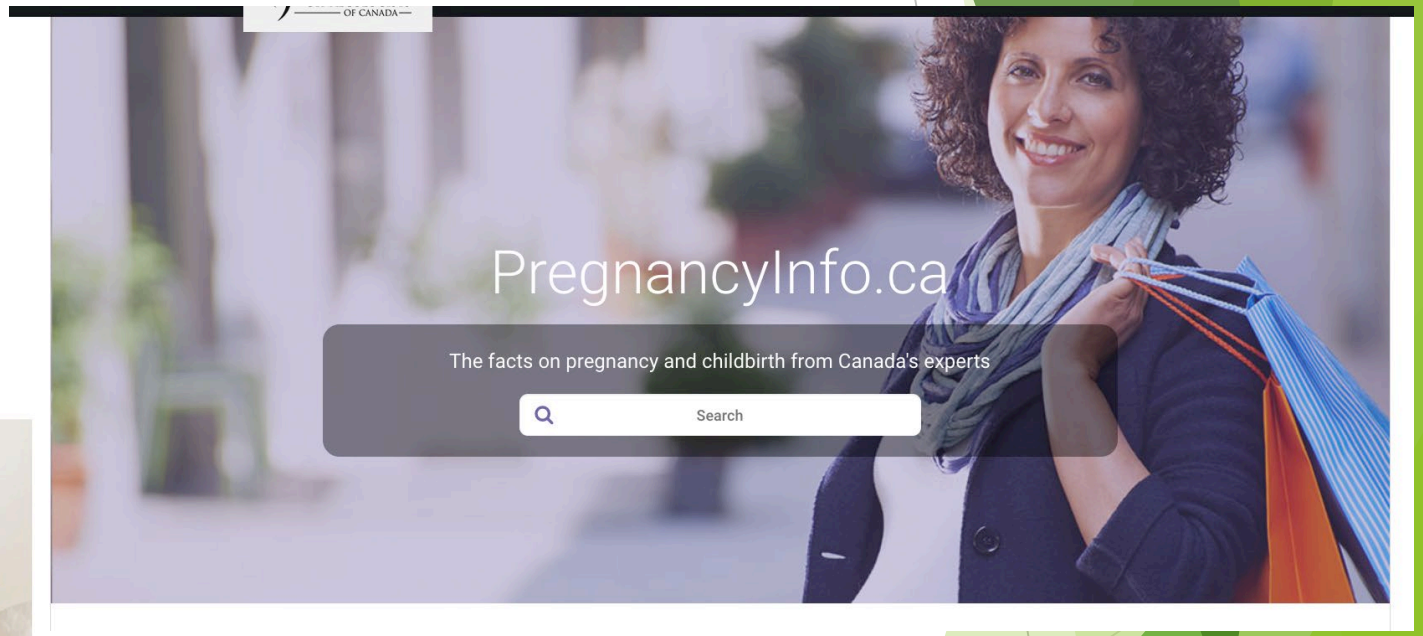
- Nirmaltrevir: No human pregnancy safety data
  - Rabbit embryo-fetal study of Nirmaltrevir at 10x clinical human exposure found reduced fetal body weights
  - No adverse developmental outcomes noted at 3x human exposure
- Ritonavir: Human safety data robust – no pregnancy specific safety signals identified in thousands of exposed pregnancies
  - Pasley et al., AIDS Rev. Jan-Mar 2013.
- PAXLOVID may be considered for use in pregnancy if the potential benefit to the mother and fetus outweigh potential risks

PAXLOVID and Breastfeeding

- There are no data on the safety of PAXLOVID with breastfeeding
- A transient decrease in body weight noted in nursing offspring of rats exposed to Nirmatrelvir at 8x clinical human exposure
- Ritonovir is detectable in breastmilk, in 117 breastfed infants whose mothers took daily ritonavir as part of cART, none had detectable levels in serum at 8 and 12 weeks - infants receive negligible exposure
  - Drugs and Lactation Database Bethesda, NLM 2021
- Short course of treatment

Resources

- https://sogc.org/covid



Conclusions

- Adverse maternal and neonatal outcomes occur for pregnant women and persons
- Vaccines are safe, effective and recommended prevention strategies for mitigating COVID-19 risk and infection in pregnancy and confer a degree of neonatal protection
- Pregnant women and individuals should be considered for therapeutics to prevent adverse outcomes wherever possible

WHO WANTS TO TALK ABOUT MONKEYPOX……