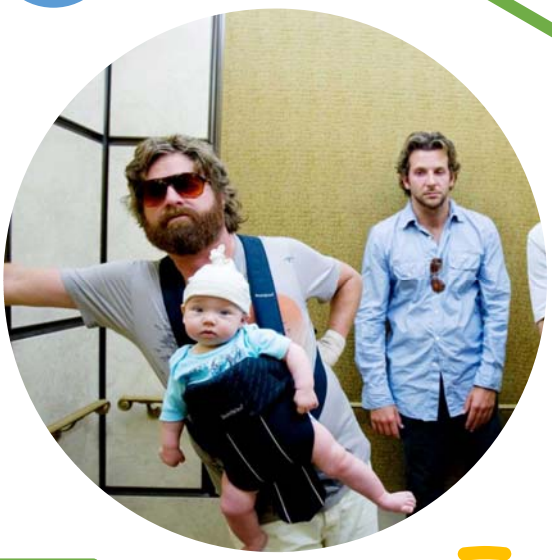


Recovering from the COVID-19 Hangover

Are our patients *ready* for pregnancy?

Learning Objectives

1. Learn about the current state of COVID and COVID vaccination in pregnancy
2. Gain an appreciation for changes in routine health surveillance that can affect pregnancy
3. How do you help your patients prepare for pregnancy?

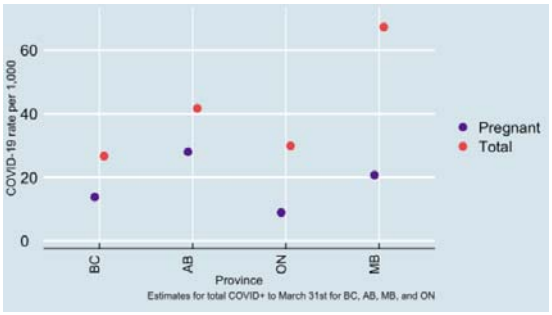
Conflicts of Interest

- Dr. Jackie Thomas and Dr. Evan Tannenbaum have NO relevant conflict of interest to declare
- Except, we both emerged from the COVID Hangover unscathed (moderately, at least)

COVID in Pregnancy

1.4% (0.9-2.8)
Pregnant population COVID +

4.14% (2.6-6.7)
Reproductive age population COVID +



Similar data from USA, UK

- **Pregnancy NOT a risk factor for acquiring COVID**
- **Safety measures are effective @ protecting pregnant patients**

CanCOVID-Preg Report #4 (Jun 4, 2021)
5 provinces

? Is the COVID disease profile altered in a pregnant individual

Same symptoms as non-pregnant individuals

Cardiovascular disease
Chronic Lung disease
Diabetes
Hypertension
Obesity (BMI >30)

Same co-morbid risk factors as non-pregnant individuals

Most common

MILD
- **Asymptomatic**
- **Minimal symptoms**
- **Upper respiratory infection**

MODERATE
- **Pneumonia**
- **Increasing signs of respiratory distress**

SEVERE

CRITICAL
- **Respiratory Failure**
- **Septic Shock**
- **MSOF**

Compared with Non-pregnant Reproductive Aged Peers

Similar data from USA, UK

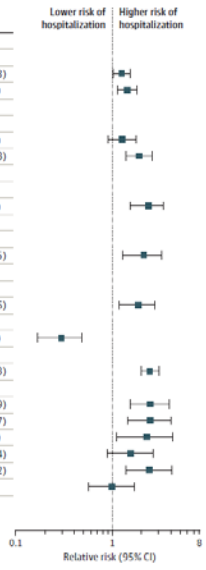
	Pregnant COVID cases	Non- Pregnant Peer COVID cases	Relative Risk
Number and percent hospitalized	7.75%	2.93%	2.6
Number and percent admitted to ICU	2.8%	0.3%	5.46

92.3 % NOT HOSPITALIZED

Greater risk of severe disease

CanCOVID-Preg (JAMA, May 2022)

Variables	No. (%) of patients: Not hospitalized	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]



Similar pattern of risk factors for:
- Need for O2 Rx
- Admission to ICU

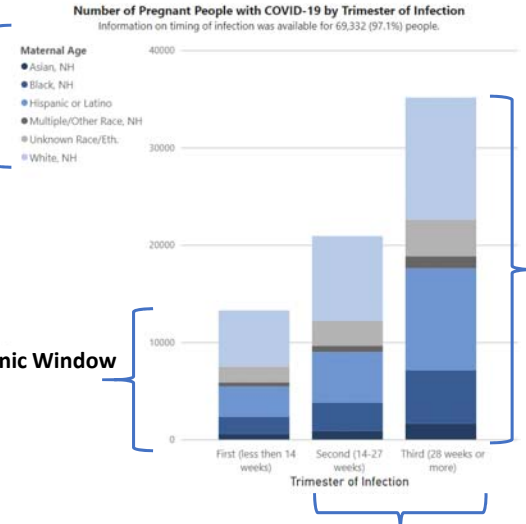
Risk factors for Moderate to Severe Disease in the Pregnant Individual

- Advancing age
- BMI > 30
- Chronic hypertension
- Diabetes
- Asthma
- Advancing GA
- Ethnicity:
  - Black
  - East/SE Asian
  - Hispanic

CanCOVID-Preg (JAMA, May 2022)

? Does the COVID infection rate vary with gestational age

Across all ethnicity & maternal age groups



Teratogenic Window

Diagnosis most common in T3

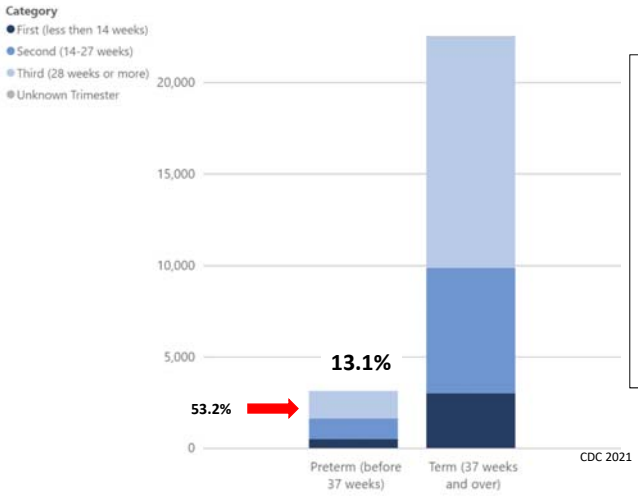
Potential Impact:
Fetal form, function, well-being, OB outcome

This is American data, but similar data exists from Canada, UK

CDC Data: up to March 2022

Impact of COVID on obstetrical outcomes

Obstetrical impact of COVID in pregnancy: PTB



In summary:

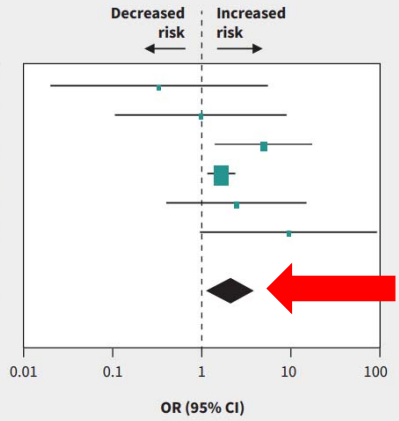
- Risk not linked to "variants of concern"
- **Risk linked to disease severity**
- Most PTB occurred in T3 when infection is most common
- BUT mean GA 34-35w: low risk for neonatal morbidity

Preterm birth most commonly associated with COVID infection in T3

CDC Sept 2021

Obstetrical impact of COVID in pregnancy: Stillbirth

Study or subgroup	COVID-19 Events	COVID-19 Total	No COVID-19 Events	No COVID-19 Total	OR (95% CI)
Adhikari et al.[48]	0	245	18	3035	0.33 (0.02 to 5.53)
Ahlberg et al.[43]	1	155	4	604	0.97 (0.11 to 8.78)
Hcini et al.[51]	7	137	4	370	4.93 (1.42 to 17.11)
Jering et al.[53]	34	6380	1289	400 066	1.66 (1.18 to 2.33)
Knight et al.[30]	3	427	2	694	2.45 (0.41 to 14.71)
Martínez-Perez et al.[18]	3	246	1	763	9.41 (0.97 to 90.86)
Total (95% CI)		7590		405 532	2.11 (1.14 to 3.90)
Total events	48		1318		
Heterogeneity: I^2 = 24%					



Mahajan et al; OBGYN (Oct 2021)
UKOSS (Sept 2021)
Wei et al, CMAJ (April 2021)

Obstetrical impact of COVID in pregnancy: Hypertensive disorders of pregnancy and postpartum hemorrhage

Outcome	Critical–Severe (n=141)			Moderate–Mild (n=499)			Asymptomatic (ref) (n=579)
		RR (95% CI)	aRR* (95% CI)		RR (95% CI)	aRR* (95% CI)	
Postpartum hemorrhage[§]	21 (14.9)	2.05 (1.26–3.35)	2.02 (1.18–3.45)	45 (9.0)	1.24 (0.83–1.86)	1.21 (0.78–1.87)	42 (7.3)
Hypertensive disorders of pregnancy[‖]	57 (40.4)	2.15 (1.65–2.79)	1.61 (1.18–2.20)	119 (23.8)	1.27 (1.01–1.60)	1.24 (0.98–1.58)	109 (18.8)

**** Increased risk of both preeclampsia and pregnancy induced hypertension ****

Metz et al (2021)

Obstetrical impact of COVID in pregnancy: Fetal Growth

43 institutions
18 Countries

Table 1. Pregnancy Complications, Perinatal Events, and Neonatal Morbidities Among Women With and Without COVID-19 Diagnosis and Their Newborns

Characteristic	No. (%) Women with COVID-19 diagnosis (n = 706)	Women without COVID-19 diagnosis (n = 1424)	Relative risk (95% CI)
Low birth weight (<2500 g)	145 (20.5)	181 (12.7)	1.58 (1.29 to 1.94)[b]
Small for gestational age (<10th centile)[f]	97 (13.7)	181 (12.7)	1.03 (0.81 to 1.31)

Increased rate of Low Birth Weight

No studies to determine optimal surveillance in COVID recovery
- **Suggest q 2-4w BPP/ EFW**
- **Self-monitoring: FM, s/s PET**

No studies to suggest IOL at term/preterm to reduce risk of harm

InterCOVID Study; JAMA Ped (Apr 2021)

COVID vaccination in pregnancy

Safety of the mRNA Vaccine in Pregnancy

* Pregnant vaccinated individuals matched to pregnant unvaccinated individuals (n= 7 530)

Outcomes	Vaccinated	Matched unvaccinated
No.	7530	7530
SARS-CoV-2 hospitalization, No. (%)	13 (0.2)	23 (0.3)
Abortion,[c] No. (%)	128 (1.7)	118 (1.6)
Intrauterine growth restriction, No. (%)	36 (0.5)	38 (0.5)
Preeclampsia, No. (%)	20 (0.3)	21 (0.3)
Stillbirth, No. (%)	1 (<0.1)	2 (<0.1)
Maternal death, No. (%)	0	0
Obstetric pulmonary embolism, No. (%)	0	0
Birth week, median (IQR)	39 (38-40)	39 (38-40)
Preterm birth (<37 wk), No. (%)	77/1387 (5.6)	85/1427 (6.0)
Infant weight, median (IQR), kg	3.2 (2.9-3.6)	3.2 (2.9-3.5)

No difference in pregnancy outcomes

IUGR
PET
IUFD
PTB
LBW
Maternal M&M

Goldshtein et al, JAMA (Aug 2021)

Safety of the mRNA Vaccine in Pregnancy

Event	No. of subjects	Prevalence (events per 100 live births)	aHR[†] (95% CI)
Preterm birth[¶]			
Full population	46,079	6.6	NA
No COVID-19 vaccines during pregnancy	36,015	7.0	Ref
Any COVID-19 vaccine during pregnancy	10,064	4.9	0.91 (0.82–1.01)
mRNA vaccine, 1 dose	1,759	7.7	0.78 (0.66–0.93)
mRNA vaccine, 2 doses	7,881	4.3	0.97 (0.86–1.10)
Second trimester**	3,668	6.4	1.05 (0.90–1.23)
Third trimester**	6,224	4.0	0.82 (0.72–0.94)
Small-for-gestational-age at birth[††]			
Full population	40,627	8.2	NA
No COVID-19 vaccines during pregnancy	31,699	8.2	Ref
Any COVID-19 vaccine during pregnancy	8,928	8.2	0.95 (0.87–1.03)
mRNA vaccine, 1 dose	1,576	8.2	0.92 (0.80–1.07)
mRNA vaccine, 2 doses	6,982	8.3	0.98 (0.89–1.08)
Second trimester**	3,226	8.6	1.00 (0.86–1.17)
Third trimester**	5,561	8.0	0.93 (0.85–1.02)

Hazard Ratio

Retrospective cohort of >40,000 pregnant women

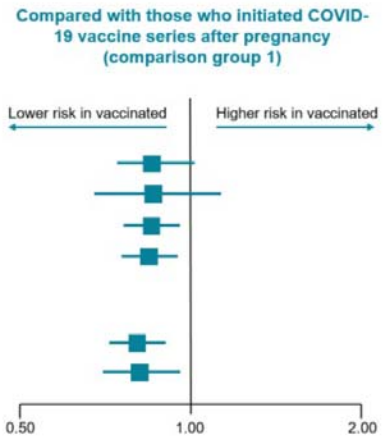
No associated with Preterm Birth
No associated with SGA

- **Trimester at time of vaccination**
- **# doses of vaccine**

CDC MMMWR Jan 2022

COVID-19 vaccination during pregnancy was not associated with negative outcomes

Outcome	Received ≥1 dose of COVID-19 vaccine during pregnancy No. (%)	Initiated COVID-19 vaccine series after pregnancy No. (%)
Pregnant individuals with a live birth or stillbirth	**N=22,660**	**N=44,815**
- Postpartum hemorrhage	677 (3.0)	1,351 (3.0)
- Chorioamnionitis	101 (0.5)	214 (0.5)
- Cesarean birth	6,988 (30.8)	14,427 (32.2)
- Emergency cesarean	2,829 (15.3)	5,943 (16.4)
Live born infants	**N=22,746**	**N=44,943**
- NICU admission	2,508 (11.0)	5,969 (13.3)
- 5-minute Apgar score <7	403 (1.8)	894 (2.0)



COVID-19 vaccination during pregnancy in Ontario: a province-wide evaluation

BORN Ontario · CHEO RESEARCH INSTITUTE INSTITUT DE RECHERCHE · uOttawa

JAMA 2022

COVID vaccination protects babies

Morbidity and Mortality Weekly Report

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

61% effective at preventing hospitalization for COVID in children < 6mos

Timing of maternal vaccination during pregnancy†	No. vaccinated¶/Total (%) Case-infants	Control-infants	Vaccine effectiveness,* % (95% CI)
Any time	28/176 (15.9)	65/203 (32.0)	61 (31 to 78)
Early (first 20 weeks)	17/165 (10.3)	26/164 (15.9)	32 (–43 to 68)
Late (21 weeks' gestation through 14 days before delivery)	9/157 (5.7)	38/176 (21.6)	80 (55 to 91)

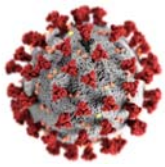
Best effect if vaccinated in late T2 or T3

Characteristic (no. unknown)	Total (N = 176)	Unvaccinated (n = 148)	Vaccinated (2-doses of mRNA COVID-19 vaccine) (n = 28)
Intensive care unit admission	**43/176 (24.4)**	38/148 (25.7)	5/28 (17.9)
Critically ill infants on life support (4)	**25/172 (14.5)**	21/144 (14.6)	4/28 (14.3)

Reduced risk of NICU admission

CDC MMWR Feb 2022

Take-home points:



- The vaccine is **safe**
- The vaccine **prevents major complications** from COVID for mom and baby
- Some unanswered questions:
  - Current state of illness is different from when data emerged in 2020 and 2021
  - 80% of people reproductive age have had exposure to COVID
  - Vaccination rate are very high amongst this population
  - The vulnerable, elderly, immunocompromised, etc. population is still at high risk

How has COVID impacted chronic disease management?

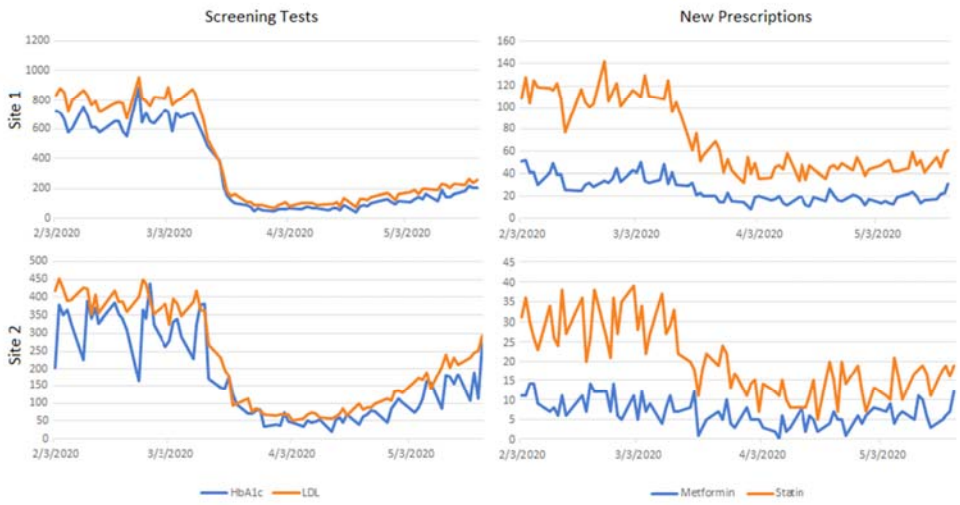
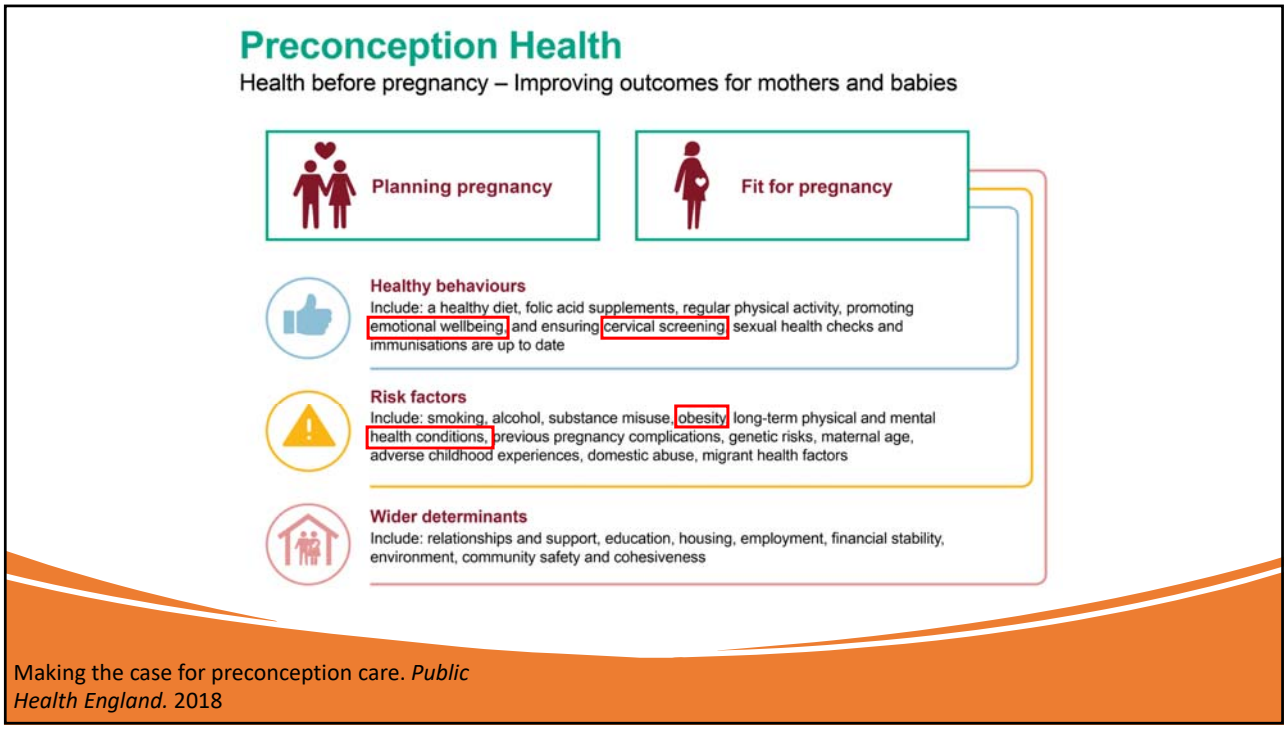


Figure 1 Rates of screening tests and new prescriptions at site 1 and site 2.

Wright A, Salazar A, Mirica M, Volk LA, Schiff GD. The Invisible Epidemic: Neglected Chronic Disease Management During COVID-19. *J Gen Intern Med*. 2020 Sep 1;35(9):2816–7.



Making the case for preconception care. *Public Health England.* 2018

CASE 1:

32 y.o. patient comes in and tells you she has a positive pregnancy test

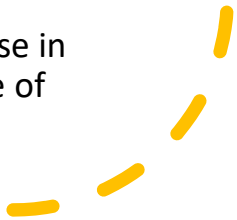
- On review of the chart, you haven't seen her in a few years because she was living abroad and then COVID hit
- She's healthy but hasn't had a pap test since 2017, before she left. She thought she'd "wait it out" which is why she didn't present for screening in the past few years
- Should she have a pap? Should she be examined? Wait until postpartum?
- What are some other considerations?

The state of cervical screening

- U.S. data showed **increasing rates** of of eligible teens up-to-date on HPV vaccination (58.6% in 2020 compared to a target of 80%)
- At 80% vaccination rate, the chance of eliminating cervical cancer within a century becomes a reality

Then COVID Hits

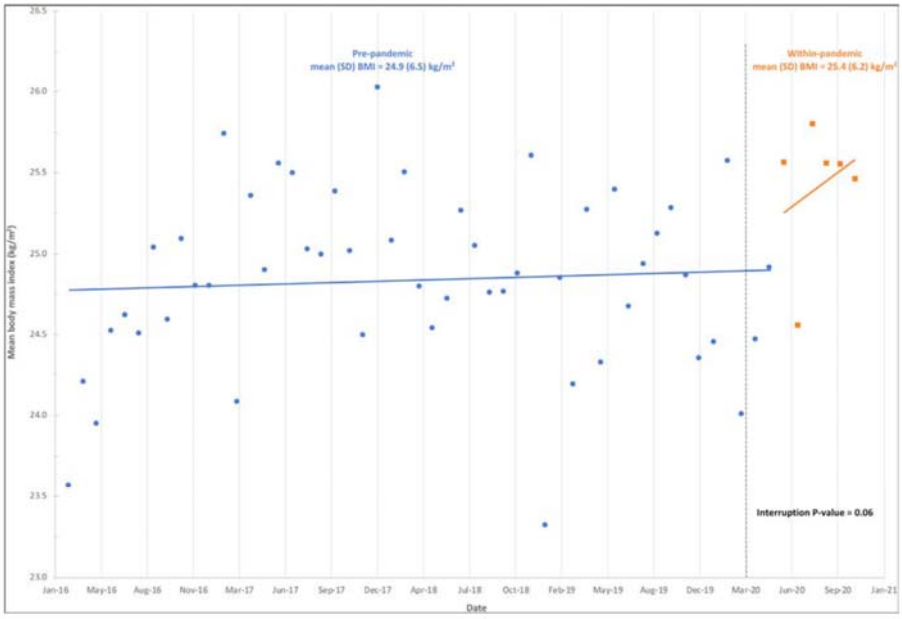
- Vaccination rates decline by >70% in March 2020
- Pap testing falls by 94% and remains 35% below pre-pandemic levels even *after* stay-at-home orders lifted
- Preventative healthcare **stopped in its tracks**... how long will it take to recover? Can we fully recover?
- It will take a few years to see a rise in cervical cancer as a consequence of decreased screening



Smith DL, Perkins RB. Low rates of HPV vaccination and cervical cancer screening: Challenges and opportunities in the context of the COVID-19 pandemic. Preventive Medicine. 2022 Jun 1;159:107070.

Pre-Pregnancy BMI

Figure. Monthly mean maternal pre-pregnancy body mass index among 9703 women with a singleton livebirth before (blue circles) and during (orange squares) the SARS-CoV-2 pandemic (vertical dashes line).



Butler EA, Cohen E, Berger H, Ray JG. Change in Pre-Pregnancy Body Mass Index in Relation to the COVID-19 Pandemic. J Obstet Gynaecol Can. 2022 Feb;44(2):131–2.

Increasing BMI

- Risk of gestational diabetes
- Risk of hypertensive disorders
- Risk of cesarean section
- And so on…

Diabetes in Pregnancy

Table 1. The distribution per year of the prevalence of GDM births according to the total number of tested patients per year.

	Total Births Per Year at Tested Patients	Total Births with GDM Per Year	% of GDM Births
2017	433	12	2.77
2018	447	13	2.91
2019	352	25	7.10
2020	371	29	7.82
2021	507	43	8.48

GDM—gestational diabetes mellitus.

Chelu S, Bernad E, Craina M, Neamtu R, Mocanu AG, Vernic C, et al. Prevalence of Gestational Diabetes in preCOVID-19 and COVID-19 Years and Its Impact on Pregnancy: A 5-Year Retrospective Study. Diagnostics. 2022 May;12(5):1241.

Screening for Gestational Diabetes

50g GCT 24-28 weeks

↓

HbA1c and random glucose (sensitivity 26%)

Perspectives in Practice

Temporary Alternative Screening Strategy for Gestational Diabetes Screening During the COVID-19 Pandemic—The Need for a Middle Ground

Jennifer M. Yamamoto MD [a,b,*]; Lois E. Donovan MD [c]; Denice S. Feig MD [d,e,f]; Howard Berger MD [g]

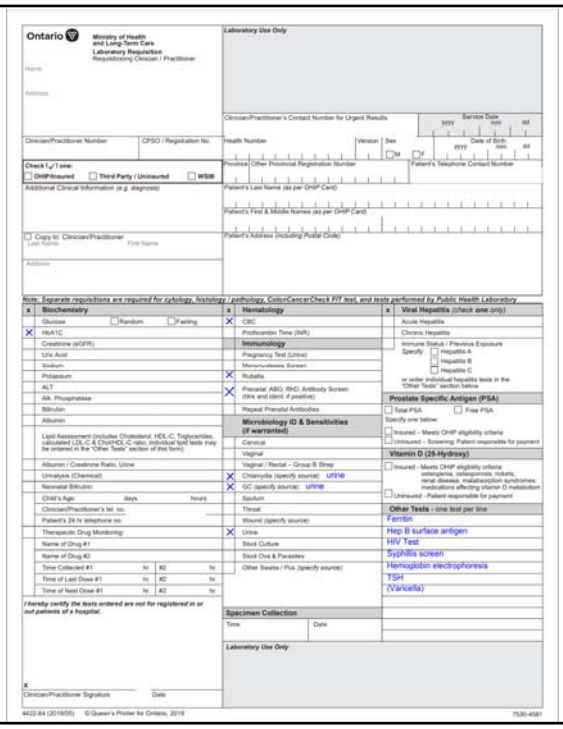
[a] Department of Internal Medicine, University of Manitoba and Children's Hospital Research Institute of Manitoba, Winnipeg, Manitoba, Canada
[b] Department of Medicine, University of Calgary, Calgary, Alberta, Canada
[c] Departments of Medicine and Obstetrics and Gynecology, Cumming School of Medicine, University of Calgary and Alberta Children's Hospital Research Institute, Calgary, Alberta, Canada
[d] Mount Sinai Hospital, Toronto, Ontario, Canada
[e] Lunenfeld-Tanenbaum Research Institute, Toronto, Ontario, Canada
[f] Department of Medicine, University of Toronto, Toronto, Ontario, Canada
[g] Department of Obstetrics and Gynecology, Saint Michael's Hospital, University of Toronto, Toronto, Ontario, Canada

Yamamoto JM, Donovan LE, Feig DS, Berger H. Temporary Alternative Screening Strategy for Gestational Diabetes Screening During the COVID-19 Pandemic—The Need for a Middle Ground. Canadian Journal of Diabetes. 2022 Mar 1;46(2):204–6.

It is probably most important to identify those with undiagnosed diabetes

Gestational Diabetes Mellitus
During Pregnancy

- Untreated gestational diabetes leads to increased maternal and perinatal morbidity. Treatment reduces these adverse pregnancy outcomes.
- In women at high risk of undiagnosed type 2 diabetes, early screening (<20 weeks) with an A1C should be done to identify women with potentially overt diabetes to guide fetal surveillance and early maternal treatment, including self-monitoring of blood glucose, interventions that promote healthy behaviours and healthy weight gain.
- The diagnostic criteria for gestational diabetes (GDM) remain controversial; however, these guidelines identify a "preferred" and an "alternate" screening approach. The preferred approach is an initial 50 g glucose challenge test, followed, if abnormal, with a 75 g oral glucose tolerance test. A diagnosis of GDM is made if one plasma glucose value is abnormal (i.e. fasting ≥5.3 mmol/L, 1 hour ≥10.6 mmol/L, 2 hours ≥9.0 mmol/L). The alternate approach is a 1-step approach of a 75 g oral glucose tolerance test. A diagnosis of GDM is made if one plasma glucose value is abnormal (i.e. fasting ≥5.1 mmol/L, 1 hour ≥10.0 mmol/L, 2 hours ≥8.5 mmol/L).
- First-line therapy consists of diet and physical activity. If glycemic targets are not met, insulin or metformin can then be used.



Ontario

Ministry of Health and Long-Term Care

Laboratory Requisition

Requisitioning Clinician / Practitioner

Laboratory Use Only

Name

Address

Clinician/Practitioner's Contact Number for Urgent Results

Service Date (yyyy mm dd)

Clinician/Practitioner Number | CPSO / Registration No.

Health Number | Version | Sex ☐M ☐F | Date of Birth (yyyy mm dd)

Province | Other Provincial Registration Number | Patient's Telephone Contact Number

Check (✓) one: ☐ OHIP/Insured ☐ Third Party / Uninsured ☐ WSIB

Additional Clinical Information (e.g. diagnosis)

Patient's Last Name (as per OHIP Card)

Patient's First & Middle Names (as per OHIP Card)

☐ Copy to: Clinician/Practitioner — Last Name | First Name

Address

Patient's Address (including Postal Code)

Note: Separate requisitions are required for cytology, histology / pathology, ColonCancerCheck FIT test, and tests performed by Public Health Laboratory.

x	Biochemistry		
	Glucose	☐ Random	☐ Fasting
X	HbA1C		
	Creatinine (eGFR)		
	Uric Acid		
	Sodium		
	Potassium		
	ALT		
	Alk. Phosphatase		
	Bilirubin		
	Albumin		
	Lipid Assessment (includes Cholesterol, HDL-C, Triglycerides, calculated LDL-C & Chol/HDL-C ratio; individual lipid tests may be ordered in the "Other Tests" section of this form).		
	Albumin / Creatinine Ratio, Urine		
	Urinalysis (Chemical)		
	Neonatal Bilirubin:		
	Child's Age: days hours		
	Clinician/Practitioner's tel. no.		
	Patient's 24 hr telephone no.		
	Therapeutic Drug Monitoring:		
	Name of Drug #1		
	Name of Drug #2		
	Time Collected #1 hr #2 hr		
	Time of Last Dose #1 hr #2 hr		
	Time of Next Dose #1 hr #2 hr		

I hereby certify the tests ordered are not for registered in or out patients of a hospital.

x Clinician/Practitioner Signature | Date

x	Hematology
X	CBC
	Prothrombin Time (INR)
	Immunology
	Pregnancy Test (Urine)
	Mononucleosis Screen
X	Rubella
X	Prenatal: ABO, Rh(D), Antibody Screen (titre and ident. if positive)
	Repeat Prenatal Antibodies
	Microbiology ID & Sensitivities (if warranted)
	Cervical
	Vaginal
	Vaginal / Rectal – Group B Strep
X	Chlamydia (specify source): urine
X	GC (specify source): urine
	Sputum
	Throat
	Wound (specify source):
X	Urine
	Stool Culture
	Stool Ova & Parasites
	Other Swabs / Pus (specify source):

Specimen Collection

Time | Date

Laboratory Use Only

x	Viral Hepatitis (check one only):
	Acute Hepatitis
	Chronic Hepatitis
	Immune Status / Previous Exposure Specify: ☐ Hepatitis A ☐ Hepatitis B ☐ Hepatitis C or order individual hepatitis tests in the "Other Tests" section below
	Prostate Specific Antigen (PSA)
	☐ Total PSA ☐ Free PSA
	Specify one below:
	☐ Insured – Meets OHIP eligibility criteria
	☐ Uninsured – Screening: Patient responsible for payment
	Vitamin D (25-Hydroxy)
	☐ Insured - Meets OHIP eligibility criteria: osteopenia, osteoporosis, rickets; renal disease, malabsorption syndromes; medications affecting vitamin D metabolism
	☐ Uninsured - Patient responsible for payment
	Other Tests – one test per line
	Ferritin
	Hep B surface antigen
	HIV Test
	Syphilis screen
	Hemoglobin electrophoresis
	TSH
	(Varicella)

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Isolation affects mental health and wellbeing

- Increased rates of depression
- Increased rates of anxiety
- Decrease in amount of physical activity

Moms Are Not OK: COVID-19 and Maternal Mental Health

Margie H. Davenport[1], Sarah Meyer[1], Victoria L. Meah[1], Morgan C. Strynadka[1] and Rshmi Khurana[2]*

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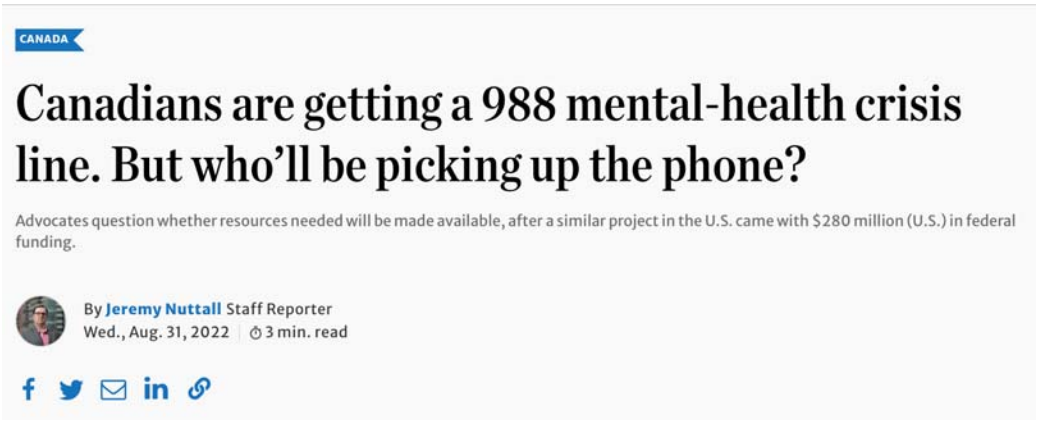
With current health human resource struggles, who will provide the care?



CANADA

Canadians are getting a 988 mental-health crisis line. But who'll be picking up the phone?

Advocates question whether resources needed will be made available, after a similar project in the U.S. came with $280 million (U.S.) in federal funding.

By Jeremy Nuttall Staff Reporter
Wed., Aug. 31, 2022 | 3 min. read

As we "emerge" from the pandemic, we are starting to recognize the long-lasting impacts of reducing preventative healthcare on our "healthy" population

Maybe they're not as healthy as they think they are...