Supplemental Online Content

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eTable 3. Post Hoc Analysis of the Risk of Severe Maternal Morbidity From 20 Weeks’ Gestation to 42 Days’ Post Partum and Severe Neonatal Morbidity Arising Less Than 28 Days After a Livebirth in Relation to a Woman Having an Emergency Department (ED) Visit Within 90 Days Preceding the Estimated Clinical Start of Pregnancy, Stratified by the Total Number of Aggregated Diagnosis Groups (ADGs) Within 120 Days Before the Estimated Clinical Start of Pregnancy

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This supplemental material has been provided by the authors to give readers additional information about their work.
**eTable 1. Variables Used to Define Cohort Entry and Exclusion Criteria, Outcomes, and Adjustment Variables**

| Assessment            | Timing                                                                 | Disease, procedure or measure                                                                 | ICD-10-CA diagnostic codes and CCI procedure codes [bolded], in DAD, SDS and NACRS                                                                 |
|-----------------------|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| **Cohort entry criteria** | At the index delivery date (where the estimated clinical start of pregnancy [i.e. 0 weeks’ gestation] is April 1, 2003 to January 31, 2020) | All obstetrically delivered mothers and their linked newborns (livebirths and stillbirths) in the province of Ontario | Main patient service code indicating “obstetrical delivery” (the MOMBABY dataset includes linked DAD inpatient admission records of delivering mothers and their newborns; https://datadictionary.ices.on.ca/Applications/DataDictionary/Library.aspx?Library=MOMBABY) |
| **Exclusion criteria**  | From 0 weeks’ gestation up to and including 42 days’ postpartum       | Woman had an invalid healthcare number or hospital number                                       | Invalid healthcare number on the DAD delivery record, or invalid maternal-newborn linkage in MOMBABY                                               |
|                       | Same as above                                                         | Woman was a non-Ontario resident at any time during the perinatal period                      | Sex not ‘Female’, birth date missing, or unregistered healthcare number {RPDB}                                                                  |
|                       | Same as above                                                         | Woman was not OHIP eligible during the entire perinatal period                                | Postal code {RPDB}                                                                                                                            |
|                       | Estimated clinical start of pregnancy                                 | Woman’s recorded death date preceded pregnancy                                                | Eligibility start and end dates {RPDB}                                                                                                        |
|                       | Same as above                                                         | Woman’s age was missing or < 10 or > 55 years                                                 | Death date {RPDB}                                                                                                                             |

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| **Main Exposure** | Within 90 days before the estimated clinical start of pregnancy | ED visit during the pre-pregnancy period | Any ICD-10-CA code in NACRS |
|-------------------|---------------------------------------------------------------|----------------------------------------|----------------------------|
| **Secondary Exposure** | From the estimated clinical start of pregnancy up to 12 weeks’ gestation | Main diagnostic code for the ED visit | Any ICD-10-CA code in NACRS |
| **Main outcomes** | Arising from 20 weeks’ gestation up to 42 days after the index delivery | Severe Maternal Morbidity (SMM) | Severe preeclampsia and hemolysis, elevated liver enzymes and low platelets (HELLP) syndrome: O14.1, O14.2 |

Eclampsia: O15
Cerebral venous thrombosis in pregnancy, or the puerperium: O22.5, O87.3
Acute fatty liver with red blood cell (RBC) transfusion or plasma transfusion: O26.6 + (CIHI-DAD RBC transfusion indicator=1 or CIHI-DAD Plasma transfusion indicator=1)
Pulmonary, cardiac, and CNS complications of anaesthesia during pregnancy, the puerperium, or labour and delivery: O29.0, O29.1, O29.2, O89.0, O89.1, O89.2, O74.0, O74.1, O74.2, O74.3
Placenta previa with hemorrhage with RBC transfusion: O44.1 + CIHI-DAD RBC transfusion indicator=1
| ICD-10 Codes | Description |
|--------------|-------------|
| O45.0        | Placental abruption with coagulation defect |
| O46.0        | Antepartum hemorrhage with coagulation defect |
| O67.0        | Intrapartum hemorrhage with coagulation defect |
| O67 + CIHI-DAD RBC transfusion indicator=1 | Intrapartum hemorrhage with RBC transfusion |
| O71.0 or O71.1 + any of the following: | Rupture of the uterus with RBC transfusion, procedures to the uterus or hysterectomy: |
| • CIHI-DAD RBC transfusion indicator=1, or |
| • (1.RM.13, 1.KT.51, 5.PC.91.LA or 5.PC.91.HV) + CIHI-DAD RBC transfusion indicator=1, or |
| • (5.MD.60.RC, 5.MD.60.RD, 5.MD.60.KE, 5.MD.60.CB or 1.RM.89.LA), or |
| • 1.RM.87.LA-GX | |

**NOTE:** 1.RM.89.LA is included only if codes 1.PL.74, 1.RS.74 or 1.RS.80 are NOT also present

| O72 + any of the following: | Postpartum hemorrhage with RBC transfusion, procedures to the uterus or hysterectomy: |
| • CIHI-DAD RBC transfusion indicator=1, or |
| • (1.RM.13, 1.KT.51, 5.PC.91.LA or 5.PC.91.HV) + CIHI-DAD RBC transfusion indicator=1, or |
| • (5.MD.60.RC, 5.MD.60.RD, 5.MD.60.KE, 5.MD.60.CB or 1.RM.89.LA), or |
| • 1.RM.87.LA-GX | |

**NOTE:** 1.RM.89.LA is included only if codes 1.PL.74, 1.RS.74 or 1.RS.80 are NOT also present

| O74.2, O89.1, O90.3, I21, I22, I42, I43, I46, I49.0, IS0, J81, 1.HZ.09, 1.HZ.30 | Cardiac conditions: |
| O75.1, R57, T80.5, T88.6 | Obstetric shock: |
| O75.3 | Septicemia during labour: |
| O75.4 | Complications of obstetric surgery and procedures: |
| Category                                                      | Code(s)                           |
|--------------------------------------------------------------|-----------------------------------|
| Puerperal sepsis                                             | O85                               |
| Obstetric embolism                                           | O88                               |
| Acute renal failure                                          | O90.4, N17, N19, N99.0            |
| Disseminated intravascular coagulation                       | D65                               |
| Sickle cell anemia with crisis                               | D57.0                             |
| Acute psychosis                                              | F53.1, F23                        |
| Status epileptic                                             | G41                               |
| Cerebral edema or coma                                        | G93.6, R40.2                      |
| Cerebrovascular diseases: subarachnoid and intracranial       |                                   |
| hemorrhage, cerebral                                         |                                   |
| infarction, stroke                                           |                                   |
| Acute abdomen                                                | K35, K37, K65, N73.3, N73.5       |
| Hepatic failure                                              | K71, K72                          |
| Assisted ventilation through endotracheal tube               | 1.GZ.31.CA-ND                     |
| Assisted ventilation through tracheostomy                    | 1.GZ.31.CR-ND                     |
| Hysterecтомy                                                 | 5.MD.60.RC, 5.MD.60.RD, 5.MD.60.KE, 5.MD.60.CB, 1.RM.89.LA | (exclude if 1.PL.74, 1.RS.74 or 1.RS.80 code also present) or 1.RM.87.LA-GX |
| Dialysis                                                     | 1.PZ.21                           |
| Evacuation of incisional hematoma with RBC transfusion       | 5.PC.73.JS + CIHI-DAD             |
| Repair of bladder, urethra, or intestine                      | 5.PC.80.JR, 1.NK.80, 1.NM.80      |
| Procedures to the uterus/pelvic vessels with RBC transfusion: (1.RM.13, 1.KT.51, 5.PC.91.LA or 5.PC.91.HV) + CIHI-DAD RBC transfusion indicator=1 |
|---|
| Surgical or manual correction of inverted uterus for vaginal births only: 5.PC.91.HQ or 5.PC.91.HP, restricted to vaginal births (i.e., absence of caesarean 5.MD.60) |
| Reclosure of caesarean wound: (5.PC.80.JM or 5.PC.80.JH) + CIHI-DAD RBC transfusion indicator=1 |
| Curettage with RBC transfusion: (5.PC.91.GA, 5.PC.91.GC or 5.PC.91.GD) + CIHI-DAD RBC transfusion indicator=1 |
| Reclosure of caesarean wound: (5.PC.80.JM or 5.PC.80.JH) + CIHI-DAD RBC transfusion indicator=1 |
| Maternal ICU admission: CIHI-DAD Special Care Unit 10, 20, 25, 30, 35, 40, 45, 60, 80 |

| Same as above | All-cause maternal death |  -- |  Death date {RPDB} |
|---|---|---|---|
| Arising < 28 days after a livebirth | Severe neonatal morbidity (SNM), using the severe neonatal adverse outcomes indicator (NAOI) | All indicators are identified from the DAD newborn record: |
| Gestational age at birth < 32 weeks |
| Birthweight < 1500 grams |
| Respiratory distress syndrome: P22.0 |
| Seizures: P90, R56 |
| Intraventricular haemorrhage (grades 3 and 4): P52.2 |
| Cerebral infarction: I63 |
| Periventricular leukomalacia: P91.2 |
| Birth Trauma (intracranial hemorrhage paralysis due to brachial plexus injury, skull or long bone fracture): P10.0-3, P13.0, P13.2-3, P14.0-1 |
| Hypoxic ischemic encephalopathy: P91.5, P91.8, P91.6 |
| Necrotising enterocolitis: P77 |

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| Condition                                                                 | ICD-10 Codes |
|--------------------------------------------------------------------------|--------------|
| Sepsis/septicaemia (streptococcus staphylococcus, E.coli, unspecified gram negative) | P36.0-8, B95.1, B96.2 |
| Pneumonia                                                                | P23, J12-18  |
| Other respiratory (primary atelectasis, respiratory failure)             | P28.0, P28.5 |
| Chronic respiratory disease originating in the perinatal period          | P27          |
| Bacterial meningitis                                                     | G00-03, G05  |
| Resuscitation                                                           | 1.GZ.30.CJ, 1.GZ.30.CJ-NB, 1.GZ.30.JH, 1.HZ.30.JN, 1.HZ.30.JY |
| Ventilatory support (mechanical ventilation and/or CPAP)                | 1.GZ.31.CA-EP, 1.GZ.31.CA-ND, 1.GZ.31.CA-PK, 1.GZ.31.CB-ND, 1.GZ.31.CR-ND, 1.GZ.31.GP-ND, 1.GZ.31.JA-GX, 1.GZ.31.JA-MD, 1.GZ.31.JA-NC, 1.GZ.31.JA-PK |
| Central venous or arterial catheter                                      | 1.KV.53.HA-CH, 1.KV.53.HA-FT, 1.KV.53.LA-FT, 2.IM.28.GP, 2.LZ.28.GQ-PL, 2.LZ.28.GR-PL, 2.LZ.28.JA-PL, 1.KX.53.HA-CH, 1.KX.53.HA-FT, 1.KX.53.LA-FT, 2.LZ.28.GQ-PL, 2.LZ.28.GR-PL |
| Pneumothorax requiring intercostal catheter                             | 1.GV.52.DA, 1.GV.52.DA-TS, 1.GV.52.HA, 1.GV.52.HA-HE, 1.GV.52.HA-TK, 1.GV.52.LA, 1.GV.52.LA-TS, 1.GV.52.LA-XX-E, 1.GV.54.JA-TS, 1.GV.55.JA-TS |
| Any intravenous fluids                                                   | 1.LZ.35.CA-E6, 1.LZ.35.CA-C1, 1.LZ.35.CA-C5, 1.LZ.35.CA-C6, 1.LZ.35.CA-C7, 1.LZ.35.CA-E6, 1.LZ.35.CA-T7, 1.LZ.35.CA-T9, 1.LZ.35.HA-Z9, 1.LZ.35.HH-C1, 1.LZ.35.HH-C5, 1.LZ.35.HH-C6, 1.LZ.35.HH-C7, 1.LZ.35.HH-E0, 1.LZ.35.HH-E6, 1.LZ.35.HH-T7, 1.LZ.35.HH-T9, 1.LZ.35.HH-Z9, 1.LZ.35.HR-C5, 1.LZ.35.HR-C6, 1.LZ.35.HR-C7, 1.LZ.35.HR-T9, 1.LZ.35.HR-Z9 |
| Any body cavity surgical procedure                                        | 1.AA.52, 1.AA.87, 1.AC.87, 1.AE.87, 1.AF.87, 1.AG.87, 1.AJ.87, 1.AK.87, 1.AN.52, 1.AN.59, 1.AN.87, 1.AP.59, 1.AP.72, 1.AP.87, 1.AW.59, 1.AW.72, 1.AW.87, 1.AX.87, 1.BA.72, 1.BA.80, 1.BA.87, 1.BB.72, 1.BB.80, 1.BB.87, 1.BD.72, 1.BD.80, 1.BD.87, 1.BF.80, 1.BG.72, 1.BG.80, 1.BG.87, 1.BK.59,
| 1.BM.72, 1.BM.80, 1.BM.87, 1.BN.72, 1.BN.80, 1.BN.87, 1.BP.72, 1.BP.80, 1.BP.87, 1.BQ.72, 1.BQ.80, 1.BQ.87, 1.BS.72, 1.BS.80, 1.BS.87, 1.BT.72, 1.BT.80, 1.BT.87, 1.GA.87, 1.GA.89, 1.GB.87, 1.GB.89, 1.GD.89, 1.GE.80, 1.GE.87, 1.GE.89, 1.GE.91, 1.GH.84, 1.GJ.86, 1.GJ.87, 1.GK.87, 1.GK.89, 1.GM.80, 1.GM.86, 1.GM.87, 1.GN.92, 1.GR.87, 1.GR.89, 1.GR.91, 1.GT.78, 1.GT.87, 1.GT.89, 1.GT.91, 1.GV.87, 1.GV.89, 1.GW.87, 1.GX.80, 1.GX.86, 1.GX.87, 1.GY.70, 1.GY.72, 1.GY.86, 1.HJ.76, 1.HJ.82, 1.HN.87, 1.HP.76, 1.HP.78, 1.HP.80, 1.HP.82, 1.HP.83, 1.HP.87, 1.HR.80, 1.HR.84, 1.HR.87, 1.HS.80 (excl. 1.HS.80.G), 1.HS.90, 1.HT.80 (excl. 1.HT.80.G), 1.HT.89, 1.HT.90, 1.HU.80 (excl. 1.HU.80.G), 1.HU.90, 1.HV.80 (excl. 1.HV.80.G), 1.HV.90, 1.HW.78, 1.HW.79, 1.HX.80, 1.HX.87, 1.HX.89, 1.HZ.87, 1.IA.76, 1.IA.80, 1.IA.87, 1.IB.76, 1.IB.79, 1.IB.80, 1.IB.82, 1.IB.87, 1.IC.76, 1.IC.80, 1.IC.82, 1.IC.87, 1.ID.80, 1.ID.82, 1.ID.86, 1.ID.87, 1.IF.83, 1.IJ.76, 1.IJ.80, 1.IJ.87, 1.IL.80, 1.IL.84, 1.IL.87, 1.IM.83, 1.IM.87, 1.IN.83, 1.IN.84, 1.IN.87, 1.JE.57 (excl. 1.JE.57.G), 1.JE.76, 1.JE.80, 1.JE.87, 1.JJ.76, 1.JJ.80, 1.JK.76, 1.JK.80, 1.JK.87, 1.JW.51 (excl. 1.JW.51.G), 1.JW.57, 1.JW.76, 1.LA.84, 1.LC.84, 1.LD.84, 1.NA.72, 1.NA.74, 1.NA.76, 1.NA.90, 1.NA.91, 1.NA.92, 1.NA.80, 1.NA.84, 1.NA.86, 1.NA.87, 1.NA.88, 1.NA.89, 1.NA.90, 1.NA.91, 1.NA.92, 1.NE.80, 1.NF.76, 1.NF.78, 1.NF.80, 1.NF.82, 1.NF.84, 1.NF.86, 1.NF.87 (excl. 1.NF.87.B), 1.NF.89, 1.NF.90, 1.NF.91, 1.NF.92, 1.NK.76, 1.NK.77, 1.NK.80, 1.NK.82, 1.NK.84, 1.NK.87 (excl. 1.NK.87.B), 1.NM.74, 1.NM.76, 1.NM.77, 1.NM.80, 1.NM.82, 1.NM.87 (excl. 1.NM.87.B), 1.NM.89, 1.NM.91, 1.NP.72, 1.NP.73, 1.NP.86, 1.NQ.74 (excl. 1.NQ.74.B), 1.NQ.80, 1.NQ.84, 1.NQ.86, 1.NQ.87 (excl. 1.NQ.87.B), 1.NQ.89, 1.NQ.90, 1.NT.80, 1.NT.84, 1.NT.86, 1.NT.87, 1.NV.89, 1.OA.87, 1.OB.87, 1.OB.89, 1.OD.76, 1.OD.89, 1.OE.76, 1.OE.80, 1.OE.89, 1.OJ.76 (excl. 1.OJ.76.B), 1.OI.76, 1.OI.89, 1.OK.87, 1.OK.89, 1.OK.91, 1.OT.72, 1.OT.87, 1.OT.91, 1.PB.87, 1.PB.89, 1.PC.80, 1.PC.87 (excl. 1.PC.87.D), 1.PC.89, 1.PC.91, 1.PE.57 (excl. 1.PE.57.BD), 1.PE.80 (excl. 1.PE.80.D), 1.PE.82, 1.PE.87 (excl. 1.PE.87.D), 1.PE.89 (excl. 1.PE.89.D), 1.PG.76, 1.PG.77, 1.PG.80 (excl. 1.PG.80.D), 1.PG.86, 1.PG.89, 1.PL.74 (excl. 1.PL.74.CD), 1.PL.80, 1.PM.79, 1.PM.86, 1.PM.87 (excl. 1.PM.87.B), 1.PM.89, 1.PM.90, 1.PM.91, 1.PM.92, 1.QE.53, 1.QE.57, 1.QE.82, 1.QE.84, 1.QE.87, 1.QE.89, 1.QG.89, 1.QM.74, 1.QM.80, 1.QM.87, 1.QM.89, 1.QM.91, 1.QM.92, 1.QT.87, 1.QT.91, 1.RB.74, 1.RB.80, 1.RB.83, 1.RB.87, 1.RB.89, 1.RD.89, 1.RF.51, 1.RF.72, 1.RF.74, 1.RF.80, 1.RF.87, 1.RF.89, 1.RM.87 (excl. 1.RM.87.B), 1.RM.89, 1.RM.91, 1.RN.87, 1.RN.89, 1.RS.74, 1.RS.80, 1.RS.86, 1.RS.87, 1.RS.89, 1.RW.87, 1.RW.88, 1.RW.91, 1.RW.92, 1.SA.74, 1.SA.75, 1.SA.80, 1.SA.89, 1.SC.74, 1.SC.75, 1.SC.80, 1.SC.87, 1.SC.89, 1.SE.53, 1.SE.89 (excl. 1.SE.89.D), 1.SF.80, 1.SF.87, 1.SF.89, 1.SG.80, 1.SG.87, 1.SH.87, 1.SM.74, 1.SM.80,
| Event | Definition | Discharge disposition | Death date |
|-------|------------|-----------------------|------------|
| Same as above | All-cause neonatal death | ‘Died’ or ‘Died in facility’ (DAD newborn record) | Death date (RPDB) |
| At the index delivery | Stillbirth at ≥ 20 weeks’ gestation | Z37.1, Z37.3, Z37.4, Z37.6, Z37.7, O36.4 (DAD delivery record) | -- |
| **Covariates** | | | |
| At the estimated clinical start of pregnancy | Woman’s age | -- | Age (RPDB) |
| Same as above | Woman’s area-level income quintile based on her 6-digit postal code | -- | {Statistics Canada census} |
| Same as above | Woman’s rural residence based on her 6-digit postal code | -- | {Statistics Canada census} |
| At the index delivery | Woman’s number of previous deliveries | Previous term deliveries + Previous pre-term deliveries (DAD delivery record) | -- |
| Same as above | Woman’s number of previous pregnancies | Previous term deliveries + Previous pre-term deliveries + Previous spontaneous abortions + Previous therapeutic abortions (DAD delivery record) | -- |
| Within 120 days before the estimated clinical start of pregnancy | Total number of Aggregated Diagnosis Groups (ADGs; 0-2, 3-4, 5-6, 7-32) | ADGs were obtained from diagnosis codes in DAD, SDS and NACRS using The Johns Hopkins ACG® System software | -- |
ADG Aggregated Diagnosis Group; CCI Canadian Classification of Interventions; CCP Canadian Classification of Diagnoses and Procedures; ICD-9 International Classification of Diseases, 9th Revision; ICD-10-CA International Classification of Diseases, 10th Revision, Canada; NACRS National Ambulatory Care Reporting System; OHIP Ontario Health Insurance Plan; RPDB Registered Persons Database; SDS Same Day Surgery Database

*R* Restricted to deliveries in the Better Outcomes Registry & Network database from April 2006 to March 2018.
| Outcome                              | Parity        | ED visit within 90 days before pregnancy | Number of outcome events (rate per 1000) | Relative risk (95% confidence interval) |
|-------------------------------------|---------------|------------------------------------------|------------------------------------------|----------------------------------------|
|                                     |               |                                           |                                          | Unadjusted                             | Adjusted<sup>a</sup>                     |
| Severe maternal morbidity           | Nulliparous   | No ED visit (N = 836,847)                | 16,553 (19.8)                            | 1.00 (ref.)                            | 1.00 (ref.)                              |
|                                     |               | ED visit (N = 97,943)                   | 2432 (24.8)                              | 1.26 (1.20 to 1.31)                    | 1.33 (1.27 to 1.38)                      |
|                                     | Parous        | No ED visit (N = 1,075,109)              | 15,003 (14.0)                            | 1.00 (ref.)                            | 1.00 (ref.)                              |
|                                     |               | ED visit (N = 120,027)                  | 2420 (20.2)                              | 1.43 (1.37 to 1.50)                    | 1.48 (1.42 to 1.55)                      |
| Severe neonatal morbidity           | Nulliparous   | No ED visit (N = 832,252)                | 55,613 (66.8)                            | 1.00 (ref.)                            | 1.00 (ref.)                              |
|                                     |               | ED visit (N = 97,347)                   | 7365 (75.7)                              | 1.13 (1.11 to 1.16)                    | 1.18 (1.15 to 1.21)                      |
|                                     | Parous        | No ED visit (N = 1,070,078)              | 49,802 (46.5)                            | 1.00 (ref.)                            | 1.00 (ref.)                              |
|                                     |               | ED visit (N = 119,343)                  | 7424 (62.2)                              | 1.32 (1.29 to 1.35)                    | 1.35 (1.32 to 1.38)                      |

<sup>a</sup>Adjusted for maternal age, neighbourhood income quintile and rurality at the start of the index pregnancy.
### eTable 3. Post Hoc Analysis of the Risk of Severe Maternal Morbidity From 20 Weeks’ Gestation to 42 Days’ Post Partum and Severe Neonatal Morbidity Arising Less Than 28 Days After a Livebirth in Relation to a Woman Having an Emergency Department (ED) Visit Within 90 Days Preceding the Estimated Clinical Start of Pregnancy, Stratified by the Total Number of Aggregated Diagnosis Groups (ADGs) Within 120 Days Before the Estimated Clinical Start of Pregnancy

| Outcome                          | Pre-pregnancy ADG group | ED visit within 90 days before pregnancy | Number of outcome events (rate per 1000) | Relative risk (95% confidence interval) |
|----------------------------------|-------------------------|------------------------------------------|----------------------------------------|----------------------------------------|
|                                  |                         |                                          |                                        | Unadjusted                             | Adjusted<sup>a</sup>                     |
| **Severe maternal morbidity**    |                         |                                          |                                        |                                        |                                        |
| 0-2                              | No ED visit (N = 1,573,553) |                                          | 24,950 (15.9)                          | 1.00 (ref.)                           | 1.00 (ref.)                            |
|                                  | ED visit (N = 58,473)    |                                          | 1129 (19.3)                            | 1.21 (1.14 to 1.29)                   | 1.24 (1.16 to 1.31)                    |
| 3-4                              | No ED visit (N = 271,982) |                                          | 5140 (18.9)                            | 1.00 (ref.)                           | 1.00 (ref.)                            |
|                                  | ED visit (N = 89,192)    |                                          | 1826 (20.5)                            | 1.08 (1.03 to 1.14)                   | 1.13 (1.07 to 1.19)                    |
| 5-6                              | No ED visit (N = 56,417) |                                          | 1202 (21.3)                            | 1.00 (ref.)                           | 1.00 (ref.)                            |
|                                  | ED visit (N = 48,863)    |                                          | 1226 (25.1)                            | 1.18 (1.09 to 1.27)                   | 1.22 (1.12 to 1.32)                    |
| 7-32                             | No ED visit (N = 10,282) |                                          | 267 (26.0)                             | 1.00 (ref.)                           | 1.00 (ref.)                            |
|                                  | ED visit (N = 21,483)    |                                          | 672 (31.3)                             | 1.20 (1.04 to 1.38)                   | 1.25 (1.08 to 1.44)                    |
| **Severe neonatal morbidity**    |                         |                                          |                                        |                                        |                                        |
| 0-2                              | No ED visit (N = 1,565,852) |                                          | 84,504 (54.0)                          | 1.00 (ref.)                           | 1.00 (ref.)                            |
|                                  | ED visit (N = 58,160)    |                                          | 3559 (61.2)                            | 1.13 (1.09 to 1.17)                   | 1.15 (1.11 to 1.19)                    |
| 3-4                              | No ED visit (N = 270,501) |                                          | 16,449 (60.8)                          | 1.00 (ref.)                           | 1.00 (ref.)                            |
|                                  | ED visit (N = 88,685)    |                                          | 5795 (65.3)                            | 1.07 (1.04 to 1.10)                   | 1.10 (1.06 to 1.13)                    |
| 5-6                              | No ED visit (N = 56,044) |                                          | 3733 (66.6)                            | 1.00 (ref.)                           | 1.00 (ref.)                            |
|                                  | ED visit (N = 48,585)    |                                          | 3571 (73.5)                            | 1.10 (1.05 to 1.15)                   | 1.13 (1.08 to 1.19)                    |
| 7-32                             | No ED visit (N = 10,207) |                                          | 756 (74.1)                             | 1.00 (ref.)                           | 1.00 (ref.)                            |
|                                  | ED visit (N = 21,301)    |                                          | 1866 (87.6)                            | 1.18 (1.09 to 1.28)                   | 1.19 (1.09 to 1.29)                    |

<sup>a</sup>Adjusted for maternal age, neighbourhood income quintile and rurality at the start of the index pregnancy.
eTable 4. Risk of Severe Maternal Morbidity Arising From 20 Weeks’ Gestation to 42 Days’ Post Partum in Relation to the Main Discharge Diagnosis Group at the Most Recent Emergency Department (ED) Visit Preceding the Estimated Clinical Start of Pregnancy

Findings are stratified by nulligravid and gravid women (upper), and by nulliparous and parous women (lower).

| Main discharge diagnosis group (ICD-10CA grouping) | Nulligravid women | Gravid women |
|---------------------------------------------------|-------------------|-------------|
|                                                   | Median (IQR) no. days pre-pregnancy | No. women affected | Adjusted RR (95% CI)¹ | Median (IQR) no. days pre-pregnancy | No. women affected | Adjusted RR (95% CI)¹ |
| No ED visit within 90 days before pregnancy       | Not applicable | 641,278 | 1.00 (ref.) | Not applicable | 1,270,682 | 1.00 (ref.) |
| Diseases the blood & blood-forming organs (D50-D89) | 42 (21-61) | 66 | 16.08 (10.79-23.97) | 39 (19-61) | 173 | 13.59 (9.99-18.49) |
| Endocrine, nutritional & metabolic diseases (E00-E90) | 42 (18-69) | 183 | 4.12 (2.48-6.83) | 38 (20-64) | 375 | 5.76 (4.11-8.07) |
| Diseases the circulatory system (I00-I99)         | 47 (23-69) | 300 | 3.11 (1.99-4.88) | 45 (21-66) | 764 | 1.97 (1.32-2.95) |
| Diseases of nervous system (G00-G99)              | 42 (21-65) | 1005 | 1.70 (1.21-2.39) | 41 (20-64) | 2303 | 1.41 (1.07-1.88) |
| Mental, behavioral & neurodevelopmental disorders (F00-F99) | 41 (19-64) | 2115 | 1.63 (1.26-2.10) | 39 (19-62) | 3798 | 1.86 (1.53-2.27) |
| Diseases of digestive system (K00-K93)            | 40 (20-64) | 3069 | 1.42 (1.15-1.77) | 41 (20-65) | 7244 | 1.35 (1.15-1.60) |
| Symptoms, signs, abnormal clinical & laboratory findings, NEC (R00-R99) | 41 (19-65) | 12,693 | 1.40 (1.26-1.57) | 41 (19-64) | 25,817 | 1.63 (1.51-1.77) |
| Pregnancy (O00-O99)ᵇ                              | 48 (29-68) | 1756 | 1.30 (0.97-1.74) | 53 (32-70) | 39,129 | 1.24 (1.15-1.34) |
| Infections & parasitic diseases (A00-B99)         | 40 (19-64) | 2200 | 1.36 (1.04-1.77) | 41 (20-65) | 4395 | 1.51 (1.24-1.84) |
| Diseases of genitourinary system (N00-N99)        | 39 (18-63) | 7847 | 1.31 (1.14-1.52) | 41 (19-65) | 15,983 | 1.52 (1.37-1.70) |
| Diseases of respiratory system (J00-J99)          | 42 (20-65) | 5940 | 1.29 (1.09-1.52) | 40 (20-65) | 13,225 | 1.47 (1.31-1.65) |
| Diseases of skin & subcutaneous tissue (L00-L99)  | 41 (19-65) | 1659 | 1.26 (0.92-1.72) | 41 (19-64) | 3210 | 1.69 (1.36-2.11) |
| Injury, poisonings & consequences of external causes (S00-T98) | 42 (21-66) | 12,108 | 1.28 (1.14-1.44) | 42 (20-65) | 21,498 | 1.46 (1.33-1.60) |
| Other or unknown                                  | 40 (19-64) | 5223 | 1.24 (1.03-1.48) | 43 (22-66) | 14,241 | 1.29 (1.14-1.46) |
| Neoplasms (C00-D48)                               | 41 (22-70) | 71 | 0.71 (0.10-5.03) | 47 (20-70) | 186 | 2.03 (0.92-4.51) |
| Main discharge diagnosis group (ICD-10CA grouping) | Nulliparous women | Parous women |
|-------------------------------------------------|-------------------|--------------|
| Median (IQR) no. days pre-pregnancy | No. women affected | Adjusted RR (95% CI) | No. women affected | Adjusted RR (95% CI) |
| No ED visit within 90 days before pregnancy | Not applicable | 836,847 | 1.00 (ref.) | Not applicable | 1,075,109 | 1.00 (ref.) |
| Diseases of blood & blood-forming organs (D50-D89) | 39 (21-59) | 97 | 17.34 (12.78-23.53) | 40 (19-63) | 142 | 12.48 (8.64-18.04) |
| Endocrine, nutritional & metabolic diseases (E00-E90) | 41 (18-67) | 261 | 5.54 (3.87-7.94) | 37 (20-61) | 297 | 4.57 (2.93-7.11) |
| Diseases of circulatory system (I00-I99) | 47 (22-69) | 423 | 2.24 (1.44-3.49) | 44 (21-65) | 641 | 2.44 (1.62-3.67) |
| Diseases of nervous system (G00-G99) | 41 (21-64) | 1369 | 1.72 (1.29-2.30) | 41 (20-64) | 1939 | 1.32 (0.95-1.84) |
| Infections & parasitic diseases (A00-B99) | 40 (19-64) | 2922 | 1.50 (1.21-1.86) | 41 (20-65) | 3673 | 1.41 (1.11-1.78) |
| Symptoms, signs, abnormal clinical & laboratory findings, NEC (R00-R99) | 41 (19-64) | 17,788 | 1.46 (1.33-1.60) | 41 (19-64) | 20,722 | 1.63 (1.49-1.79) |
| Mental, behavioral & neurodevelopmental disorders (F00-F99) | 40 (19-64) | 3132 | 1.49 (1.20-1.86) | 39 (19-63) | 2781 | 2.08 (1.66-2.60) |
| Diseases of respiratory system (J00-J99) | 41 (19-65) | 7719 | 1.36 (1.18-1.56) | 40 (20-65) | 11,446 | 1.49 (1.31-1.69) |
| Diseases of digestive system (K00-K93) | 40 (19-64) | 4163 | 1.34 (1.10-1.62) | 41 (20-65) | 6150 | 1.44 (1.20-1.73) |
| Diseases of musculoskeletal system (M00-M99) | 41 (21-65) | 3983 | 1.28 (1.05-1.56) | 41 (20-64) | 5411 | 1.49 (1.24-1.79) |
| Diseases of skin & subcutaneous tissue (L00-L99) | 41 (20-65) | 2233 | 1.28 (0.98-1.67) | 41 (19-64) | 2636 | 1.80 (1.41-2.29) |
| Diseases of genitourinary system (N00-N99) | 40 (19-63) | 11,532 | 1.30 (1.15-1.46) | 41 (19-65) | 12,298 | 1.58 (1.40-1.79) |
| Other or unknown | 42 (21-65) | 8558 | 1.21 (1.05-1.39) | 43 (21-66) | 10,906 | 1.29 (1.12-1.49) |
| Injury, poisonings & consequences of external causes (S00-T98) | 42 (21-66) | 16,502 | 1.23 (1.11-1.36) | 42 (20-65) | 17,104 | 1.56 (1.41-1.74) |
| Pregnancy (O00-O99)c | 53 (32-70) | 17,152 | 1.13 (1.02-1.24) | 53 (32-70) | 23,733 | 1.12 (1.01-1.24) |
| Neoplasms (C00-D48) | 46 (20-72) | 109 | 0.89 (0.23-3.54) | 44 (21-69) | 148 | 2.26 (0.93-5.49) |

a Adjusted for maternal age, neighbourhood income quintile and rurality at the start of the index pregnancy

b Among ED visits in the 90 days before pregnancy that had a pregnancy-related ICD-10-CA code at the latest ED visit, the majority of diagnoses (69% of nulligravid and 70% of gravid women) were for an abortive outcome (ICD-10-CA O00-O08), and other maternal disorders predominantly related to pregnancy (27% of nulligravid and 25% of gravid women) (ICD-10-CA O20-O29).

c Among ED visits in the 90 days before pregnancy that had a pregnancy-related ICD-10-CA code at the latest ED visit, the majority of diagnoses (72% of nulliparous and 69% of parous women) were for an abortive outcome (ICD-10-CA O00-O08), and 25% for other maternal disorders predominantly related to pregnancy (ICD-10-CA O20-O29).

ICD-10-CA International Classification of Diseases, 10th Revision, Canada; RR relative risk; CI confidence interval.

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eFigure 1. Flow Diagram of Cohort Creation

2,255,940 livebirths or stillbirths in Ontario, Canada, April 2003 to January 2020

125,695 births (5.6%) excluded
- 6531 invalid maternal universal healthcare number
- 3329 maternal non-Ontario residency at the start of pregnancy
- 35 implausible maternal death date
- 31 maternal age < 10 or > 55 years at the start of pregnancy
- 376 length of gestation < 20 weeks or > 42 weeks
- 79,562 multifetal births
- 177 liveborn infants with unknown birthweight

2,130,245 births included
- 2,119,335 (99.5%) livebirths
- 10,910 (0.5%) stillbirths
eFigure 2. Risk of the Secondary Study Outcomes of Severe Maternal Morbidity or Death, Severe Neonatal Morbidity, Neonatal Mortality, and Stillbirth in Relation to A Woman Having an Emergency Department (ED) Visit Within 90 Days Preceding the Estimated Clinical Start of Pregnancy Shown are unadjusted relative risks (black squares), and relative risks adjusted for maternal age, neighbourhood income quintile, rurality, and total Aggregated Diagnosis Groups (red diamonds).