

Temporal Trends in Postpartum Hemorrhage and Severe Postpartum Hemorrhage in Canada From 2003 to 2010

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Abstract

Objective: Increases in postpartum hemorrhage have been reported from several countries. We assessed temporal trends in postpartum hemorrhage and severe postpartum hemorrhage in Canada between 2003 and 2010.

Methods: We carried out a population-based cohort study of all hospital deliveries in Canada (excluding Quebec) from 2003 to 2010 ($n = 2\,193\,425$), using data from the Canadian Institute for Health Information. Postpartum hemorrhage was defined as a blood loss of ≥ 500 mL following vaginal delivery or ≥ 1000 mL following Caesarean section, or as noted by the care provider. Severe postpartum hemorrhage was defined as postpartum hemorrhage plus blood transfusion, hysterectomy, or other procedures to control bleeding (including uterine suturing or ligation/embolization of pelvic arteries). Temporal trends were assessed using the chi-square test for trend, relative risks, and logistic regression.

Results: Postpartum hemorrhage increased by 22% (95% CI 20% to 25%) from 5.1% in 2003 to 6.2% in 2010 ($P < 0.001$), driven by a 29% increase (95% CI 26% to 33%) in atonic postpartum hemorrhage (3.9% in 2003 vs. 5.0% in 2010, $P < 0.001$). Postpartum hemorrhage with blood transfusion increased from 36.7 to 50.4 per 10 000 deliveries ($P < 0.001$), while postpartum hemorrhage with hysterectomy increased from 4.9 to 5.8 per

10 000 deliveries ($P < 0.01$). Postpartum hemorrhage with uterine suturing, or ligation/embolization of pelvic arteries, increased from 4.1 to 10.7 per 10 000 deliveries ($P < 0.001$). These increases occurred in most provinces and territories, and could not be explained by changes in maternal, fetal, and obstetric factors.

Conclusion: Rates of postpartum hemorrhage and severe postpartum hemorrhage continued to increase in Canada between 2003 and 2010.

Résumé

Objectif : Une hausse des taux d'hémorragie postpartum a été signalée dans plusieurs pays. Nous avons évalué les tendances temporelles en matière d'hémorragie postpartum et d'hémorragie postpartum grave au Canada pour la période se situant entre 2003 et 2010.

Méthodes : Nous avons mené une étude de cohorte en population générale ayant porté sur tous les accouchements hospitaliers au Canada (exception faite du Québec) pour la période se situant entre 2003 et 2010 ($n = 2\,193\,425$), au moyen des données issues de l'Institut canadien d'information sur la santé. L'hémorragie postpartum a été définie comme étant une perte sanguine ≥ 500 ml à la suite d'un accouchement vaginal ou $\geq 1\,000$ ml à la suite d'une césarienne, ou encore conformément aux notes du fournisseur de soins. L'hémorragie postpartum grave a été définie comme étant une hémorragie postpartum s'accompagnant d'une transfusion sanguine, d'une hystérectomie ou d'autres interventions visant à juguler les saignements (y compris les sutures utérines ou la ligature / l'embolisation des artères pelviennes). Les tendances temporelles ont été évaluées au moyen d'un test du chi carré (pour ce qui est de l'évolution), des risques relatifs et d'une régression logistique.

Résultats : Le taux d'hémorragie postpartum a connu une hausse de 22 % (IC à 95 %, 20 % - 25 %), soit de 5,1 % en 2003 à 6,2 % en

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2010 ($P < 0,001$), déterminée par une hausse de 29 % (IC à 95 %, 26 % - 33 %) du taux d'hémorragie postpartum par atonie utérine (3,9 % en 2003 vs 5,0 % en 2010, $P < 0,001$). Le taux d'hémorragie postpartum s'accompagnant d'une transfusion sanguine est passé de 36,7 à 50,4 par 10 000 accouchements ($P < 0,001$), tandis que le taux d'hémorragie postpartum s'accompagnant d'une hystérectomie est passé de 4,9 à 5,8 par 10 000 accouchements ($P < 0,01$). Le taux d'hémorragie postpartum s'accompagnant de sutures utérines ou d'une ligature / embolisation des artères pelviennes est passé de 4,1 à 10,7 par 10 000 accouchements ($P < 0,001$). Ces hausses se sont manifestées dans la plupart des provinces et des territoires, et ne pouvaient être expliquées par des modifications affectant des facteurs maternels, fœtaux ou obstétricaux.

Conclusion : Les taux d'hémorragie postpartum et d'hémorragie postpartum grave ont poursuivi leur croissance au Canada entre 2003 et 2010.

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INTRODUCTION

Increasing rates of postpartum hemorrhage have been reported in several high income countries including Australia, Canada, Ireland, Scotland, Norway, Sweden, and the United States.^{1–7} Postpartum hemorrhage can lead to death and serious complications that follow an extreme drop in blood volume and related organ failure, including acute renal failure, adult respiratory distress syndrome, coagulopathy, and shock.^{8,9} Rates of postpartum hemorrhage in Canada increased by 23% between 1991 and 2004 (from 4.1% to 5.1%), and atonic postpartum hemorrhage was identified as the subtype of postpartum hemorrhage underlying the increase.² However, the reasons for the increase in postpartum hemorrhage have not been identified despite several studies that have examined the role of various maternal, fetal, and obstetric factors (including changes in maternal age, pre-pregnancy weight, multifetal pregnancy, birth weight, epidural anaesthesia, labour induction and augmentation, and Caesarean section).^{2,5,9}

It is unclear if the observed increases in rates of postpartum hemorrhage and severe postpartum hemorrhage in Canada between 1991 and 2004 have stabilized or continued. Also, regional variations in the temporal trends in postpartum hemorrhage within Canada have not been adequately explored. The purpose of this study was to determine whether the rate of postpartum hemorrhage continued to increase in Canada after 2004. We further explored temporal patterns in postpartum hemorrhage rates by provinces and territories, and by maternal, fetal, and obstetric factors. Finally, we examined temporal changes in severe postpartum hemorrhage using objective markers of severity, such as blood transfusion, emergency hysterectomy, and other procedures to control bleeding (including uterine suturing, or ligation/embolization of pelvic blood vessels).

METHODS

The data source for this study was the Canadian Institute for Health Information's Discharge Abstract Database, which contains information on women delivering in all hospitals in Canada (excluding Quebec). Information in the database is abstracted by trained health records personnel using standardized definitions and includes information on maternal characteristics, medical history, and details of all diagnoses and procedures. Validation studies have shown that the perinatal information in the database is accurate.¹⁰ In particular, the diagnosis of postpartum hemorrhage had a sensitivity of 90.2% and specificity of 98.2%, and blood transfusion had a sensitivity of 85.7% and specificity of 99.8%.¹⁰

All hospital deliveries ($n = 2\,193\,425$) in Canada (excluding Quebec) that resulted in a live birth or stillbirth between April 1, 2003, and March 31, 2011 (hereafter referred to as years 2003 to 2010) were included in the study. The primary outcome of postpartum hemorrhage was defined using ICD-10 codes 072.0 to 072.3, which identified postpartum hemorrhage as a blood loss of ≥ 500 mL following vaginal delivery or ≥ 1000 mL following Caesarean section, or as a diagnosis noted by a health care provider. Atonic postpartum hemorrhage was defined as postpartum hemorrhage within 24 hours of delivery (ICD-10 code 072.1) excluding that caused by retained placenta or coagulation defects. Non-atonic postpartum hemorrhage excluded deliveries with an atonic postpartum hemorrhage diagnosis and comprised postpartum hemorrhage due to retained placenta, secondary postpartum hemorrhage (occurring more than 24 hours after delivery), and postpartum hemorrhage due to coagulation defects. Severe postpartum hemorrhage was defined as postpartum hemorrhage in conjunction with a procedure code for blood transfusion, hysterectomy, or other procedures to control bleeding (including suturing of the uterus, e.g., B-Lynch suture, or ligation/embolization of pelvic blood vessels for the purpose of controlling postpartum hemorrhage).

Postpartum hemorrhage rates were examined according to maternal and fetal characteristics, pregnancy complications, medical interventions, and labour complications including maternal age, previous Caesarean section, multifetal gestation, antepartum diagnosis of large fetus, hypertensive disorder, diabetes mellitus, chorioamnionitis, polyhydramnios, placenta previa, placental abruption, induction of labour, epidural anaesthesia, instrumental delivery, Caesarean section, uterine rupture, third or fourth degree perineal tear, cervical laceration, and high vaginal laceration. All diagnostic and procedure codes used in the study are listed in Table 1 of the Appendix. Rates of postpartum hemorrhage within the provinces

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