Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

Maternal deaths with coronavirus disease 2019: a different outcome from low- to middle-resource countries?

TO THE EDITORS: Physiological adaptations in normal pregnancy increase the susceptibility of mothers to microorganisms (bacteria and viruses) and their products. In particular, activation of the innate limb of immune response is thought to increase generation of reactive oxygen radicals by granulocytes and monocytes¹ and predisposes to a cytokine storm. This has been invoked to explain the increased fatality rate of pregnant women affected by severe acute respiratory syndrome (SARS), Middle East respiratory syndrome, ebola, influenza, and H1N1.^{2,3} During the H1N1 pandemic, pregnancy, childbirth, and the postpartum period were considered risk factors for disease worsening and maternal death. In Brazil, H1N1 influenza was the main cause of indirect maternal death in 2009–2010.³ However, in the case of coronavirus disease 2019 (COVID-19) and on the basis of a few case series from China, Europe, and the United States, it is thought that pregnant women may not be more likely to experience severe symptoms from this disease than the general population and there were no reported maternal

deaths.² A new picture may now be emerging from Brazil, Iran, and Mexico, raising the possibility of increased risk of maternal death from COVID-19; in Brazil there is evidence of 5 maternal deaths out of 1947 total deaths from COVID-19, in Iran 2 of 3800,⁴ and in Mexico 2 of 486 (Table). It is therefore possible that in developing as opposed to developed countries, high birth rates and limited resources for health-care provision will uncover the increased risk for maternal death because of COVID-19 and emphasize the need for appropriate measures for adequate prenatal and postnatal care. At the present time, professional organizations have not emphasized that pregnant women exposed to severe acute respiratory syndrome coronavirus 2 may be at an increased risk for adverse outcome; however, it is important that obstetricians and gynecologists be aware that data from countries other than the USA and Europe seem to suggest an increased risk to pregnant mothers. We hope that the scientific community remains open minded and vigilant about this.

TABLE

Coronavirus disease 2019-related maternal deaths worldwide until April 10, 2020

Country	Maternal deaths	Symptoms onset	Moment of death	Comorbidities	Source
Iran	2 of 3800 reported total deaths	Pregnancy	Postpartum	Not reported	Karimi-Zarchi et al 2020
Brazil	5 of 1947 reported total deaths	Not reported	Postpartum ^a	Not reported	Brazilian Ministry of Health
		Not reported	Postpartum ^a	Not reported	Brazilian Ministry of Health
		Postpartum (6 days after elective cesarean delivery)	Postpartum (7 days)	Absent	Local media ^b
		Pregnancy (admitted 32 weeks, emergency CS 2 days later)	Postpartum (2 days)	Absent	Local media ^c
		Pregnancy (admitted 32 weeks, emergency CS)	Postpartum	Absent	Local media ^d
Mexico	2 of 486 reported total deaths	Pregnancy (35 weeks)	Postpartum	Obesity, hypertension	Local media ^e
		Not reported	Not reported	Obesity, gestational diabetes	Mexico Ministry of Health

^a Mode of delivery: elective cesarean delivery; ^b <https://www.folhadelondrina.com.br/geral/mulher-de-28-anos-morre-por-covid-19-sete-dias-apos-parto-na-bahia-2985448e.html>; ^c <https://epoca.globo.com/brasil/gravida-morre-de-covid-19-em-recife-bebe-sobrevive-24353787>; ^d <https://www.agazeta.com.br/brasil/no-rio-mulher-morre-de-covid-19-dez-dias-apos-dar-a-luz-prematuramente-0420>; ^e López-Gatell: Desafortunadamente mueren dos embarazadas por covid-19 | CNN [Internet]. 2020 [cited 2020 Apr 10]. Available from: <https://cnnespanol.cnn.com/video/mueren-mujeres-embarazadas-covid-coronavirus-mexico-gatell-informe-sot-perspectivas-mexico>.

Amorim. Maternal deaths with COVID-19. *Am J Obstet Gynecol* 2020.

ACKNOWLEDGMENTS

The authors thank the members of the Brazilian group of COVID-19 and pregnancy for all efforts in searching this reliable information (Carla Betina Andreucci, MD, PhD; Mariane de Oliveira Menezes, CPM, MSc; Leila Katz, MD, PhD; Roxana Rnobel, MD, PhD; and Adriana Melo, MD, PhD).

This communication has been published in the middle of the COVID-19 pandemic and is available via expedited publication to assist patients and healthcare providers.

Melania Maria Ramos Amorim, MD, PhD

Instituto de Medicina Integral Professor Fernando Figueira - IMIP
Caruaru, Brazil

Maíra Libertad Soligo Takemoto, CNM, PhD

Faculdade de Medicina de Botucatu - UNESP, Botucatu, Brazil

Eduardo Borges da Fonseca, MD, PhD

Paraíba Federal University

Av epitacio Pessoa 557

João Pessoa, PB 58038381

Brazil

fonseca2003@yahoo.com

REFERENCES

1. Naccasha N, Gervasi MT, Chaiworapongsa T, et al. Phenotypic and metabolic characteristics of monocytes and granulocytes in normal pregnancy and maternal infection. *Am J Obstet Gynecol* 2001;185: 1118–23.
2. Rasmussen SA, Smulian JC, Lednicky JA, Wen TS, Jamieson DJ. Coronavirus Disease 2019 (COVID-19) and pregnancy: what obstetricians need to know. *Am J Obstet Gynecol* 2020. [Epub ahead of print].
3. Cirelli JF, Surita FG, Costa ML, Parpinelli MA, Haddad SM, Cecatti JG. The burden of indirect causes of maternal morbidity and mortality in the process of obstetric transition: A cross-sectional multicenter study. A importância das causas indiretas da morbidade e mortalidade maternas no processo de transição obstétrica: um estudo multicêntrico transversal. *Rev Bras Ginecol Obstet* 2018;40: 106–14.
4. Karimi-Zarchi M, Neamatzadeh H, Dastgheib SA, et al. Vertical transmission of coronavirus Disease 19 (COVID-19) from infected pregnant mothers to neonates: a review. *Fetal Pediatr Pathol* 2020;0:1–5. [Epub ahead of print].

© 2020 Elsevier Inc. All rights reserved. <https://doi.org/10.1016/j.ajog.2020.04.023>

How to calculate the risk of preeclampsia in women with a history of positive screening

TO THE EDITORS: With the current demonstration of the benefits of aspirin initiated in early pregnancy to prevent the most severe and preterm forms of preeclampsia, there is a growing interest for the prediction of preterm preeclampsia in the first trimester of pregnancy.¹ In the review by Wright et al,² the authors reported that approximately 90% of women who will develop early preeclampsia could be identified using a competing risks approach in the first trimester of pregnancy, with a false-positive rate of 10%. The screening rate for preterm preeclampsia was approximately 70% for nulliparous women and 65% for white nulliparous women.³ Aspirin initiated before 16 weeks' gestation at a daily dose of >100 mg and with good compliance substantially reduces the overall risk of preeclampsia and more specifically the risk of preterm preeclampsia.¹ This strategy of combining the prediction and prevention of preeclampsia is likely to become standard practice in reducing the overall rate of early preeclampsia in several centers and countries.

In the current algorithm, an important factor influencing the risk of preeclampsia in parous women is a history of preeclampsia, and particularly, a history of preterm preeclampsia (relative risk for preterm preeclampsia from 6 to 30 times). However, we wondered how to manage (or to include in the algorithm) women who had a positive screening result in their previous pregnancy, who took aspirin accordingly, and who did not develop preterm preeclampsia.

We are aware that aspirin seems to delay the development of preeclampsia,⁴ and consequently some women will instead develop a term preeclampsia; however, a history of term preeclampsia is a much lower risk factor than a history of preterm preeclampsia in the algorithm. Given the positive screening rate of approximately 11.3%³ and the substantial weightage of previous pregnancy history in the risk calculation of preeclampsia, it is necessary to propose a specific screening strategy for pregnant women with a positive screening history. Some options seem possible, and we would like to know the opinion of the authors.

With the increasing number of women with a positive screening result at their first pregnancies, knowledge in this area will improve, and the algorithm will eventually include this criterion. For the time being, considering that most women with a positive screening result and treated with aspirin do not develop preeclampsia, will physicians run the risk of not treating them during their subsequent pregnancies? Would these women not prefer to take aspirin because taking aspirin had potentially prevented adverse pregnancy outcomes? ■

Paul Guerby, MD, PhD

Research Center of CHU de Québec-Université Laval

Québec City, QC, Canada

Obstetrics Department

Paule de Viguier Hospital

CHU Toulouse