



BJGH

Brazilian Journal
of Global Health
Revista Brasileira
de Saúde Global

"Near miss mom": important indicator of the care provided to the pregnant woman

Fernanda Achkar¹, Rita de Cássia Silva Calabresi², Yara Juliano³, Neil Ferreira Novo³, Jane de Eston Armond^{3*}

¹Faculdade de Medicina, Universidade Santo Amaro, São Paulo/SP, Brasil.

²Maternidade Estadual Interlagos, São Paulo/SP, Brasil.

³Pós-Graduação em Ciências da Saúde, Universidade Santo Amaro, São Paulo/SP, Brasil. Brasil.

ABSTRACT

OBJECTIVE

The term "near miss" was introduced in the study of maternal morbidity referring to the situation in which a woman presents potentially lethal complications during pregnancy, delivery, or puerperium, only surviving due to chance or hospital care. The present study aimed to verify the characteristics of women and the variables associated with the near-death condition.

METHODS

A retrospective longitudinal observational case-control study was carried out by means of a survey of medical records from the Medical Archives and Statistics Service (SAME) of Hospital Maternidade de Interlagos, located in the southern region of the city of São Paulo referring to the year 2019. Statistical treatment was performed from the Mann - Whitney Test, Chi square test and G test for complete data analysis.

RESULTS

It was found that maternal age, gestational age, first- and fifth-minute Apgar did not contribute to increase in complications and cases of near miss mom. However, inadequate prenatal care, the number of pregnancies and cesarean deliveries proved to be significantly higher in the cases of pregnant women who reached near miss. It was possible to observe that the main causes of maternal morbidity were hypertensive crisis, infections and hemorrhage, besides glycemic crisis and premature placental abruption, which also stood out in the study.

CONCLUSIONS

The profile of women who reached near death was multiparous, with inadequate prenatal care, and who had a non-normal delivery.

DESCRIPTORS

Maternal mortality, Maternal morbidity, Near miss mom.

Corresponding author:

Jane de Eston Armond.

Docente do Programa de Pós-Graduação em Ciências da Saúde e Diretora de Relações Institucionais em Saúde da Universidade Santo Amaro. R. Prof. Enéas de Siqueira Neto, 340 - Jardim das Imbuías, São Paulo - SP, Brasil.

E-mail: jarmond@prof.unisa.br

ORCID ID: <https://orcid.org/0000-0003-1561-8113>

Copyright: This is an open-access article distributed under the terms of the Creative Commons

Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided that the original author and source are credited.

DOI: <https://doi.org/10.56242/globalhealth;2022;2;8;16-19>

INTRODUCTION

The term "near miss" was originally used by air traffic controllers to describe an accident that was about to occur but did not for some reason; furthermore, from the military point of view, the concept refers to a ballistic projectile that misses its target narrowly¹. However, in the study of maternal morbidity, the concept was introduced by Stones et al in 1991, and refers to the situation where women experience potentially lethal complications during pregnancy, labour, or the puerperium, only surviving due to chance or hospital care².

Maternal death is understood to be the end of a sequence of events in which, most of the time, interventions could be implemented that would prevent cases of maternal death³. The maternal mortality ratio is, therefore, a sensitive and relevant indicator of attention and quality of women's health, expression of human and social development and living conditions of the population because it reflects the quality of life of a region, especially the care provided in health care to the female population, in which with the description of social factors it is possible to understand the existence of a more vulnerable population and at higher risk of complications⁴.

Until the 1980s, women were considered a reproductive means, and the related health programs were called "maternal and child health", based basically on child health, treating women's health with contempt⁵. From this, Sweden pioneered measures to reduce maternal mortality by adopting national policies that encouraged the practice of professional midwives and antiseptic techniques, thinking about women's health for the first time. However, despite the efforts made by world organizations, some developing countries still have maternal death rates comparable to those observed in industrialized countries until the beginning of the 20th century⁶. In the year 2000, it was estimated that twenty million women suffered acute complications of pregnancy with the occurrence of 529,000 maternal deaths⁷.

In 2007, the World Health Organization (WHO) developed a standardized definition and identification criteria for maternal near-death cases. The approach to near miss should be carried out in three stages: (1) initial assessment; (2) situation analysis; and (3) interventions to improve health care. Having as inclusion criteria for the initial quality assessment maternal complications, critical interventions or intensive care unit use, life threatening conditions and maternal vital status⁸. In addition, in 2016 the United Nations created a manual with practical tools, seeking to improve the quality of maternity and perinatal care⁹.

However, the applicability of the criteria and approach is limited in Health Care networks, and it is currently estimated that for every woman who dies from a pregnancy-related cause, about twenty, approximately 7 million women per year, experience injury, infection, disease, or disability¹⁰. Despite the numbers and the urgency of the situation, progress in reducing maternal mortality has been slow in most countries that have high maternal mortality rates¹¹.

Studies point out that the main causes of maternal near-death are pregnancy hypertensive disorder (GVHD) (67.2%), postpartum hemorrhage (42.2%), and sepsis (12.7%), most of these deaths being from preventable causes^{12,13,14}. Thus, it is possible to emphasize the importance of the approach and qualification of professionals who work in the front line with pregnant women, in prenatal care and hospital care, preparing them to identify possible causes of maternal death in order to avoid them.

This study aimed to verify the frequency of severe maternal morbidity (near miss) among women, seen at the Hospital Maternidade Interlagos in the municipality of São Paulo/SP, Brazil in the year 2019, who had severe complications, due to preg-

nancy, delivery, and puerperium associating to the causes of severe maternal morbidity.

METHODS

A retrospective longitudinal observational case-control study, carried out through a survey of medical records in the Medical Archives and Statistics Service (SAME) of the Hospital Maternidade de Interlagos, located in the southern region of the city of São Paulo/SP, Brazil in the year 2019.

All 572 pregnant women who were admitted to the Hospital Maternidade Interlagos in São Paulo in the year 2019, who were considered high-risk by the system, were analyzed. From this study, the 53 who reached the state of near death were separated denominating them as cases and performing random selection among the other 519 to obtain a paired control of 106 pregnant women at risk but who did not present the near miss conditions.

The project was submitted and approved by the Ethics and Research Committee (CEP) of the Universidade Santo Amaro (UNISA) and by the Committee of the Interlagos Maternity Hospital, having the Informed Consent, Commitment and Confidentiality Terms, and the Maternity Hospital Concession Term signed by the respective responsible parties.

After that, the data of interest for the research were collected and addressed the following variables: Regarding the mother: Age, parity, prenatal care, type of delivery, and comorbidities. Regarding the newborn: gestational age; 1st and 5th minute APGAR and newborn outcome (alive, stillborn, stillborn or miscarriage).

After the selection of the sample of interest, the medical records were selected based on the WHO near miss criteria (hemorrhagic diseases, hypertensive disease, HELLP Syndrome, Prior Placenta, Ectopic pregnancy, postpartum hemorrhage, uterine rupture, sepsis, hypertensive encephalopathy, convulsions, shock, and sepsis) for analysis and collection of the important variables for the study.

Statistical treatment was performed using the Mann-Whitney test, chi-square test and G test for the complete analysis of the data collected¹⁵. The significance level was considered as $p < 0.5$ or 5%.

RESULTS

From data collected from the Medical Archives and Statistics Service (SAME) of the Hospital Maternidade de Interlagos, we found 572 deliveries in 2019, of which 53 puerperae presented a situation corresponding to near miss (9.15%).

We applied the Mann-Whitney test¹⁵ to compare the variables: maternal age, gestational age, and number of children. The case group (high-risk pregnant women who had complications and reached maternal near-death during pregnancy, delivery or puerperium) with the control group (pregnant women who did not reach near death). From this analysis, it was possible to understand that variables such as maternal age ($p = 0.2675$) and gestational age ($p = 0.0785$) did not contribute to the increase in complications and cases of near miss mom. However, the comparison in relation to the number of children of the case and control showed to be significant ($p = 0.0239$) and higher in the cases of pregnant women who reached near miss, being an important factor for the impact of gestational complications.

The first ($p = 0.25$) and fifth minute Apgar scores ($p = 0.4785$) were not significant for the research, because they did not show significant differences comparing cases and controls. The chi square test¹⁵ was used to compare the outcomes of newborns in the groups studied (Table 1), and it was possible to observe that the number of miscarriages in cases was

significantly higher than in controls, showing the important relationship between maternal health and child health.

Table 1. Outcomes in relation to the newborn.

	Case	Control	Total	% Case
Life	46	100	146	31,50%
Natimorph	3	5	8	37,00%
Neomorphers	0	1	1	0,00%
Abortions	4	0	4	100%

$\chi^2 = 8,86$
 $p = 0,0312$

With this same test we compared the significance of an adequate prenatal period, which was higher in controls; the significance of normal delivery was also higher in controls (Tables 2 and 3).

The presence of comorbidities was not significant comparing cases and controls (Table 4).

Table 2. Prenatal care.

Pre-natal			
Case	Control	Total	% Case
39 = yes	92 = yes	131	29%
14 = not	14 = not	28	50%

$\chi^2 = 4,25$
 $p = 0,0393$

Table 3. Type of normal birth.

Normal birth			
Case	Control	Total	% Case
8 = yes	33 = yes	41	20%
43 = not	73 = not	116	37%

$\chi^2 = 4,26$
 $p = 0,0391$

Two CASE records did not present such information, reducing to 51 pregnant women in the normal delivery chi square.

Table 4. Type of normal birth.

Comorbidities			
Case	Control	Total	% Case
44 = yes	79 = yes	123	36%
9 = not	27 = not	36	25%

$\chi^2 = 4,26$
 $p = 0,0391$

Although the presence of comorbidities was not significant, we studied the main underlying diseases present in the cases, verifying that only 10% of the pregnant women denied previous comorbidities; 44.4% reported pressure problems, 11.1% were smokers or used some kind of drug or alcohol; 7.4% had diabetes; 7.4% repeated urinary tract infections, and 19.8% reported other comorbidities (including pulmonary, cardiovascular, mental, chronic renal, thyroid, and hemolytic alterations).

Through the data collected, it was also possible to observe the main causes of near miss: 49.0% was from hypertensive crisis; 20% infection from premature rupture of the ovular membranes; 5.45% premature detachment of the placenta; 5.45% infections (including urinary tract infections, pyelonephritis and postoperative infections); 5.45% hemorrhages; 3.63% hyperglycemic crisis and 10.9% other causes (including oligohydramnios, placenta previa and septic shock with no reason given).

DISCUSSION

The WHO technical working group realized that variables that are traditionally collected as part of sociodemographic or epidemiological assessments, such as maternal age and parity, may not necessarily be useful in assessing the quality of care⁸. From the study it was possible to observe that in fact maternal age, like gestational age, was not relevant; however, parity was significantly higher in women who reached near-maternal death. This result may be due, not to the number of births, but to previous cesarean sections, which are more prevalent in cases of maternal near miss.

It was also not expected that Apgar was significant for mom near miss, but for baby near miss, which would validate a new complete study to understand such impacts¹⁷. However, it was possible to relate the maternal situation to the fetal¹⁸ situation, so much so that the newborn outcomes were shown to be significant for the study, where 100% of the miscarriages occurred in mothers who reached near miss.

In the literature, adequate prenatal care is evaluated as an essential criterion to avoid complications and disasters during pregnancy for both mother and child^{8,9,19}. According to the Ministry of Health, an adequate prenatal care is equivalent to at least six consultations during pregnancy, ideally one in the first trimester of pregnancy, two in the second, and three in the third²⁰. It was observed in this study that adequate prenatal care is significant, because most women who had the consultations as indicated were not in the case group (which presented risk of death).

The incidence of maternal near miss was also higher among women who had non-normal deliveries (including the use of forceps and cesarean sections). In the literature, however, there is a disagreement on whether the absence of normal delivery is a cause or consequence of near miss, because it is understood that non-normal deliveries may be indicated by maternal complications during pregnancy or delivery, and these complications are the cause of near miss¹⁰.

The presence of comorbidities was not relevant for the occurrence of near death, however, it was possible to observe that specific comorbidities were more present in women who presented the risk of death, and even contributed as causes of near death.

Among the pregnant women, 44.4% reported having previous blood pressure problems and 49.0% of the causes of the near miss was from a hypertensive crisis. 7.4% reported having diabetes and 3.63% of the cases were from glycemic crisis. In addition, 20% was caused by premature rupture of the ovular membranes that presents as a risk factor smoking and use of illicit drugs²¹ and 11.1% of pregnant women who reached near miss reported having addictions. 7.4% had recurrent urinary tract infection and 5.45% of the cases were due to infections, including urinary tract infections; 5.45% was from premature detachment of the placenta that has smoking and drug use as risk factors again, besides hypertensive disorders and premature rupture of the membranes themselves²². 5.45% of the cases resulted from major hemorrhage, which has multiparity as a risk factor, which, as already discussed, is higher in cases of near miss. The use of magnesium sulfate to control seizures in pregnancy-specific hypertensive disorder can also cause side effects such as respiratory depression²³.

It was possible to observe in this study that the main causes of maternal morbidity were the same as those reported in the literature: hypertensive crisis, infections, hemorrhage, glycemic crisis, and premature placental abruption^{12,13,14}.

The present study found that age and pre-existing comorbidities were not the main factors associated with pregnant women who reached near death; however, parity, prenatal care, and type of delivery were important. In addition, pressure problems, hemorrhage, and sepsis were among the main variables associated with complications, however, it is important to highlight premature rupture of ovular membranes, placental abruption, urinary tract infections, hemorrhages, glycemic crisis, oligohydramnios, and previous placentas as factors that cause complications. In the year 2019, the frequency of severe maternal morbidity was 9.15%.

It was found that the biggest problem is in the inadequate prenatal care, since through this care could identify and control blood pressure and glycemic problems, suspend the use of drugs and tobacco, in addition to the alert and greater care with pregnant women who have had previous pregnancies, mainly through cesarean sections.

REFERENCES

- Amaral E, Souza JP, Surita F, Luz AG, Sousa MH, Cecatti JG, Campbell O. A population-based surveillance study on severe acute material morbidity (near- miss) and adverse perinatal outcomes in Campinas, Brazil: The Vigimoma Project. *BMC Pregnancy And Childbirth* , 2011. Disponível em: <https://link.springer.com/content/pdf/10.1186/1471-2393-11-9.pdf>.
- Storeng KT, Drabo S, Ganaba R, Sundby J, Clavert C, Filipi V. Mortality after near-miss obstetric complications in Burkina Faso: medical, social and health- care factors. *Bulletin of the World Health Organization* 2012;90:418-425C. Disponível em: <https://www.who.int/bulletin/volumes/90/6/11-094011/en>.
- Araújo LM, et al. Health promotion actions and maternal near miss: an integrative review. *Rev Rene*. 2021;22:e60394. DOI: <https://doi.org/10.15253/2175-6783.2021226039>.
- Magalhães MC, Bustamante-Teixeira MT. Morbidade materna extremamente grave: uso do Sistema de Informação Hospitalar. *Rev. Saúde Pública* vol.46 no.3 São Paulo June 2012 Epub Apr 17, 2012. Disponível em: https://www.scielo.br/scielo.php?pid=S0034-89102012005000029&script=sci_abstract&tlng=pt .
- Santana DS, et al. Near miss materno - entendendo e aplicando o conceito. *Revista de Medicina*. São Paulo, 2018 ;97(2):187-94. Disponível em: <http://www.revistas.usp.br/revistadc/article/view/143212>.
- Viana RC, et al. Mortalidade Materna - uma abordagem atualizada. Com. Ciências Saúde. Brasília, 2011. Disponível em: http://bvsmms.saude.gov.br/bvs/artigos/mortalidade_materna.pdf.
- Souza JP, et al. Appropriate criteria for identification of near-miss maternal morbidity in tertiary care facilities: A cross sectional study. *BMC Pregnancy and Childbirth* 2007, 7:20. Disponível em: <https://bmcpregnancychildbirth.biomedcentral.com/track/pdf/10.1186/1471-2393-7-20>.
- Organização Mundial da Saúde. Avaliação da qualidade do cuidado nas complicações graves da gestação - A abordagem do near miss da OMS para a saúde materna. 2011.
- WHO Regional Office for Europe. Improving the quality of maternal and perinatal health care: Conducting a maternal near-miss case review cycle at hospital level - Manual with practicaltools. 2016 Disponível em: https://www.euro.who.int/data/assets/pdf_file/0003/324390/NMCR-manual-en.pdf.
- Dias MAB, Leal MC. Incidência do near miss materno no parto e pós-parto hospitalar: dados da pesquisa Nascer no Brasil. *Cad. Saúde Pública* 30 (Suppl 1), 2014. Disponível em: <https://www.scielo.org/article/csp/2014.v30suppl1/S169-S181>.
- Souza JP, et al. Revisão sistemática sobre morbidade materna near miss. *Cad. Saúde Pública* vol.22 no.2 Rio de Janeiro Feb. 2006. Disponível em: 17 <https://www.scielo.br/j/csp/a/Vc3nwKDLnXBy4mddb8ZwqPH/?format=pdf&lang=pt>.
- Lima THB et al. Maternal near miss determinants at a maternity hospital for high-risk pregnancy in northeastern Brazil: a prospective study. *BMC Pregnancy and Childbirth* 19:271. 2019.
- Mensuri F, Mall A. Analysis of Maternal Near Miss at Tertiary Level Hospitals, Ahmedabad: A Valuable Indicator for Maternal Health Care. *Indian Journal of Community Medicine*, 2019.
- Soares FAF, et al. Óbito materno, causalidade e estratégias de vigilância: uma revisão integrativa. *REAS, Revista Eletrônica Acervo Saúde*, 2017. Vol. Sup. 9, S890-S897.
- Siegel S, Castellan JR, N.J. Estatística não paramétrica para ciências do comportamento. 2º edição - Artmed. Porto Alegre, 448p. 200.
- Dias MAB, et al. Incidência do near miss materno no parto e pós-parto hospitalar: dados da pesquisa Nascer no Brasil. *Cadernos de Saúde Pública*. 2014 Aug;30 (suppl 1):S169-81. Disponível em: <https://www.arca.fiocruz.br/bitstream/icict/11075/2/Incid%C3%Aancia%20do%20near%20miss%20materno%20no%20parto%20e%20p%C3%B3s%20parto%20hospitalar%20dados%20da%20pesquisa%20Nascer%20no%20Brasil.pdf>.
- Carvalho OMC, et al. Fatores associados ao near miss e óbito neonatais em maternidade pública de referência. *Rev. Bras. Saúde Mater. Infant.*, Recife, 20 (3): 851-862 jul-set., 2020. Disponível em: https://www.researchgate.net/publication/345766248_Factors_associated_wit_h_neonatal_near_miss_and_death_in_public_referral_maternity_hospitals.
- Oliveira LC, Costa AAR. Óbitos fetais e neonatais entre casos de near miss materno. *Revista da Associação Médica Brasileira* [Internet]. 2013 Sep [cited 2022 May 17];59(5):487-94. Available from: <https://www.scielo.br/j/ramb/a/6p7VD-cWlksksNyjBw4L4DrJ/?lang=en>.
- Souza MACD, Souza THSCD, Gonçalves AKDS. Fatores determinantes do near miss materno em uma unidade de terapia intensiva obstétrica. *Revista Brasileira de Ginecologia e Obstetrícia* [Internet]. 2015 Nov [cited 2022 May 17];37(11):498-504. Available from: <https://www.scielo.br/j/rbgo/a/ZqBS8Wn87gWtxsVztV57Lcr/?lang=pt> .
- Secretaria de Estado de Saúde. Pré-Natal. 2019. Disponível em: <https://www.saude.go.gov.br/biblioteca/7637-pr%C3%A9-natal#:~:text=No%20Brasil%2C%20a%20partir%20desse,semana%2C%20sejam%20realizadas%20consultas%20mensais>.
- Universidade federal do triângulo mineiro hospital de clínicas. Assistência na ruptura prematura de membranas ovulares. Empresa Brasileira de Serviços Hospitalares 2021. <https://www.gov.br/ebserh/pt-br/hospitais-universitarios/regiao-sudeste/hc-uftm/documentos/protocolos-clinicos/RupturaPrematuraMembranasOvularesfinal.pdf> .
- Tikkanen M. Placental abruption: epidemiology, risk factors and consequences. *Acta Obstet Gynecol Scand*. 2011 Feb; 90(2):140-9.
- Assistenciais R, Escola M. HEMORRAGIA PUERPERAL. Disponível em: http://www.me.ufrj.br/images/pdfs/protocolos/obstetricia/hemorragia_puerperal_new.pdf