

Quality of life 1 year after a maternal near-miss event

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Abstract

Objectives

To evaluate quality of life (QoL) parameters among women categorized with a maternal near-miss during pregnancy.

Methods

The present prospective cohort study was conducted at a tertiary referral hospital in South Africa between April 1, 2013, and March 31, 2016. Patients who experienced maternal near-miss events were included and patients with uncomplicated low-risk pregnancies

were enrolled as a control group. Various parameters were assessed using a WHO QoL questionnaire.

Results

The maternal near-miss and uncomplicated low-risk pregnancy (control) groups comprised 95 and 51 women. The maternal near-miss group scored lower than the control group in all four domains of the questionnaire ($P<0.001$). Overall, 42 (82%) women in the control group and 41 (43%) women in the maternal near-miss group desired future fertility ($P<0.001$). Women in the maternal near-miss group who had experienced perinatal loss scored lower in the physical health and well-being ($P=0.009$), psychological health and well-being ($P=0.007$), and environment ($P=0.031$) domains compared with women in the maternal near-miss group who experienced a live delivery. Nonetheless, QoL scores among women in the maternal near-miss group who had experienced perinatal loss remained lower than those reported by women in the control group ($P<0.001$).

Conclusion

A maternal near-miss event during pregnancy was associated with reduced QoL, especially among women who had experienced perinatal loss.

Keywords

Future fertility; Hypertension; Live birth rate; Maternal near-miss; Medical condition in pregnancy; Perinatal loss; Quality of life

Introduction

Maternal near-miss is defined as the survival of a potentially life-threatening obstetric complication during pregnancy.¹ Women often experience immediate and long-term

physical, social, financial, and psychological consequences after a maternal near-miss event.² Indeed, Filippi et al.³ found that women categorized with maternal near-miss remained at increased risk of mortality and experienced poor mental-health outcomes (e.g. suicidal ideation and depression) during the first 3 months after delivery.

Quality of life (QoL) has been defined by WHO⁴ as, “an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns”. The consequences of maternal near miss on post-delivery QoL is uncertain.

The aim of the present study was to examine QOL among women who had been categorized with maternal near miss in comparison with women who had experienced an uncomplicated low-risk pregnancy.

Methods

The present prospective cohort study was conducted at Steve Biko Academic Hospital (SBAH) in Pretoria, South Africa. Patients were recruited between April 1, 2013, and March 31, 2015, with 1-year follow-up visits scheduled between April 1, 2014, and March 31, 2016. Patients who experienced maternal near-miss events were eligible for inclusion and a control group was recruited from patients who had uncomplicated low-risk pregnancies. Approval for the present study was obtained from the Research Ethics Committee of the University of Pretoria, South Africa. The participants were informed of the purpose of the present study and told that their responses would remain confidential. Informed consent was subsequently provided by all women included in the analysis.

Approximately 10% of all deliveries that occur at SBAH, a tertiary referral hospital, are considered to have a low level of exposure to danger, mainly as the result of low-risk

women presenting in labor for the first time. Low-risk patients were identified by completing the Guidelines for Maternity Care in South Africa⁵ checklist, a basic prenatal care approach used in all South African public institutions. The present study formed part of a larger study comparing cardiac function between women with pre-eclampsia and those at low risk of this complication. The cardiology department at SBAH reserved echocardiographic appointments every Wednesday for low-risk women. The first such patient who experienced a low-risk delivery each Wednesday (as recorded in the maternity register) was subsequently recruited to the control group.

Maternal near-miss cases were prospectively identified at daily audit meetings held at SBAH using the criteria defined by WHO (Box 1).⁶

Both groups of women attended a postnatal visit at 1 week after delivery. Women in the maternal near-miss group also attended the SBAH maternal near-miss clinic on a monthly basis after delivery if they required chronic administration of medication.

All participants received a 1-year follow-up visit to assess post-delivery QoL. A questionnaire designed by WHO (WHOQOL-BREF)⁴ was completed during personal interviews conducted by female interviewers experienced in the local dialect (should the participants be illiterate or unable to speak English). The WHOQOL-BREF questionnaire contains two items assessing overall QoL and general health; seven items assessing physical health; six items assessing psychological health; three items assessing social relationships; and eight items assessing environmental health. Each item is rated on a five-point scale, with a score of 1 reflecting poor QoL and a score of 5 reflecting very good QoL. The WHO-QoL questionnaire is further grouped in four domains that assess physical health and well-being (domain 1), psychological health and well-being (domain 2), social relations (domain 3), and the environment (domain 3). The participants were also asked about their desire for future fertility.

BOX 1. The maternal near-miss criteria defined by WHO.⁶

Clinical

- Acute cyanosis
- Oliguria unresponsive to fluids or diuretics
- Jaundice concomitant with pre-eclampsia
- Shock
- Cerebrovascular accident
- Breathing rate >40/min or <6/min
- Loss of consciousness, with no pulse and/or heartbeat
- Gaspings
- Coagulation disorders
- Total paralysis

Laboratory

- Oxygen saturation <90% for >1 h
- Serum creatinine level >300 $\mu\text{mol/L}$ (>3.5 mg/dL)
- Unconscious, with glucose and ketoacidosis detected in the urine
- Ratio of PaO_2 to FiO_2 <200 mm Hg
- Acute thrombocytopenia (<50 000 platelets)
- Serum bilirubin level >100 $\mu\text{mol/L}$ (>6.0 mg/dL)
- Plasma lactate level >5 mg/dL
- pH <7.1

Management

- Use of vasoactive drug (intravenous)
- Puerperal hysterectomy owing to infection or hemorrhage
- Transfusion with >5 units of red blood cell concentrate
- Dialysis for treatment of acute kidney failure
- Cardiopulmonary resuscitation
- Intubation and ventilation for a period of >1 hour, unrelated to anesthesia

Abbreviations: FiO_2 , fraction of inspired oxygen; PaO_2 , partial pressure of oxygen in the arterial blood.

The data were analyzed using SPSS version 24.0 (IBM, Armonk, NY, USA). The descriptive analyses included frequencies and percentages for categorical data, with ranges, means, and standard deviations for continuous data. Linear regression analysis was used to assess which specific conditions underlying the maternal near-miss event (hypertension; hemorrhage; medical disorders in pregnancy; infection not related to pregnancy; or pregnancy-related infection) were independent predictors of the WHOQOL-BREF score. The reliability of WHOQOL-BREF questionnaire was assessed using the

Cronbach α , with a score of at least 0.70 deemed to be acceptable.⁷ A *P* value of less than 0.05 was considered statistically significant.

Results

A total of 6536 deliveries were recorded at SBAH during the recruitment phase. There were 133 maternal near-miss events, of which 18 (13.5%) resulted in death. The obstetric causes underlying maternal near-miss are described in Table 1. The most frequently recorded causes were obstetric hemorrhage and hypertension. The mortality index was 2.0% and 13.6% for hemorrhage and hypertension, respectively. In total, 110 of the 133 women who had experienced maternal near-miss and 55 patients with uncomplicated low-risk pregnancy were recruited to the present study. There were 15 patients with a maternal near-miss event and four with an uncomplicated low-risk pregnancy who were lost to follow-up and were excluded from the analyses. Consequently, the maternal near-miss and control groups comprised 95 and 51 women, respectively, all of whom completed the WHOQOL-BREF questionnaire.

Table 1. Primary obstetric cause of maternal near-miss events (n=133).^a

Obstetric cause	No. (%)
Medical disease	23 (17.3)
Infection unrelated to pregnancy	4 (3.0)
Spontaneous abortion	12 (9.0)
Pregnancy-related infection	3 (2.3)
Obstetric hemorrhage	49 (36.8)
Hypertension	39 (29.3)
Anesthetic complications	2 (1.5)
Acute collapse with unknown cause	1 (0.8)

^a Among all 133 near-miss events identified in the study.

The characteristics of the two groups are shown in Table 2. A statistically significant between-group difference was found for live delivery rate only ($P<0.001$). The majority of stillbirths occurred in women with abruption placentae and most of these women presented with fetuses who had demised in utero. In the control group, 1 (2%) patient presented at term with loss of fetal movements and intrauterine fetal demise; a macerated stillborn was delivered vaginally.

Table 2. Demographic characteristics of the participants.^a

Characteristic	Maternal near-miss group (n=95)	Control group (n=51)
Age, y ^b	28.3 ± 6.83 (18–46)	27.4 ± 7.14 (20–42)
	Ethnicity	
African	85 (90)	42 (82)
White	5 (5)	4 (8)
Black (of African origin)	4 (4)	5 (10)
Indian	1 (1)	0
Parity ^c	1.3 (0–4)	1.6 (0–5)
	Timing of delivery, wk	
<34	44 (46)	0
34–37	25 (26)	5 (10)
>37	26 (27)	46 (90)
Live delivery rate ^d	61 (64)	50 (98)
	Tubal ligation or hysterectomy performed during pregnancy	
Yes	11 (12)	2 (4)
No	84 (88)	49 (96)

^a Values are given as mean ± SD (range), number (percentage), or mean (range).

^b Independent-sample *t* test; *P*=0.663.

^c Independent-sample *t* test; *P*=0.712.

^d Independent-sample *t* test; *P*<0.001.

Table 3 outlines responses to each item included in the WHOQOL-BREF questionnaire. The control group scored significantly higher than the maternal near-miss group for all QoL measures assessed (*P*<0.001), with the exception of body image (*P*=0.521). The highest mean score for the maternal near-miss group was for pain (4.27; indicating that daily life was not affected), whereas the highest mean score for the control group was for dependence on medical aids (4.94; indicating that medical treatment was not needed to

function normally). The lowest mean score recorded for both groups was for lack of financial security (2.62 for the maternal near-miss group and 3.31 for the control group).

Table 3. Responses for each item included in the WHO quality-of-life questionnaire.^{4a,b}

Item	Maternal near-miss group (n=95)			Control group (n=51)		
	Score	Scored at lowest level	Scored at highest level	Score	Scored at lowest level	Scored at highest level
Overall quality of life	3.56 ± 0.9 2 (2)		13 (14)	4.47 ± 0.6 2 (4)		25 (49)
Overall health	3.67 ± 1.0 1 (1)		19 (20)	4.65 ± 0.5 17 (33)		30 (59)
Pain preventing daily work ^c	4.27 ± 0.9 4 (4)		50 (53)	4.91 ± 0.3 4 (8)		45 (88)
Dependence on medical aids for daily function ^c	4.00 ± 0.9 1 (1)		29 (31)	4.94 ± 0.2 2 (4)		48 (94)
Positive feeling	3.52 ± 0.9 3 (3)		9 (10)	4.25 ± 0.7 6 (12)		19 (37)
Personal belief	3.46 ± 0.8 1 (1)		5 (5)	4.20 ± 0.7 10 (20)		20 (39)
Concentration	3.74 ± 0.7 2 (2)		7 (7)	4.61 ± 0.5 1 (2)		31 (61)
Security	3.55 ± 0.9 1 (1)		9 (10)	3.96 ± 0.8 18 (35)		17 (33)
Physical environment	3.43 ± 0.9 1 (1)		7 (7)	4.08 ± 0.8 15 (29)		19 (37)
Energy	3.80 ± 0.8 1 (1)		17 (18)	4.33 ± 0.5 1 (2)		17 (33)
Body image	3.71 ± 0.8 6 (6)		14 (15)	3.80 ± 0.7 18 (35)		8 (16)
Financial security	2.62 ± 0.9 7 (7)		3 (3)	3.31 ± 0.7 3 (6)		1 (2)
Accessibility of information	2.98 ± 0.9 29 (31)		5 (5)	4.02 ± 0.6 1 (2)		8 (16)
Leisure activity	2.87 ± 0.9 5 (5)		4 (4)	4.16 ± 0.6 1 (2)		14 (28)
Mobility	3.18 ± 1.0 1 (1)		8 (8)	4.12 ± 0.6 6 (12)		12 (24)
Sleep and rest	3.80 ± 0.9 11 (12)		20 (2)	4.63 ± 0.5 1 (2)		31 (61)
Activities of daily living	3.87 ± 0.8 5 (5)		16 (17)	4.69 ± 0.5 16 (31)		34 (67)
Work capacity	3.88 ± 0.8 7 (7)		17 (18)	4.67 ± 0.6 3 (6)		36 (71)
Self-esteem	3.80 ± 0.8 7 (7)		16 (17)	4.56 ± 0.5 22 (43)		28 (55)
Personal relationship	3.71 ± 0.9 1 (1)		18 (19)	4.27 ± 0.7 6 (12)		19 (37)

Item	Maternal near-miss group (n=95)			Control group (n=51)		
	Score	Scored at lowest level	Scored at highest level	Score	Scored at lowest level	Scored at highest level
Sexual activity	3.78 ± 0.9	2 (2)	21 (22)	4.08 ± 0.7	12 (24)	15 (29)
Social support	3.49 ± 0.9	1 (1)	9 (10)	4.31 ± 0.6	5 (10)	18 (35)
Home environment	3.52 ± 0.9	1 (1)	13 (14)	4.14 ± 0.7	9 (18)	16 (3)
Health care	3.74 ± 0.9	10 (11)	17 (18)	4.45 ± 0.6	4 (8)	25 (49)
Transport	3.26 ± 0.9	20 (21)	9 (10)	4.21 ± 0.6	5 (10)	15 (29)
Negative feeling	3.73 ± 0.9	9 (10)	16 (17)	4.51 ± 0.6	1 (2)	28 (55)

^a Values are given as mean ± SD or number (percentage).

^b Independent-sample *t* test; *P*<0.001 for all comparisons, other than body image (*P*=0.521).

^c Scores ranged from 1 (an extreme amount) to 5 (not at all).

The items included in the WHOQOL-BREF questionnaire were grouped into four domains that evaluated physical health and well-being; psychological health and well-being; social relations; and environment (Table 4). Women in the maternal near-miss group scored lower for each of these domains when compared to women in the control group (*P*<0.001). The reliability of the WHOQOL-BREF questionnaire was found to be adequate (Cronbach α coefficient, 0.964).

Table 4. Comparison of the four domain scores.^{a,b}

Domain	Maternal near-miss group	Control group
Physical health and well-being	26.8 ± 4.2	32.3 ± 2.3
Psychological health and well-being	21.9 ± 3.6	26.0 ± 2.7
Social relations	11.0 ± 2.3	12.7 ± 1.9
Environment	26.0 ± 5.4	32.5 ± 3.9

^a Values are given as mean ± SD.

^b Independent-sample *t* test; *P*<0.001 for all comparisons.

In all, 42 (82%) women in the control group and 41 (43%) women in the maternal near-miss group expressed a desire for additional children ($P < 0.001$). Conversely, 6 (12%) women in the control group and 7 (7%) women in the maternal near-miss group were uncertain about their desire for future fertility. Women in the maternal near-miss group scored the lowest when questioned about their financial status. This discrepancy was highlighted in the participants' narratives, with many references to loss of income either because of separation from a partner or loss of employment:

“The pregnancy caused a set-back in my life. I was forced to leave my job. Now I have money problems. My mother has to look after my 5-year old.” [maternal near-miss participant no. 32, Interview on social relations]

“I lost my job while in the hospital. I cannot get another job because I am too weak. I am getting a grant.” [maternal near-miss participant no. 2, Interview on physical health and well-being]

“My boyfriend broke-up with me because I lost the baby.” [maternal near-miss participant no. 24, Interview on social relations]

“I have marriage problems and I am very stressed.” [maternal near-miss participant no. 83, Interview on social relations]

Certain QoL variables were also assessed within the maternal near-miss group. Women in receipt of a social grant scored lower for the following items than did women who were not dependent on social support: pain ($P=0.024$); dependence on medical aids ($P=0.026$); body image ($P=0.014$); mobility ($P=0.025$); and negative feeling ($P=0.033$). By contrast, no statistically significant differences were found for any components of the WHOQOL-BREF questionnaire (including the four domain scores) among women infected with HIV versus those who were not infected with HIV.

Women in the maternal near-miss group who had been discharged from SBAH after experiencing perinatal loss scored lower for the following components than did women in the maternal near-miss group whose pregnancy had resulted in a live birth: overall health ($P=0.004$); positive feeling ($P=0.002$); personal belief ($P=0.001$); concentration ($P=0.027$); security ($P=0.031$); energy ($P=0.004$); leisure activity ($P=0.013$); self-esteem ($P=0.029$); and home environment ($P=0.033$). Women who had experienced both maternal near-miss and perinatal loss also scored lower than their counterparts with a live birth in the following three domains: physical health and well-being ($P=0.009$); psychological health and well-being ($P=0.007$); and environment ($P=0.031$). No difference was found between these two groups with regard to social relations ($P=0.119$).

A sub-analysis was performed to evaluate QoL among all of the women who were discharged from hospital following a live delivery. When compared with the control group, women in the maternal near-miss group scored lower for all components and domains of the WHOQOL-BREF questionnaire ($P<0.001$), with the exception of security ($P=0.084$), body image ($P=0.977$), and sexual activity ($P=0.159$).

The underlying obstetric causes among the 95 women included in the maternal near-miss group were hypertension (37 [39%]); obstetric hemorrhage (34 [36%]); medical condition during pregnancy (20 [21%]); infection not related to pregnancy (2 [2%]); and pregnancy-related infection (2 [2%]). Patients who experienced maternal near-miss events linked to a medical condition in pregnancy scored lower for energy compared with patients who had near-miss events related to hemorrhage, hypertension and infection (95% confidence interval [CI] -1.02 to -0.082; $P=0.022$), body image (95% CI -0.958 to -0.082; $P=0.021$), mobility (95% CI -1.140 to -0.086; $P=0.023$), physical health and well-being (95% CI -4.375 to -0.436; $P=0.017$), and psychological health and well-being (95% CI -3.849 to -0.436; $P=0.014$). No statistically significant differences in QoL scores were found when patients were stratified by maternal near-miss events due to hypertension, hemorrhage, infection unrelated to pregnancy, or pregnancy-related infection.

Discussion

The present study provided important information for understanding how maternal near-miss events can affect QoL among women after delivery. Of note, women in the maternal near-miss group scored substantially lower than women in the control group on all domains of the WHOQOL-BREF questionnaire at the 1-year follow-up visit.

The live birth rate in the present study was lower in the maternal near-miss group than in the control group (64% vs 98%). Interestingly, women in the maternal near-miss group who had experienced perinatal loss scored markedly lower on nine components and three domains of the WHOQOL-BREF questionnaire than did women in the maternal near-miss

group who had experienced a live birth. A quantitative analysis of postpartum psychological function found that perinatal loss was important for initiating symptoms of psychological distress.⁸ Unfortunately these adverse pregnancy events result in mothers carrying the long-term burden of an overall QoL that is poorer than that of women who have had uncomplicated pregnancies; the effects of a poorer QoL are often carried over into subsequent pregnancies.⁹

Both study groups had insufficient money for daily needs but the deficit was a greater problem for women in the near-miss group who recorded the lowest scores for financial security. This finding reflected either loss of income because women were unable to continue working in jobs that they had previously occupied or else the fact that the maternal near-miss event had resulted in separation from their partners, on whom they were previously dependent for financial support. In some cases, lack of money led to a breakdown of the family unit, with children being cared for by other family members who did not live in the same household. As a result of job loss, some women in the maternal near-miss group became dependent on social support grants, which in turn was associated with low scores for some components of the WHOQOL-BREF questionnaire. The words “diversity” and “divergence” have been used to describe the cycle of poor maternal health.¹⁰ Diversity refers to the degree and causes of maternal health problems; divergence describes the disparity in maternal mortality between women living in high-income countries and vulnerable populations such as in Sub-Saharan Africa. Women in lower- and middle-income countries are considered vulnerable because of where they live and who they are.¹⁰ Such women carry the risk of increased maternal morbidity, which progresses to low QoL aggravated by poor social and economic burden. The women who experienced a maternal near-miss in the present study fall into this category.

The current scores recorded for personal relationships in the maternal near-miss and control groups suggested that such relationships were potentially strained among the women who had experienced a maternal near-miss event. Traumatic birth events have been found to provoke intense anxiety and fear among male partners, resulting in long-term consequences for both them and their families.¹¹ Other studies have found that men can experience various feelings after an obstetric emergency, including alienation, lack of empowerment, information deprivation, and exclusion from their partners.¹²⁻¹⁵ Some men also become withdrawn from their social networks and might be reluctant to seek support as such behavior is believed to contradict societal expectations.¹¹

Although both the maternal near-miss and control groups exhibited similar age and parity, the present study found that fewer than half of all women who had experienced a maternal near-miss event expressed a desire for future children. This high loss of reproductive potential probably reflects the severity of the adverse event, as well as the subsequent physical and emotional consequences.¹⁶

Several studies have reported that mothers infected with HIV experience more morbidity and mortality during the first 2 years after delivery than do women who are not infected with HIV.¹⁷⁻¹⁹ The present study found that HIV status was not associated with a statistically significant difference in QoL at 1 year after delivery among women in the maternal near-miss group. No statistically significant differences in QoL were found for other obstetric causes of maternal near-miss, other than for an underlying medical disorder in pregnancy.

To the best of our knowledge, the present study was the first conducted in South Africa to compare QoL among women who had experienced maternal near-miss events with that of women who had experienced uncomplicated low-risk pregnancies. However, the present study was limited in that only a portion of all maternal near-miss patients were interviewed. Furthermore, all women categorized with a maternal near-miss event in the present study had access to targeted healthcare in the form of a maternal near-miss clinic. This clinic was particularly beneficial for women with chronic hypertension and other chronic medical conditions because a single clinic could meet all of their medical needs. Medical personnel at the maternal near-miss clinic consulted other specialist disciplines if needed. In addition, women who attended the clinic were able to develop a support system with other mothers who had similar experiences. Therefore, the present results cannot be generalized to the South African population as SBAH hosts the only known maternal near-miss clinic in the country. Women who do not have access to such a clinic might record even lower scores on QOL questionnaires.

In conclusion, measures of QoL might be reduced among women who have experienced maternal near-miss, a situation that is aggravated by perinatal loss. Institutions are therefore recommended to establish a database of maternal near-miss events as part of their prenatal and postnatal maternal-health programs.

Disclosure of interests

None declared

Contribution to authorship

PSP and RCP designed the study and wrote the manuscript. JDM analysed, interpreted the data, carried out the statistical analyses and wrote the manuscript.

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