Research Square

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Development and Validation of a Logic Model–Based Support Program for Women with Maternal Near Miss: A Nominal Group Technique Study

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Abstract

Background

Women who experience maternal near miss (MNM) often face long-term physical, psychological, social, and economic consequences that extend beyond the acute obstetric event. Despite these complex needs, structured post-event support programs for these women remain limited. This study aimed to develop and validate a supportive program for women who experienced maternal near miss using a program logic model.

Methods

This study employed a multi-phase design. First, evidence regarding the unmet needs of women with maternal near miss was identified through previous qualitative studies and a systematic review conducted by the research team. Based on these findings, a preliminary program was developed using the program logic model framework, including inputs, activities, outputs, and expected outcomes. The preliminary model was subsequently validated using the Nominal Group Technique (NGT). A one-day expert workshop was held in November 2020 with the participation of 12 multidisciplinary professionals involved in maternal health. The NGT process included silent idea generation, round-robin sharing, clarification, discussion, and prioritization of program components.

Results

The preliminary logic model identified eight major strategic domains addressing the needs of women with maternal near miss, including psychological support, fertility and childbearing counseling, information provision, improvement of care quality, socio-cultural support, financial support, breastfeeding support, and nutritional counseling. Through the NGT process, experts reviewed, refined, and prioritized these components, resulting in the development of a validated comprehensive support program structured according to the logic model framework.

Conclusion

Integrating evidence synthesis with expert consensus enabled the development of a comprehensive and context-sensitive support program for women experiencing maternal near miss. The proposed logic model may serve as a practical framework for designing supportive interventions aimed at improving recovery and long-term well-being among these women.

Background

Women who experience a maternal near-miss (MNM) event, defined as surviving a severe life-threatening complication during pregnancy or childbirth(1, 2) often face lasting consequences that extend well beyond the acute episode. These women encounter persistent physical, emotional, and psychosocial challenges such as anxiety, depression, social withdrawal, and symptoms of traumatic stress(3–7) (8, 9). The adverse repercussions of these experiences also affect their infants and family members, amplifying the overall burden(7, 10).

Evidence suggests that timely psychological interventions can effectively mitigate postnatal depression among women at risk(11). Such interventions typically include professional home visits, peer-support via telephone, interpersonal psychotherapy, and structured counseling. In the United Kingdom, Knight et al. (2016) emphasized the routine provision of counseling and psychological care to prevent post-traumatic stress disorder and postpartum depression among women who survived MNM events(12). Moreover, delays in resuming sexual activity and increased prevalence of sexual dysfunction have been reported in this group(13), while those who have experienced perinatal loss often require extended follow-up care for subsequent pregnancies(14).

Integrated postnatal care that addresses physical, psychological, social, and spiritual aspects of women's health is essential to reducing the burden of pregnancy-related morbidities globally(15). Consistently, Standard 6 of the World Health Organization's *Standards for Improving Quality of Maternal and Newborn Care* highlights the need for emotional support and empowerment of every woman and her family(16). It further recommends that trained health personnel provide psychological support during the postpartum period, particularly for women at high risk of depression(17).

Despite these recommendations, care for women who survive MNM events often focuses mainly on clinical and physical aspects(15, 18, 19), while comprehensive psychosocial support remains fragmented. The global prevalence of MNM is estimated at 18.67 per 1000 live births(20, 21), and 3 per 1000 in Iran(20, 21); yet, a coherent, structured support plan for these women is lacking. Irregular follow-up and uncoordinated service delivery often fail to capture the cumulative and long-term effects of such experiences(22). A study in New Zealand by Furniss et al. (2018) emphasized the urgent need for specific and evaluated programs to address both physical and psychological consequences among MNM survivors(23). Early identification of needs prior to hospital discharge and systematic psychosocial follow-up can facilitate recovery and reduce distress(23, 24).

Given that many mothers leave hospital in vulnerable conditions, facing multifaceted challenges with limited support, the development of a comprehensive program is crucial. The present study was therefore conducted to design and validate a supportive program for women with maternal near miss using a Program Logic Model (PLM). This model was selected because it is straightforward to implement, provides a systematic pathway linking resources, activities, outputs, target groups, and expected short-, medium-, and long-term outcomes(25), and has proven useful in reproductive-health program planning(26, 27). The PLM has been increasingly applied in the field of midwifery to enhance the clarity, implementation, and evaluation of complex interventions(28, 29).

Methods

Study design

This study used a multi-phase approach to design and validate a supportive program for women experiencing maternal near miss (MNM) using a Program Logic Model (PLM). The study consisted of two main stages: (1) development of the program framework based on evidence and identified needs, and (2) validation of the preliminary program using the Nominal Group Technique (NGT). Ethical approval was obtained from the University Ethics Committee, and all participants provided informed consent. Confidentiality of the collected data was ensured throughout the study.

Identification of program assumptions and needs

According to the PLM framework, identifying assumptions and unmet needs is the first step in program development. To assess the current situation and determine the needs of women with MNM, evidence from several complementary studies conducted by the research team was used. These included a phenomenological study(1), a qualitative study protocol(30), and several systematic review studies(20, 21, 31, 32). These studies were conducted in educational and research hospitals affiliated with the University of Medical Sciences that provide specialized care for high-risk pregnancies.

The findings of these studies provided a comprehensive understanding of the experiences and perspectives of mothers who had experienced MNM as well as healthcare providers involved in their care. These findings served as the primary evidence base for identifying unmet needs and informing the design of the support program.

Expert consultation and qualitative analysis

In addition to the evidence obtained from previous studies, 37 experts in the field of maternal near miss and maternal health were engaged as key informants. Semi-structured interviews were conducted to further explore the needs of women with MNM and to obtain expert perspectives on appropriate support strategies. The interview data were analyzed using thematic analysis.

The identified themes were categorized and used to formulate the main strategies of the program. As a result, eight key strategic domains were identified: psychological support, fertility and childbearing counseling, information provision, improvement of care quality, socio-cultural support, financial support, breastfeeding support, and nutritional counseling. These strategies formed the foundation of the MNM support program. A summary of these strategies is presented in Fig. 1.

Development of the Program Logic Model

After defining the program strategies, the components of the Program Logic Model were developed. The PLM included the following elements: assumptions, inputs, activities, outputs, outcomes, and impact. Outcomes were categorized into immediate, intermediate, and long-term outcomes.

Inputs consisted of all resources required for program implementation, including human resources, educational facilities, equipment, financial resources, and other supporting infrastructure. Activities referred to the processes and actions designed to address the identified needs of women with MNM. Outputs represented the direct products of program activities, reflecting how the program was implemented and measured.

Outcomes referred to the expected changes among program participants. Immediate outcomes included changes in knowledge and awareness. Intermediate outcomes included changes in attitudes and skills, while long-term outcomes reflected behavioral changes. The impact referred to broader and sustained changes at the health system or societal level resulting from program implementation.

Based on the identified strategies, the research team determined the corresponding inputs and activities and defined the expected outputs and outcomes through several internal meetings and discussions. The relationships among program components were structured using an “if–then” logical framework. In this framework, if the required inputs are available, then specific program activities can be implemented; and if these activities are successfully implemented, then the expected outputs and outcomes will be achieved.

Validation using the Nominal Group Technique

The preliminary program was validated using the Nominal Group Technique (NGT), a structured method widely used to facilitate consensus and decision-making in healthcare research [32]. Twelve experts with experience in maternal health and MNM care were purposively selected and invited to participate in the expert panel through official correspondence, based on recommendations from professors and members of the research team.

The NGT session was conducted in October 2020 in the university meeting hall. Participants attended a one-day workshop lasting approximately three hours. The process followed the standard stages of the NGT, including silent generation of ideas, round-robin sharing, clarification and discussion of ideas, and prioritization of the proposed program components.

All procedures were conducted in accordance with relevant ethical guidelines and regulations. Written informed consent was obtained from all participants prior to the meeting, including permission to document and publish their viewpoints.

Results

Identification of strategic domains

Based on the synthesis of evidence from previous studies and expert consultations, eight strategic domains were identified to address the needs of women who experienced maternal near miss. These domains included psychological support, fertility and childbearing counseling, information provision, improvement of care quality, socio-cultural support, financial support, breastfeeding support, and nutritional counseling.

These strategies reflected the main categories of unmet needs reported by mothers and healthcare providers. The research team subsequently conducted several internal brainstorming sessions to translate these strategic domains into practical program components. Through this process, potential resources, activities, and expected outcomes were proposed for each domain, resulting in the development of the initial draft of the maternal near-miss support program.

Validation of the program using the Nominal Group Technique

Following the development of the preliminary program, a validation process was conducted using the Nominal Group Technique (NGT) to refine and prioritize the program components. The structured decision-making process of NGT was implemented in five sequential stages(33).

Idea generation

At the beginning of the meeting, the facilitator introduced the objectives and overall structure of the session and explained the steps of the NGT process. The preliminary draft of the support program was distributed to all participants. Experts were asked to review the document and focus on identifying potential gaps and areas for improvement.

Silent generation of ideas

Participants were asked to individually and silently generate ideas in response to two guiding questions:

(1) What shortcomings exist in the draft program that require revision?

(2) What suggestions do you propose to improve the maternal near-miss support program?

Participants recorded their responses independently without discussion with others. Approximately 30 minutes were allocated for this stage.

Round-robin recording of ideas

During the round-robin phase, participants sequentially presented their ideas. All suggestions were recorded on a board by the facilitator and assisting researchers without evaluation or discussion. This step ensured that every participant had equal opportunity to contribute ideas and lasted approximately 30 minutes.

Clarification and discussion

In this stage, participants reviewed the listed ideas to ensure clarity and shared understanding. Ambiguities were clarified, and similar or duplicate suggestions were merged. Ideas considered irrelevant to the program objectives were removed with the agreement of the group. This stage lasted approximately 50 minutes and allowed participants to elaborate on their proposals.

Voting and prioritization

In the final stage, participants prioritized the remaining ideas. Each participant selected five ideas considered most important and assigned scores from one to five, where five represented the highest priority. The scores were then aggregated, and the ideas with the highest rankings were selected as the key components of the maternal near-miss support program.

Finalization of the program logic model

The highest-ranked ideas obtained through the NGT process were incorporated into the preliminary program to refine its structure. The final set of prioritized components formed the basis of the maternal near-miss support program. The finalized list of prioritized ideas is presented in Table 1.

The refined program was subsequently organized according to the Program Logic Model framework, including inputs, activities, outputs, outcomes, and impact. The complete structure of the finalized program logic model is presented in Table 2.

Discussion

In the present study, a comprehensive support program for women who experienced maternal near miss (MNM) was developed using a Program Logic Model (PLM) and subsequently validated through the Nominal Group Technique (NGT). The program was designed based on evidence from previous studies, qualitative exploration of stakeholders' experiences, and expert consensus. The findings resulted in the identification of eight key strategic domains addressing the multifaceted needs of women with MNM, including psychological, fertility and childbearing, informational, care quality improvement, socio-cultural, financial, breastfeeding, and nutritional support.

Over the past decade, increasing attention has been paid to the concept of maternal near miss as an important indicator for assessing the quality of maternal health services. In 2011, the World Health Organization (WHO) introduced the "near-miss approach" in its guideline *Evaluating the quality of care for severe pregnancy complications: The WHO near-miss approach for maternal health* to help health systems systematically assess severe maternal morbidity and improve the quality of obstetric care(34). This framework enables health authorities to collect detailed information on severe complications and to

identify gaps in care delivery. Similarly, guidance from the WHO Regional Office for Europe recommends multidisciplinary review meetings involving key stakeholders within the healthcare system to analyze cases of severe maternal morbidity and prevent avoidable errors(35). In such meetings, a trained facilitator reviews the clinical course of the case from admission to discharge using a “door-to-door” approach to identify critical points in the care process.

International initiatives have also attempted to improve maternal outcomes through systematic surveillance of severe complications. One example is the United Kingdom Obstetric Surveillance System (UKOSS), which collects national data on rare but severe pregnancy complications and identifies avoidable factors contributing to maternal morbidity. Through continuous monitoring and analysis, the system contributes to improvements in clinical guidelines and obstetric care practices(36).

Despite these valuable initiatives, most existing programs primarily focus on surveillance and the identification of clinical errors rather than on the comprehensive support needs of women who survive severe maternal complications. A review of near-miss programs in Iran and other countries indicates that the majority of these initiatives concentrate on collecting quantitative data, assessing the prevalence of maternal morbidity, or evaluating clinical management based on patient records. Consequently, the broader psychosocial and supportive needs of MNM survivors have received relatively limited attention.

Only a small number of studies have specifically addressed supportive interventions for near-miss mothers. Among these, studies conducted by Hinton and colleagues have explored aspects of psychological support for women who survived severe obstetric complications (18, 37, 38).

While these studies highlight the importance of addressing psychological consequences such as trauma and emotional distress, other dimensions of women’s post-event experiences including fertility concerns, informational needs, breastfeeding challenges, socio-cultural issues, financial burdens, and nutritional support have rarely been examined comprehensively.

The program developed in the present study attempts to address this gap by adopting a holistic and multidimensional perspective. The eight strategic domains identified in this study reflect the complex and interconnected needs of women following a near-miss event. Psychological support aims to address emotional distress and potential post-traumatic stress. Fertility and childbearing counseling responds to women’s concerns regarding future pregnancies and reproductive health. Informational support enhances mothers’ understanding of their medical condition and recovery process. Strategies related to improvement of care quality emphasize better communication, continuity of care, and responsiveness within the healthcare system. Socio-cultural and financial support address contextual barriers that may affect recovery and well-being, while breastfeeding and nutritional counseling focus on promoting maternal and infant health following severe obstetric complications.

Another important aspect of this program is its multidisciplinary implementation framework. The effective implementation of the proposed strategies requires collaboration among various healthcare professionals and stakeholders, including obstetricians, hospital midwives, community midwives, healthcare providers, nurses, maternal health experts, academic staff, and healthcare administrators. Involving stakeholders at multiple levels of the healthcare system may facilitate coordinated care and improve the continuity of support provided to women after discharge from hospital.

The present study also provides a structured framework for program implementation through the use of a Program Logic Model. By clearly defining inputs, activities, outputs, outcomes, and impact, the PLM offers a transparent pathway for translating program strategies into practical actions and measurable outcomes. Such structured planning may facilitate the integration of the program into existing maternal health services and support future program evaluation.

Future research should focus on evaluating the effectiveness of the proposed program through clinical or implementation studies. Assessing the impact of program implementation on key maternal health outcomes such as depression, post-traumatic stress symptoms, quality of life, breastfeeding practices, nutritional status, and perceived quality of care would provide important evidence regarding the practical benefits of this comprehensive support approach.

Strengths and Limitations

This study has several notable strengths. To our knowledge, this is one of the first studies to develop a comprehensive support program specifically designed for women who have experienced maternal near miss. The program was developed using a systematic and evidence-informed approach that integrated findings from qualitative studies, systematic reviews, and expert consultations. In addition, the use of the Nominal Group Technique enabled structured participation of experts and facilitated consensus regarding the key components of the program.

Another strength of the study was the extensive exploration of stakeholders’ perspectives during the needs assessment phase. The views and experiences of mothers, spouses, healthcare providers, and policymakers were examined through qualitative studies with maximum variation sampling. This approach allowed the identification of diverse needs and ensured that multiple perspectives within the maternal health system were considered during program development.

However, some limitations should also be acknowledged. The program was developed and validated within a specific healthcare context, which may limit its direct generalizability to other settings. Furthermore, the study focused on program development and validation rather than implementation and outcome evaluation. Therefore, further research is required to assess the feasibility, effectiveness, and long-term impact of the program in clinical practice.

Conclusion

The present study developed and validated a comprehensive support program for women who have experienced maternal near miss using a Program Logic Model and expert consensus through the Nominal Group Technique. The program provides a structured framework that guides healthcare providers and

families in delivering appropriate and multidimensional support to these women during the recovery period.

By addressing psychological, reproductive, informational, socio-cultural, financial, breastfeeding, and nutritional needs, the program aims to facilitate the empowerment and rehabilitation of near-miss mothers and to mitigate the long-term consequences of severe maternal complications. Improving the well-being and quality of life of mothers not only benefits women themselves but also positively influences the health and welfare of their children and families. In addition, the program can enhance the awareness and preparedness of healthcare personnel to respond sensitively to the complex needs of women who have survived life-threatening obstetric conditions.

Given that the program was validated through the participation of experts and stakeholders with diverse professional backgrounds, the proposed model has the potential to inform maternal health policies and supportive care strategies. In alignment with global efforts to improve maternal health and achieve the Sustainable Development Goals, this program may serve as a practical framework for strengthening post-near-miss care not only in Iran but also in other healthcare settings. Future research should evaluate the implementation and effectiveness of this program in improving maternal health outcomes and quality of care.

Abbreviations

Nominal Group Technique (NGT); Maternal Near Miss (MNM); Program Logic Model (PLM).

Declarations

This study presents the development and validation of a structured supportive care program for women who have experienced maternal near-miss events. The program was developed through the integration of perspectives from healthcare providers and policymakers in the field of maternal health and was informed by existing clinical guidelines and national regulations.

Implementation of this evidence-based program may contribute to reducing the burden of severe maternal morbidities among women and may help prevent long-term complications while facilitating a more efficient recovery process following severe obstetric events.

Ethical considerations

This study was approved by the Ethics Committee of Mashhad University of Medical Sciences (IR.MUMS.NURSE.REC.1398.009). All participants received oral information about the purpose of the study, and informed consent was obtained prior to participation. Anonymity and confidentiality were ensured, and participants were informed that they could withdraw from the study at any time without any consequences. All procedures were conducted in accordance with relevant ethical guidelines and regulations.

Consent for publication

Not Applicable.

Availability of data and material

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request and with permission from the Ethics Committee of Mashhad University of Medical Sciences. The interviews used in this study were derived from a component of a doctoral dissertation.

Competing statement

The authors declare that they have no conflicts of interest.

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Authors' contributions

SA, and TKh contributed to the conception and design of the study, as well as to data analysis and interpretation. HE contributed to the critical revision of the manuscript.

SA and TKh conducted the interviews and were responsible for data collection. SA and TKh prepared the initial draft of the manuscript and contributed to subsequent revisions. All authors read and approved the final manuscript.

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References

1. Abdollahpour S, Heydari A, Ebrahimipour H, Faridhoseini F, Khadivzadeh T. Mothering sweetness mixed with the bitterness of death: the lived mothering experience of near-miss mothers. Journal of Psychosomatic Obstetrics & Gynecology. 2020:1–8.
2. Abdollahpour S, Heydari A, Ebrahimipour H, Faridhoseini F, Khadivzadeh T. Death-stricken survivor mother: the lived experience of near miss mothers. Reproductive Health. 2022;19(1):1–10.
3. Elmir R, Schmied V, Jackson D, Wilkes L. Between life and death: women's experiences of coming close to death, and surviving a severe postpartum haemorrhage and emergency hysterectomy. Midwifery. 2012;28(2):228 – 35.
4. Furuta M, Sandall J, Cooper D, Bick D. The relationship between severe maternal morbidity and psychological health symptoms at 6–8 weeks postpartum: a prospective cohort study in one English maternity unit. BMC pregnancy and childbirth. 2014;14(1):133.
5. la Cruz CZ, Coulter ML, O'rourke K, Amina Alio P, Daley EM, Mahan CS. Women's experiences, emotional responses, and perceptions of care after emergency peripartum hysterectomy: a qualitative survey of women from 6 months to 3 years postpartum. Birth (Berkeley, Calif). 2013;40(4):256 – 63.
6. Snowdon C, Elbourne D, Forsey M, Alfirevic Z. Information-hungry and disempowered: a qualitative study of women and their partners' experiences of severe postpartum haemorrhage. Midwifery. 2012;28(6):791-9.
7. Thompson JF, Heal LJ, Roberts CL, Ellwood DA. Women's breastfeeding experiences following a significant primary postpartum haemorrhage: a multicentre cohort study. International breastfeeding journal. 2010;5(1):5.
8. Abdollahpour SM, Zahra. Lived traumatic childbirth experiences of newly delivered mothers admitted to the postpartum ward: a phenomenological study. Journal of caring sciences. 2019;8(1):23.
9. Fenech G, Thomson G. Tormented by ghosts from their past': A meta-synthesis to explore the psychosocial implications of a traumatic birth on maternal well-being. Midwifery. 2014;30(2):185 – 93.
10. Kozhimannil KB, Jou J, Attanasio LB, Joarnt LK, McGovern P. Medically complex pregnancies and early breastfeeding behaviors: a retrospective analysis. PLoS One. 2014;9(8):e104820.
11. Dennis CL, Dowswell T. Psychosocial and psychological interventions for preventing postpartum depression. Cochrane Database Syst Rev. 2013(2).
12. Knight M, Acosta C, Brocklehurst P, Cheshire A, Fitzpatrick K, Hinton L, et al. Beyond maternal death: improving the quality of maternal care through national studies of 'near-miss' maternal morbidity. Programme Grants for Applied Research. 2016;4(9):1-180.
13. Waterstone M, Wolfe C, Hooper R, Bewley S. Postnatal morbidity after childbirth and severe obstetric morbidity. BJOG: An International Journal of Obstetrics & Gynaecology. 2003;110(2):128 – 33.
14. Ganaba R, Marshall T, Sombié I, Baggaley RF, Ouédraogo TW, Filippi V. Women's sexual health and contraceptive needs after a severe obstetric complication (" near-miss"): a cohort study in Burkina Faso. Reproductive health. 2010;7(1):22.
15. Souza JP, Cecatti JG, Parpinelli MA, Krupa F, Osis MJ. An emerging "maternal near-miss syndrome": narratives of women who almost died during pregnancy and childbirth. Birth (Berkeley, Calif). 2009;36(2):149 – 58.
16. Organization WH. Standards for improving quality of maternal and newborn care in health facilities, ISBN 978 92 4 151121 6 2016.
17. WHO. World Health Organization Recommendations on Postnatal Care of the Mother and Newborn. Geneva: WHO. 2014:62 p.
18. Hinton L, Locock L, Knight M. Support for mothers and their families after life-threatening illness in pregnancy and childbirth: a qualitative study in primary care. Br J Gen Pract. 2015;65(638):e563-e9.
19. WHO. WHO recommendations on health promotion interventions for maternal and newborn health. 2015.
20. Abdollahpour S, Heidarian M, H., Khadivzadeh T. The Maternal Near Miss Incidence Ratio with WHO Approach in Iran: A Systematic Review and Meta-Analysis. Iran J Nurs Midwifery Res. 2019;24(3):159 – 66.
21. Abdollahpour S, Heidarian M, H., Khadivzadeh T. The global prevalence of maternal near miss: a systematic review and meta-analysis. Health promotion perspectives. 2019;9(4):255 – 62.
22. Kripalani S, Jackson AT, Schnipper JL, Coleman EA. Promoting effective transitions of care at hospital discharge: a review of key issues for hospitalists. Journal of hospital medicine: an official publication of the Society of Hospital Medicine. 2007;2(5):314 – 23.
23. Furniss M, Conroy M, Filoche S, MacDonald EJ, Geller SE, Lawton B. Information, support, and follow-up offered to women who experienced severe maternal morbidity. International Journal of Gynecology & Obstetrics. 2018;141(3):384-8.
24. Knight M, Lewis G, Acosta C, Kurinczuk J. Maternal near-miss case reviews: the UK approach. BJOG: An International Journal of Obstetrics & Gynaecology. 2014;121:112-6.
25. Waghmare LS, Srivastava TK. Conceptualizing physiology of arterial blood pressure regulation through the logic model. Adv Physiol Educ. 2016;40(4):477-9.
26. Hulton LJ. An evaluation of a school-based teenage pregnancy prevention program using a logic model framework. The Journal of School Nursing. 2007;23(2):104 – 10.
27. Serowoky ML, George N, Yarandi H. Using the program logic model to evaluate¡ Cuídate!: A sexual health program for latino adolescents in a school-based health center. Worldviews on Evidence-Based Nursing. 2015;12(5):297–305.
28. Butler MM, Brosnan MC, Drennan J, Feeney P, Gavigan O, Kington M, et al. Evaluating midwifery-led antenatal care: using a programme logic model to identify relevant outcomes. Midwifery. 2014;30(1):e34-e41.
29. Khatri RB, Dangi TP, Gautam R, Shrestha KN, Homer CS. Barriers to utilization of childbirth services of a rural birthing center in Nepal: a qualitative study. PLoS One. 2017;12(5):e0177602.

30. Abdollahpour S, Heydari A, Ebrahimipour H, Faridhosseini F, Khadivzadeh T. Understanding the Meaning of Lived Experience “Maternal Near Miss”: A Qualitative Study Protocol. Journal of Caring Sciences. 2021;10(1):44.
31. Abdollahpour S, Heydari A, Ebrahimipour H, Faridhosseini F, Khadivzadeh T. The Needs of Women Who Have Experienced "Maternal Near Miss": A Systematic Review of Literature. Iran J Nurs Midwifery Res. 2019;24(6):417 – 27.
32. Abdollahpour S, Heydari A, Ebrahimipour H, Faridhoseini F, Heidarian Miri H, Khadivzadeh T. Postpartum depression in women with maternal near miss: a systematic review and meta-analysis. The Journal of Maternal-Fetal & Neonatal Medicine. 2021;34(1):1–7.
33. Harvey N, Holmes CA. Nominal group technique: an effective method for obtaining group consensus. Int J Nurs Pract. 2012;18(2):188 – 94.
34. WHO. Evaluating the quality of care for severe pregnancy complications: the WHO near-miss approach for maternal health. available from: https://www.who.int/reproductivehealth/publications/monitoring/9789241502221/en/. 2011.
35. WHO. Improving the quality of maternal and perinatal health care.Conducting a maternal near-miss case review cycle at hospital level.Manual with practical tools (Regional Office for Europe). Available from: https://www.euro.who.int/en/health-topics/Life-stages/maternal-and-newborn-health/publications/2016/conducting-a-maternal-near-miss-case-review-cycle-at-hospital-level-2016. 2016.
36. Lawson B NM, Kochanski P, Kurinczuk JJ, Knight M.. UKOSS Annual Report 2017. Oxford: National Perinatal Epidemiology Unit 2017. 2017.
37. Hinton L, Locock L, Knight M. Partner experiences of "near-miss" events in pregnancy and childbirth in the UK: a qualitative study. PLoS One. 2014;9(4):e91735.
38. Hinton L, Locock L, Knight M. Maternal critical care: what can we learn from patient experience? A qualitative study. BMJ open. 2015;5(4):e006676.

Tables

Table 1: Final list of top ideas ordered based on points

No.	Idea	points
1	Forming centralized special working groups for near-miss mothers and registering of mothers in this working group for long-term follow-up	60
2	Supervision of maternal treatment processes by an experienced midwife in the field of near-miss mothers who the hospital does not assign for accurate and direct monitoring	58
3	Inclusion of home care for maternal mental health in post-discharge care as a team composed of a midwife and psychologist	55
4	Supplementary insurance coverage of near-miss mothers to cover long-term maternal expenses	52
5	Preparing a service package for near-miss mothers in health care, depending on the type of organ dysfunction	53
6	Forming organizational associations for near-miss mothers	53
7	Socio-economic and cultural assessments of mothers from the beginning of pregnancy to implement preventive support	52
8	Using standard back-breaking cost tools in financial access strategy	50
9	Using the word childbearing alongside a fertility counseling strategy	49
10	Using a 24-hour hospital IVR as an information source to answer questions from mothers and their families	48
Final Strategies of near-miss mothers’ support program		
Strategy 1: Psychological counseling: Psychological support of the mother at the time of the incident, psychological counseling of the mother in the hospital, psychological counseling of the mother at the time of discharge, psychological counseling of the mother in post-discharge health care, psychological counseling of spouse, psychological counseling of previous offsprings of family		
Strategy 2: Fertility / childbearing counseling: Counseling in cases of loss of fertility, childbearing counseling in high-risk pregnancies, childbearing counseling for future pregnancies		
Strategy 3: Information Support: Fulfilling information needs about the current problem, fulfilling the information needs of family members, sexual counseling, and marital education		
Strategy 4: Socio-cultural support: Counseling to reduce social isolation by a mental health expert, maternal support by peers, correspondence with the Welfare Organization for referring mothers before hospital discharge, risk assessment of mothers in terms of socio-cultural dimensions		
Strategy 5: Improving financial/geographical access: Assigning a monthly budget for near-miss mothers, insurance coverage for childbirth complications of near-miss mothers stated in the promotion package of the health system reform plan, financial accountability for legal negligence in the health system, charity support, scheduling a pre-arranged visit to the clinic at the time of the mother's discharge, identifying mothers with poor financial status		
Strategy 6: Breastfeeding counseling: Facilitating mother-infant communication to start breastfeeding, facilitating the process of using formula/milk bank		
Strategy 7: Nutritional counseling: Performing nutritional counseling at the time of hospitalization/health care		
Strategy 8: Promoting the care quality in near-miss mothers: Empowering staff/managers in terms of legal accountability, empowering staff in terms of ethics and professional behavior, empowering staff in terms of clinical skills, reviewing educational curricula, providing intensive care for near-miss mothers in health care, reviewing existing programs to prevent or physically rehabilitate mothers, establishing a coherent		

Table 2: Finalized near-miss mothers' program after applying validation changes

Figures

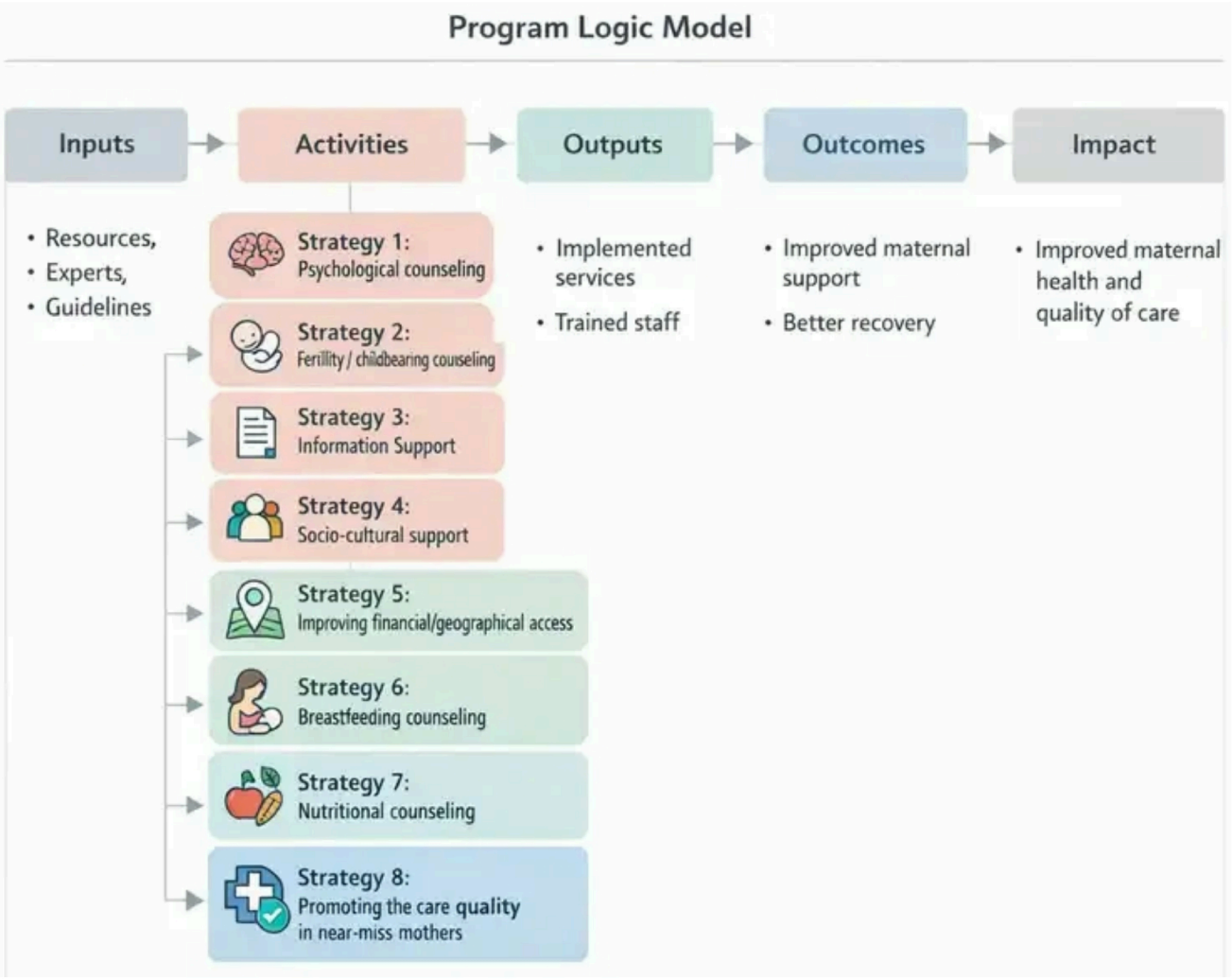


Figure 1

Program Logic Model of the Supportive Care Program for Maternal Near-Miss Mothers

Strategy 1: Psychological counseling						
Inputs	**Activities**	**outputs**	**Outcomes**			**Impact**
			Short-term outcome	Medium-term outcome	Long- term outcomes	Reducing the psychological burden following a lifelong complication
Human resources: A midwife, holding an MSc degree in counseling, a clinical psychologist, a psychiatrist, staff capable of providing initial counseling a team including a midwife, a psychologist, to do mental counseling at home	Psychological support of mother at the time of the incident	The ratio of counseled individuals at any given time to total near-miss mothers	Awareness and skill of coping with the incident	Mother's attitudes for attempting to keep calm	Proper behavior for higher adaptability with organ dysfunction in life	
	Psychological counseling of mother at the hospital	The ratio of mothers satisfied with psychological counseling to total counseling mothers	Improving awareness in alleviating concerns and identifying barriers in the mental health of mothers	Creating a positive attitude in the early diagnosis of mental problems	Preventing stress, anxiety, and depression	
	Psychological counseling of mother at the time of discharge		Improving mother's awareness of mental disease symptoms	Mother's readiness for psychological self-care with the new life situation	Proper behavior for mother's discharge based on a standard checklist of psychological screening	
	Psychological counseling of mother at post-discharge health care at home		Improving awareness in early diagnosis of depression, anxiety, and post-stress trauma	Sensitizing mothers for visiting a mental health expert or psychiatrist	Timely treatment of psychological problems and resolution of conflicts in life in case the mother cannot attend for health care	
	Psychological counseling of the husband		Awareness and readiness of the husband of the mother's problems	Changing husband's attitudes for supporting and dealing with the problems	Reducing stress and anxiety levels in the spouse	
	Psychological counseling of previous offsprings of the family		Alleviating mental concerns created after the mother's disease	Assigning importance to the identification and screening of psychological problems in children	Preventing emotional damages based on standard tools	
Strategy 2: Fertility / childbearing counseling						
Human resource: A midwife skilled at childbearing	Counseling in for the loss of fertility	The ratio of people consulted to all high-risk mothers	Mental readiness of the family for uterine dysfunction	Creating a positive attitude in the mother for accepting the number and gender of children	Counseling for accepting infertility and deciding to adopt children	Reduction of severe labor morbidity
	Childbearing Counseling in high-risk pregnancies		Increasing mothers' awareness of the complications of future pregnancies	Creating a conscious intention for a planned pregnancy based on the type of organ dysfunction	providing pre-pregnancy counseling for all mothers near death	
	Childbearing Counseling for future pregnancies		Increasing the mother's awareness of the risks of future pregnancies	Developing a responsible attitude towards re-pregnancy	Success in planning the number of children based on the mother's physical condition	
Strategy 3: Information Support						

Human resources: Skilled midwife in hospital/health center, use of 24-hour hospital IVR depending on the type of organ dysfunction of mothers as an information reference	Fulfilling information needs about the current problem	Percentage of mothers who are fully aware of their problem	Increasing awareness of mothers and families about the accident	Correcting the mother's negative attitude and misinformation about the disease	Performing mother self-care activities based on written information received in any type of dysfunction	Providing complete coverage for the mother and family in different complication situations
	Fulfilling the information needs of family members		Increasing awareness and empathetic understanding of the mother by the spouse and family members	A positive effort for full support of the mother by the husband	Emphasizing the role of the spouse in the supportive-caring activities of the mother	
	Sexual counseling and marital education	The ratio of counseled mothers / to total near-miss mothers	Increasing husband's awareness of how to have a sexual relationship again	Creating an efficient attitude for identifying sexual problems based on screening with standard tools	Counseling and skill behaviors for strengthening the marital relationship of the joint life	
Strategy 4: Socio-cultural support						
Human resources: Mental health expert, social worker, midwife	Counseling to reduce social isolation by a mental health expert	The ratio of counseled mothers / to total near-miss mothers	Increasing the mother's awareness of the reason for her isolation from society	Increasing the positive attitude of the mother to start former social activities	Having positive social activities to reduce the social burden of the disease	Reducing the socio-cultural burden of the complication on mother and baby
	maternal support by peers	Percentage of mothers who have joined peer/therapy groups.	Increasing knowledge in forming peer groups	Motivate the mother to reduce the feeling of loneliness and isolation	Guiding and referring mothers to peer associations and groups	
	correspondence with the Welfare Organization for referring mothers before hospital discharge	Percentage of mothers covered by welfare through hospital referrals	Informing the welfare organization of the existence of mothers close to death	Measures to reduce social pressures on near-miss mothers by other organizations	Allocating special conditions facilities for near-miss mothers by welfare	
	Risk assessment of mothers in terms of socio-cultural dimensions	Percentage of mothers assessed in terms of socioeconomic class based on standard tools	Increasing knowledge in early identification of high-risk cases in terms of the socio-economic and cultural level	Readiness to plan for increased follow-up care of the vulnerable	Appropriate behavior for more socio-cultural support	
Strategy 5: Improving financial/geographical access:						
Facilities: Increasing insurance coverage, Infrastructure for receiving in-person/automated appointments from the clinic	Assigning a monthly budget for near-miss mothers	Percentage of mothers who have received the allowance.	Increasing knowledge on how to reduce the costs imposed following the complication	Supportive attitude to long-term nutritional costs and follow-up treatment	Reduced convalescence from illness due to financial barriers based on hospitalization days	Improving mothers' financial/geographical access to equitable services
Facilities: Increasing insurance coverage, Infrastructure for receiving in-person/automated appointments from the clinic	insurance coverage for childbirth complications of near-miss mothers stated in the promotion package of the health system reform plan/ Supplementary insurance for morbidities	Percentage of discount to the total cost	Helping to reduce treatment and paraclinical costs	Efforts to reduce financial barriers leading to a lack of timely diagnostic care	Financial measures to help reduce the economic burden on the family following maternity leave	
Human resources: Social worker	financial accountability for legal negligence in the health system	Percentage of cases for which compensation for legal	Mother's feeling of financial support in response to	Sensitization of medical staff to be responsible for lack of	Legal accountability of the health justice system	

Arrangement: Charity		negligence has been paid	medical malpractices	professional accountability		
	charity support/social working	The ratio of mothers who have used social work support costs to total mothers	Increasing knowledge on how to reduce hospital costs Reducing family financial bankruptcy	A supportive attitude of institutions in reducing the loss of living capital due to medical expenses	Contributing to the financial well-being of mothers based on measures taken based on standard tool of backbreaking costs	
	scheduling a pre-arranged appointment to the clinic at the time of the mother's discharge	Percentage of mothers whose clinic appointment is pre-arranged	Increasing knowledge about the benefits of reducing the cost/time of follow-up after discharge	Ensuring that all mothers are followed up and returned to the clinic for follow-up	Providing timely treatment and care if needed	
	Identifying mothers with poor financial status	Percentage of mothers identified with poor socioeconomic status to all mothers	Increasing awareness in segregation and evaluation of mothers with financial problems	Planning on financial support to improve care	Correct behavior for timely diagnosis and treatment for low-income families based on scientific guidelines	
Strategy 6: Breastfeeding counseling						
Human resources: Midwife in the health care center Milk expert	Facilitating mother-infant bonding to start breastfeeding	Percentage of mothers who met the baby at the first opportunity / Total near-miss mothers	Increasing awareness in strengthening maternal feelings by starting early breastfeeding	Creating an effective attitude in employees to provide the possibility for mother and baby to meet to strengthen the emotional bond	Helping the mother to breastfeed successfully based on the hours and frequency of breastfeeding	Promoting baby feeding and breastfeeding
	Facilitating the process of using formula/milk bank	Percentage of mothers who have used the formula to total near-miss mothers	Increasing awareness to start proper and timely feeding of the baby	Positive efforts to prevent the effects of not breastfeeding	Improving the growth and development of the baby based on the booklet of health charts	
Strategy 7: Nutritional counseling						
Human resources: Nutrition expert	Performing nutritional counseling at the time of hospitalization/health care	Percentage of mothers visited by a nutritionist to total near-miss mothers	Increasing awareness in the use of diet appropriate for the physical problem	Improving staff attitude for improving physical condition and shorter convalescence from illness through nutritional counseling	Reduction of nutritional deficiencies and micronutrients caused by an improper diet based on experiments	Improving nutritious and proper nutrition
Strategy 8: Promoting the care quality in near-miss mothers						
Infrastructures **Human resources:** Forming a working group of all specialties depending on the type of organ dysfunction Hospital non-assigned experts in the field of mothers to supervise the activities, a skilled midwife as a supervisor of the obstetrics and gynecology block, an inspector of high-risk mothers with background experiences from different fields of work	Empowering staff/managers for legal accountability	Percentage of employees participating in workshops to total staff	Making mothers aware of their rights	Creating a positive attitude in finding the root of avoidable negligence by using RCA files	Accountability of the health system for its mistakes	Improving the quality of care in near-miss mothers
	Empowering staff in terms of ethics and professional behavior		Increasing awareness and effective communication skills in line with the spirit of near-miss mothers	Increasing staff's supportive motivation for respecting and paying attention in the most critical living conditions	Respectful and ethical behavior of employees	
	empowering staff in terms of clinical skills		Increasing the knowledge and awareness of staff in midwifery emergencies	Increasing sensitivity of staff/service providers to the initial complaint in all areas of the	Careful and sufficiently skilled behavior	

Educational environment: holding classes and workshops, having a standard room for classes and workshops **Financial costs:** Costs allocated for holding classes, workshop teacher salaries, purchase of accessories and educational aids, preparation of pamphlets and educational materials, **Infrastructure:** reviewing the guidelines of the Ministry of Health, the integrated national system of maternal health				mother's physical and mental health	
	reviewing educational curricula	Percentage of parts changed and revised in the educational curriculum	Increasing knowledge about the educational content for near-miss mothers	Basic midwifery training on specific skill / behavioral attitudes in near-miss mothers	Increasing the number of skilled graduates to provide services to near-miss mothers
	providing intensive care for near-miss mothers in health care,	Percentage of near-death mothers who are in intensive care	Increasing knowledge to care intermittently Maternal awareness of ongoing care	Adopting an insistent attitude to provide home care tailored to the specific flowchart of each type of dysfunction	Reducing late-diagnosed events which are due to medical team availability
	reviewing existing programs to prevent or physically rehabilitate mothers	Percentage of programs revised to meet the needs of near-miss mothers / total current programs	Eliminating the implementation of polyvalence plan in midwives to provide efficient care	Increasing the cost/effectiveness of care based on research	Increasing the achievement of the desired result of care based on indicators and including the type of special care for these mothers in the service package for adolescents, the middle-aged, and the elderly
	establishing a coherent relationship between health care and treatment	Percentage of universities that provide prenatal care within the integrated health care system.	Awareness of hospital staff of the condition and number of high-risk mothers referred to by the healthcare center	Effective preparation for the implementation of appropriate hospital care based on proper systemic records and history	Integrated health care through ongoing communication using the knowledge of the mother's condition
	Establishment of a provincial working group for near-miss mothers through the centralized registry of mothers and covering several sub-hospitals	Percentage of near-miss mothers followed by the working group / total mothers Percentage of professional errors occurred to total occupational errors based on cases in mothers' morbidity committees	Increasing the knowledge and awareness of service providers about the identification, treatment, and follow-up of near-miss mothers Decreasing the number of avoidable maternal professional errors/faults	Increasing the motivation and sensitivity of employees related to the field of mothers to prevent avoidable factors Increasing the supervising attitude and process improvement of managers to be more accountable	Improving clinical processes using behavior change associated with work conscience in service providers Reduction of multiple complications associated with maternal organ dysfunction caused by lack of proper follow-up