WHO recommendations on

Postnatal care of the mother and newborn

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Abbreviations

AIDS	acquired immunodeficiency syndrome
ARI	acute respiratory infection
BDI	Beck Depression Inventory
CHW	community health worker
CI	confidence interval
CRCT	cluster randomized controlled trial
DASS	Depression Anxiety and Stress Scale
EBF	exclusive breastfeeding
EPDS	Edinburgh Postnatal Depression Score
GDG	Guidelines Development Group
GHQ	General Health Questionnaire
GRC	Guidelines Review Committee
HAD	Hospital Anxiety and Depression
HAM	Hamilton Rating Scale for Depression
Hb	haemoglobin
HIV	human immunodeficiency virus
LMIC	low- and middle-income country
MADRS	Montgomery-Asberg Depression Rating Scale
MCA	Department of Maternal, Newborn, Child and Adolescent Health
MD	mean difference
NMR	neonatal mortality rate
OR	odds ratio
PICO	population (P), intervention (I), comparison (C), outcome (O)
PMR	perinatal mortality rate
POMS	Profile of Mood States
PPH	postpartum haemorrhage
PROJAHNMO	Project to Advance the Health of Newborns and Mothers
QIDS	Quick Inventory of Depressive Symptom
RCT	randomized controlled trial
RR	relative risk
SEARCH	Society for Education Action and Research in Community Health
USA	United States of America
WHO	World Health Organization
YIS	Young Infant Studies

Executive summary

The days and weeks following childbirth – the postnatal period – is a critical phase in the lives of mothers and newborn babies. Most maternal and infant deaths occur during this time. Yet, this is the most neglected period for the provision of quality care. WHO's *Postpartum care of the mother and newborn: a practical guide* (WHO/RHT/MSM/98.3) was published in 1998. Guidance from this document was included in the WHO guideline *Pregnancy, childbirth, postpartum and newborn care: a guide for essential practice*, published in 2004 (**http://whqlibdoc.who.int/publications/2006/924159084X_eng.pdf**). In keeping with the WHO *Handbook on development of guidelines*, these documents needed to be updated to include current best evidence-based practices.

To initiate the guidelines update process, WHO convened a technical consultation in October 2008. At this consultation, existing WHO and other agency guidelines related to postnatal care were reviewed for best practices and supporting evidence. Areas were identified where guidance was non-existent or conflicting, and these were prioritized for further work. The process of evidence review synthesis and establishment of a Steering Group and Guidelines Development Group (GDG) was taken up during 2011–2. Systematic reviews were commissioned to address the timing and content of postnatal care and contacts for the mother and newborn following normal childbirth. The GDG consultation to formulate recommendations was held in Geneva from 3–5 September 2012.

The primary audience for these guidelines is health professionals who are responsible for providing postnatal care to women and newborns, primarily in areas where resources are limited. These health professionals include physicians, midwives, nurses and auxiliary nurse-midwives providing primary health care in facilities and at home. The guidelines are also expected to be used by policy-makers and managers of maternal and child health programmes, health facilities, and teaching institutions to set up and maintain maternity and newborn care services. The information in these guidelines will be included in job aids and tools for both pre- and in-service training of health professionals to improve their knowledge, skills and performance in postnatal care.

The guidelines focus on postnatal care of mothers and newborns in resource-limited settings in low- and middle-income countries. The critical maternal health outcome considered was maternal morbidity (including haemorrhage, infections, anaemia and depression). The two critical neonatal outcomes were neonatal mortality and morbidity. Other important outcomes included growth, cognitive development and breastfeeding status.

The guidelines address timing, number and place of postnatal contacts, and content of postnatal care for all mothers and babies during the six weeks after birth. The guidelines include assessment of mothers and newborns to detect problems or complications, but the management of these conditions is addressed in other WHO documents (e.g. management of a mother with postpartum haemorrhage – PPH – or infection, care of a preterm or low-birth-weight newborn or a newborn with infection).

Through 2011–12, the Department of Maternal, Newborn, Child and Adolescent Health coordinated efforts to review and synthesize the evidence on the priority questions. The process included targeted systematic reviews of relevant literature, preparation of

GRADE[1] profiles, and analysis of the benefits and risks, values and preferences, and costs of implementation. The systematic reviews, meta-analyses and GRADE profiles were conducted by different expert groups using the methodology recommended by the Guidelines Review Committee.

In drafting the recommendations, the WHO Steering Group used the summaries of evidence for the critical outcomes, quality of evidence, risks and benefits of implementing the recommendations, values and preferences and costs. The draft recommendations, evidence summaries, GRADE tables and information on benefits and risks, values and preferences, and costs were presented to the GDG at its meeting held at WHO headquarters in Geneva, Switzerland, in September 2012. The GDG reviewed and discussed this information to finalize the recommendations. Individual members of the GDG filled in a worksheet to comment on the quality of evidence and the draft and strength of the recommendation before discussing these as a group. Where the GDG determined that there was insufficient evidence, consensus within the group was used as the basis of the recommendation. The decisions on the final recommendations and their strengths were made by consensus or, where necessary, by vote.

The recommendations for postnatal care of mothers and newborns are summarized in the table below. These recommendations will be regularly updated as more evidence is collated and analysed on a continuous basis, with major reviews and updates at least every five years. The next major update will be considered in 2018 under the oversight of the WHO Guidelines Review Committee.

[1] GRADE refers to the system for grading the quality of evidence and the strength of recommendations.

2013 WHO Recommendations on postnatal care

RECOMMENDATION	STRENGTH OF RECOMMENDATION & EVIDENCE QUALITY
PROVISION OF POSTNATAL CARE TO MOTHERS AND NEWBORNS **RECOMMENDATION 1: Timing of discharge from a health facility after birth** After an uncomplicated vaginal birth in a health facility, healthy mothers and newborns should receive care in the facility for at least 24 hours after birth.[a]	Weak recommendation based on low quality evidence
RECOMMENDATION 2: Number and timing of postnatal contacts If birth is in a health facility, mothers and newborns should receive postnatal care in the facility for at least 24 hours after birth. [a] If birth is at home, the first postnatal contact should be as early as possible within 24 hours of birth. At least three additional postnatal contacts are recommended for all mothers and newborns, on day 3 (48–72 hours), between days 7–14 after birth, and six weeks after birth.	Strong recommendation based on moderate quality evidence for newborns and low quality evidence for mothers
RECOMMENDATION 3: Home visits for postnatal care Home visits in the first week after birth are recommended for care of the mother and newborn.	Strong recommendation based on high quality evidence for newborns and low quality evidence for mothers
CONTENT OF POSTNATAL CARE FOR THE NEWBORN **RECOMMENDATION 4: Assessment of the baby** The following signs should be assessed during each postnatal care contact and the newborn should be referred for further evaluation if any of the signs is present: *stopped feeding well, history of convulsions, fast breathing (breathing rate ≥60 per minute), severe chest in-drawing, no spontaneous movement, fever (temperature ≥37.5 °C), low body temperature (temperature <35.5 °C), any jaundice in first 24 hours of life, or yellow palms and soles at any age.* The family should be encouraged to seek health care early if they identify any of the above danger signs in-between postnatal care visits.	Strong recommendation based on low quality evidence
RECOMMENDATION 5: Exclusive breastfeeding All babies should be exclusively breastfed from birth until 6 months of age. Mothers should be counselled and provided support for exclusive breastfeeding at each postnatal contact.	Strong recommendation based on moderate quality evidence
RECOMMENDATION 6: Cord care Daily chlorhexidine (7.1% chlorhexidine digluconate aqueous solution or gel, delivering 4% chlorhexidine) application to the umbilical cord stump during the first week of life is recommended for newborns who are born at home in settings with high neonatal mortality (30 or more neonatal deaths per 1000 live births). Clean, dry cord care is recommended for newborns born in health facilities and at home in low neonatal mortality settings. Use of chlorhexidine in these situations may be considered only to replace application of a harmful traditional substance, such as cow dung, to the cord stump.	Strong recommendation based on moderate quality evidence

[a] For the newborn this includes an immediate assessment at birth, a full clinical examination around one hour after birth and before discharge.

RECOMMENDATION 7: Other postnatal care for the newborn Bathing should be delayed until 24 hours after birth. If this is not possible due to cultural reasons, bathing should be delayed for at least six hours. Appropriate clothing of the baby for ambient temperature is recommended. This means one to two layers of clothes more than adults, and use of hats/caps. The mother and baby should not be separated and should stay in the same room 24 hours a day. Communication and play with the newborn should be encouraged. Immunization should be promoted as per existing WHO guidelines. Preterm and low-birth-weight babies should be identified immediately after birth and should be provided special care as per existing WHO guidelines.	GDG consensus based on existing WHO guidelines
CONTENT OF POSTNATAL CARE FOR THE MOTHER **RECOMMENDATION 8: Assessment of the mother** ***First 24 hours after birth*** All postpartum women should have regular assessment of vaginal bleeding, uterine contraction, fundal height, temperature and heart rate (pulse) routinely during the first 24 hours starting from the first hour after birth. Blood pressure should be measured shortly after birth. If normal, the second blood pressure measurement should be taken within six hours. Urine void should be documented within six hours. ***Beyond 24 hours after birth*** At each subsequent postnatal contact, enquiries should continue to be made about general well-being and assessments made regarding the following: micturition and urinary incontinence, bowel function, healing of any perineal wound, headache, fatigue, back pain, perineal pain and perineal hygiene, breast pain, uterine tenderness and lochia. Breastfeeding progress should be assessed at each postnatal contact. At each postnatal contact, women should be asked about their emotional well-being, what family and social support they have and their usual coping strategies for dealing with day-to-day matters. All women and their families/partners should be encouraged to tell their health care professional about any changes in mood, emotional state and behaviour that are outside of the woman's normal pattern. At 10–14 days after birth, all women should be asked about resolution of mild, transitory postpartum depression ("maternal blues"). If symptoms have not resolved, the woman's psychological well-being should continue to be assessed for postnatal depression, and if symptoms persist, evaluated. Women should be observed for any risks, signs and symptoms of domestic abuse. Women should be told whom to contact for advice and management. All women should be asked about resumption of sexual intercourse and possible dyspareunia as part of an assessment of overall well-being two to six weeks after birth. If there are any issues of concern at any postnatal contact, the woman should be managed and/or referred according to other specific WHO guidelines.	GDG consensus based on existing WHO guidelines

RECOMMENDATION 9: Counselling	
All women should be given information about the physiological process of recovery after birth, and that some health problems are common, with advice to report any health concerns to a health care professional, in particular: *Signs and symptoms of PPH:* sudden and profuse blood loss or persistent increased blood loss, faintness, dizziness, palpitations/tachycardia. *Signs and symptoms of pre-eclampsia/eclampsia:* headaches accompanied by one or more of the symptoms of visual disturbances, nausea, vomiting, epigastric or hypochondrial pain, feeling faint, convulsions (*in the first few days after birth*). *Signs and symptoms of infection:* fever, shivering, abdominal pain and/or offensive vaginal loss. *Signs and symptoms of thromboembolism:* unilateral calf pain, redness or swelling of calves, shortness of breath or chest pain.	GDG consensus based on existing WHO guidelines
Women should be counselled on nutrition.	
Women should be counselled on hygiene, especially handwashing.	
Women should be counselled on birth spacing and family planning. Contraceptive options should be discussed, and contraceptive methods should be provided if requested.	
Women should be counselled on safer sex including use of condoms.	
In malaria endemic areas, mothers and babies should sleep under insecticide-impregnated bed nets.	
All women should be encouraged to mobilize as soon as appropriate following the birth. They should be encouraged to take gentle exercise and make time to rest during the postnatal period.	
RECOMMENDATION 10: Iron and folic acid supplementation	
Iron and folic acid supplementation should be provided for at least three months.* * *The GDG noted that there is currently no evidence to change this recommendation and that WHO is working on developing specific guidelines for maternal nutrition interventions after birth.*	GDG consensus based on existing WHO guidelines
RECOMMENDATION 11: Prophylactic antibiotics	
The use of antibiotics among women with a vaginal delivery and a third or fourth degree perineal tear is recommended for prevention of wound complications.	Strong recommendation based on very low quality evidence
The GDG considers that there is insufficient evidence to recommend the routine use of antibiotics in all low-risk women with a vaginal delivery for prevention of endometritis.	
RECOMMENDATION 12: Psychosocial support	
Psychosocial support by a trained person is recommended for the prevention of postpartum depression among women at high risk of developing this condition.	Weak recommendation based on very low quality evidence
The GDG considers that there is insufficient evidence to recommend routine formal debriefing to all women to reduce the occurrence/risk of postpartum depression.	Weak recommendation based on low quality evidence
The GDG also considers that there is insufficient evidence to recommend the routine distribution of, and discussion about, printed educational material for prevention of postpartum depression.	Weak recommendation based on very low quality evidence
Health professionals should provide an opportunity for women to discuss their birth experience during their hospital stay.	GDG consensus based on existing WHO guidelines
A woman who has lost her baby should receive additional supportive care.	GDG consensus based on existing WHO guidelines

Introduction and scope

Background

The days and weeks following childbirth – the postnatal period – is a critical phase in the lives of mothers and newborn babies. Major changes occur during this period which determine the well-being of mothers and newborns. Yet, this is the most neglected time for the provision of quality services. Lack of appropriate care during this period could result in significant ill health and even death. Rates of provision of skilled care are lower after childbirth when compared to rates before and during childbirth. Most maternal and infant deaths occur during this time.

The World Health Organization's *Postpartum care of the mother and newborn: a practical guide* (WHO/RHT/MSM/98.3; **http://www.who.int/maternal_child_adolescent/documents/who_rht_msm_983/en/**) was published in 1998. Guidance from this document was included in the WHO guideline on *Integrated management of pregnancy and childbirth – pregnancy, childbirth, postpartum and newborn care: a guide for essential practice*, published in 2004 (**http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/924159084X/en/index.html**). In keeping with the WHO *Handbook on development of guidelines*, these documents needed to be updated to include current best evidence-based practices.

To initiate the guidelines update process, WHO convened a technical consultation in October 2008. At this consultation, existing WHO and other guidelines related to postnatal care were reviewed for best practices and supporting evidence. Areas were identified where guidance is non-existent or conflicting, and these were prioritized for further work. The meeting report is available at: **http://www.who.int/maternal_child_adolescent/documents/WHO_MPS_10_03/en/index.html**

The process of evidence review synthesis and establishment of a Steering Group and Guidelines Development Group (GDG) was taken up during 2011–2. Systematic reviews were commissioned to address the timing and content of postnatal care contacts for the mother and newborn following normal childbirth. The GDG consultation to formulate recommendations was held in Geneva from 3–5 September 2012.

Target audience

The primary audience for these guidelines is health professionals who are responsible for providing postnatal care to women and newborns, primarily in settings where resources are limited. These health professionals include physicians, midwives, nurses and auxiliary nurse-midwives providing primary health care in facilities and at home. The guidelines are also expected to be used by policy-makers and managers of maternal and child health programmes, health facilities, and teaching institutions to set up and maintain maternity and newborn care services. The information in these guidelines will be included in job aids and tools for both pre- and in-service training of health professionals so as to improve their knowledge, skills and performance in postnatal care.

Population of interest

The guidelines focus on postnatal care of mothers and newborns in resource-limited settings in low- and middle-income countries (LMICs).

Critical outcomes

The critical maternal health outcome considered was maternal morbidity (including haemorrhage, infections, anaemia and depression). The two critical neonatal outcomes were neonatal mortality and morbidity. Other important outcomes that were considered for guidelines development included growth, cognitive development and breastfeeding status.

Scope of the guidelines

These guidelines address the timing, number and place of postnatal contacts as well as the content of postnatal care for all mothers and babies during the six-week period after birth. The guidelines include assessment of all mothers and newborns to detect problems or complications, but the management of these conditions is addressed in other WHO documents (e.g. management of a mother with postpartum haemorrhage or infection, care of a preterm or low-birth-weight newborn or a newborn with infection). The priority questions, for which evidence was reviewed and synthesized for these guidelines are listed below in PICO format – population (P), intervention (I), comparison (C) and outcome (O).

Timing, place and number of postnatal care contacts

1. For women who give birth in health facilities in resource-limited settings and their newborns (P), does discharge from hospital within 24 or 48 hours of birth (I) compared with discharge any time later (C) increase the risk of maternal or neonatal readmissions for morbidity and stopping breastfeeding at six weeks or six months after birth (O)?
2. In neonates born in low- and middle-income settings (P), what is the optimal number and timing of postnatal contacts (I) to improve neonatal survival and health (O)?
3. In low and middle-income settings (P), do home visits by community health workers (CHWs) (I) compared to routine care (C) prevent neonatal and perinatal mortality (O)?

Content of postnatal care for newborns

4. Among newborns in resource-poor settings (P), how well do algorithms based on simple clinical signs for use by first level health workers or community level workers during postnatal visits (I) compared with clinicians' judgement (C) identify severe illnesses requiring referral to health facilities (O)?
5. In neonates (P), what is the effect of exclusive breastfeeding (EBF) (I) compared with predominant or partial breastfeeding in the first month of life (C) on neonatal mortality and morbidity (O)?
6. In all or a sub-population of newborns (P), does routine application of chlorhexidine to the umbilical cord stump (I) compared with dry cord care or usual cord practices (C) reduce the neonatal mortality rate and/or the incidence of systemic sepsis and omphalitis in the neonatal period (O)?

Content of postnatal care for women

7. In all low-risk women after vaginal delivery (P), what are the assessments (I) to reduce maternal mortality and morbidity (O)?
8. In all low-risk, non-anaemic women after vaginal delivery (P), does use of dietary supplements (I) compared with usual care (C) reduce the occurrence of postpartum anaemia (O)?
9. Among low-risk women following vaginal delivery (P), what are the preventive interventions (I) for reducing mortality and morbidity due to sepsis (O)?
10. Among low-risk women following vaginal delivery (P), does the use of antibiotics (I) compared with usual care (C) reduce the occurrence of endometritis (O)?
11. Among low-risk women who have sustained third or fourth degree perineal tear following vaginal delivery (P), does the use of antibiotics (I) compared with usual care (C) reduce the occurrence of perineal wound complications (O)?
12. Among low-risk women following vaginal delivery (P), what are the preventive interventions (I) for reducing postpartum depression (O)?

Methodology

Guideline Development Group

The GDG that developed the recommendations and decided on their strength was constituted by the following external experts: Ebun Adejuyigbe, Joy Lawn and Mandisa Singata (*African Region*); Wally Carlo, Guillermo Carroli, Agustin Conde-Agudelo, Sheena Currie and Heather Scott (*Region of the Americas*); Indra Malik Goonawardhane, Ekawaty Lutfia Haksari, Ruby Jose and Vinod Kumar Paul (*South-East Asia Region*); Anita Zaidi (*Eastern Mediterranean Region*); Tina Lavender and James Neilson (*European Region*); Carolyn Maclennan and Jun Jim Zhang (*Western Pacific Region*).

All GDG members completed a WHO Declaration of Interests form. Several members of the GDG declared that they had conducted research projects or done systematic reviews in the areas relevant for postnatal care of the mother and newborn. In addition, Wally Carlo declared that he had a patent pending to blend oxygen and air and that he had received travel support from the American Academy of Pediatrics (less than US$ 1000 per year). These largely academic declarations of interests were considered by the WHO Steering Group, who found that they did not pose a major risk of bias in recommendations. None of the above experts were therefore precluded from participation in the GDG meeting to formulate recommendations.

The WHO Steering Group consisted of the following staff members: Maternal, Newborn, Child and Adolescent Health (MCA): Rajiv Bahl, José Martines, Matthews Mathai and Severin von Xylander; Reproductive Health and Research: João Paolo de Souza and Metin Gulmezoglu. Staff members from the Departments of Nutrition for Health and Development, HIV/AIDS and Mental Health and Substance Abuse also participated in the discussions.

Evidence retrieval and synthesis process

Through 2011–12, MCA coordinated efforts to review and synthesize the evidence on the priority questions. The WHO process included targeted, systematic reviews of relevant literature, preparation of GRADE[1] profiles, and analysis of the benefits and risks, values and preferences, and costs of implementation.

A literature search of the Cochrane Database and OVID-Medline was conducted in July 2010 to identify high quality, systematic reviews from the previous two years that were relevant to the priority PICO questions. Where data were not available or up-to-date from the two sources, systematic reviews were commissioned to various groups to collate the evidence.

The systematic reviews, meta-analyses and GRADE profiles were done by different expert groups (see Acknowledgements) using the methodology recommended by the Guidelines Review Committee (GRC). Where data were lacking, systematic searches were conducted from various electronic sources, including Medline/PubMed, Embase, CENTRAL, NLM Gateway and WHO regional databases. Studies from low- and middle-income as well as high- income countries were considered for inclusion in evidence reviews. Efforts were

[1] GRADE refers to the system for grading the quality of evidence and the strength of recommendations.

made to identify relevant English as well as non-English language articles. A standardized form was used to extract relevant information from studies. Systematically extracted data included: study identifiers, setting, design, participants, sample size, intervention or exposure, control or comparison group, outcome measures and results. Quality characteristics also were recorded for all studies: allocation concealment or risk of selection bias (observational studies); blinding of intervention or observers, or risk of measurement bias; loss to follow-up; and intention-to-treat analysis or adjustment for confounding factors. For each question, data on critical and secondary outcomes were extracted and appraised by evaluating the quality, consistency and external validity of the evidence.

Grading the quality of evidence

The GRADE approach for assessing and grading the quality of evidence was used. Quality was defined as the extent to which one could be confident that an estimate of effect or association was correct. The quality of the set of included studies reporting results for an outcome was graded as high, moderate, low or very low. The implications of these categories are detailled in **Table 1**.

Table 1. Categories of evidence

LEVEL OF EVIDENCE	RATIONALE
High	Further research is very unlikely to change confidence in the estimate of effect.
Moderate	Further research is likely to have an important impact on confidence in the effect.
Low	Further research is very likely to have an important impact on estimate of effect and is likely to change the estimate.
Very low	Any estimate of effect is very uncertain.

The assessment of quality of a set of studies (the majority of those included) was based on the following criteria:

- *Study design:* randomized controlled trials (RCTs) – individual or cluster RCTs (CRCTs); non-randomized experimental studies; or observational studies.
- *Risk of bias:* risk of selection bias – allocation concealment in RCTs and comparability of groups in observational studies; risk of measurement bias – blinding or objective outcomes; extent of loss to follow-up; appropriateness of analysis – intention-to-treat, adjustment for cluster randomization in CRCTs, adjustment for confounding in observational studies.
- *Consistency:* similarity of results across the set of available studies – direction of effect estimates, most studies showing meaningful benefit or unacceptable harm.
- *Precision:* based on the width of confidence intervals (CIs) of the pooled effects across studies.
- *Directness:* whether the majority of included studies evaluated interventions relevant to the identified questions.

Additional considerations included the magnitude of the effect, presence or absence of a dose-response gradient, and direction of plausible biases. GRADE tables from systematic reviews were cross-checked, and a discussion on benefits and harms, values and preferences of health care providers and policy-makers, and whether costs are qualitatively justifiable compared to the benefits in LMICs was drafted. No efforts were made to collate the values and preferences of the persons addressed by the guidelines (i.e. mothers). Data from observational studies were considered to have a risk of bias, thereby

resulting in moderate quality evidence, if there was no very serious risk of bias due to methodological issues, imprecision, consistency or directness. Thus, the highest possible quality of evidence when data were from observational studies was "moderate".

Recommendations were formulated and drafted in accordance with procedures outlined in the WHO *Handbook for guideline development*,[1] and guided by the quality of evidence using the GRADE methodology.

Formulation of recommendations

In drafting the recommendations, the WHO Steering Group used the summaries of evidence for the critical outcomes, quality of evidence, risks and benefits of implementing the recommendations, values and preferences, and costs.

The draft recommendations, evidence summaries, GRADE tables and information on benefits and risks, values and preferences, and costs were presented to the GDG at its meeting held at WHO headquarters in Geneva, Switzerland, in September 2012. The GDG reviewed and discussed this information to finalize the recommendations. Individual members of the GDG filled in a worksheet to comment on the quality of evidence and the strength of each recommendation, before discussing these as a group. Where the GDG determined that there was insufficient evidence, consensus within the group was used as the basis of the recommendation.

The decisions on the final recommendations and their strength were made by consensus or, where necessary, by vote. In deciding on the strength of the recommendations, the GDG was guided by the agreed-upon assessment criteria described in **Table 2**.

Table 2. Assessment criteria for the strength of recommendations

STRENGTH OF RECOMMENDATION	RATIONALE
Strong	The GDG is confident that the desirable effects of adherence to the recommendation outweigh the undesirable effects. The quality of evidence required to make such a recommendation is at least *moderate*, although the panel may make exceptions.
Weak	The GDG concludes that the desirable effects of adherence to a recommendation probably outweigh the undesirable effects, irrespective of the quality of evidence. However, new evidence may result in changing the balance of risk to benefits OR the benefits may not warrant the cost or resource requirements in all settings.

When the GDG felt that the benefits of a recommendation outweighed the harms in some situations but not in others, the situation to which the recommendation is relevant was explicitly stated.

The recommendations, their level of strength, and remarks were circulated to the GDG for comments before finalization.

When existing WHO guidelines are referenced, they were not updated, and a decision was made whether to use or endorse that guideline. In one case, the GDG did not feel the necessity of new evidence reviews. Existing guidelines approved by the WHO GRC are so indicated.

[1] *Handbook for guideline development*. Geneva: WHO; 2010.

A set of peer reviewers identified by the WHO Steering Group reviewed the final recommendations and provided their feedback. The Steering Group reviewed the comments and made appropriate modifications – factual errors were corrected and lack of clarity was addressed by improving the language. However, when there was a conflict between the peer review comments and the decisions of the GDG, no changes were made to the guidelines.

Review and update of the recommendations

These recommendations will be regularly updated as more evidence is collated and analysed on a continuous basis, with major reviews and updates at least every five years. The next major update will be considered in 2018 under the oversight of the WHO GRC.

Evidence and recommendations

PROVISION OF POSTNATAL CARE TO MOTHERS AND NEWBORNS

Timing of discharge from the health facility

RECOMMENDATION 1

After an uncomplicated vaginal birth in a health facility, healthy mothers and newborns should receive care in the facility for at least 24 hours after birth.

— *Weak recommendation, based on low quality evidence*

Remarks:

- *Appropriate standard of care for mothers and newborns should be provided in health facilities, as per other existing WHO guidelines. For the newborn this includes an immediate assessment at birth, a full clinical examination around one hour after birth and before discharge.* (http://www.who.int/maternal_child_adolescent/documents/924159084x/en/index.html).
- *"Healthy mothers and newborns" are defined in the safe childbirth checklist to be used to assess mothers and newborns at the time of discharge* (http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0035151#s5)*; mother's bleeding should be controlled, mother and baby should not have signs of infection, and baby should be breastfeeding well.*

Review question

For women who give birth in health facilities in resource-limited settings and their newborns (P), does discharge from hospital within 24 or 48 hours of birth (I) compared to discharge at a later time (C), increase the risk of maternal or neonatal readmissions for morbidity and stopping breastfeeding at six weeks or six months after birth (O)?

Summary of evidence

In total, 924 studies with the potential to be included were reviewed. Studies that had a robust design (RCTs, but also quasi-randomized and cohort studies) and included healthy women who had uncomplicated vaginal deliveries in health facilities and gave birth to healthy neonates who were not of very low birth weight were eligible if they compared outcomes by time of mothers' discharge from health facilities (within 24 or 48 hours of birth versus later). Thirteen studies – seven RCTs *(1–7)*, three prospective cohort *(8–10)* and three historical cohort studies *(11–13)* – met these criteria and were included in the final analysis. These studies were all conducted in developed country settings except for one study from Mexico.

For all but one of the seven RCTs, early discharge was accompanied by follow-up contacts through home visits by nurses or midwives, alone or in combination with phone contacts. These contacts were made within the first two weeks after birth for providing domiciliary midwifery care. In the cohort studies, the timing of discharge after birth was determined by third parties external to the health facility, such as the mother's insurance package.

Outcomes by discharge within 24 hours after birth versus later

One RCT (3) and three cohort studies *(8,10,12)* which compared discharge within 24 hours of birth with that at a later time were identified.

Neonatal readmissions: The results of one RCT showed that the risk of neonatal readmission when the mother and baby were discharged from the health facility within 24 hours after birth was not significantly different than when the discharge occurred at a later time (RR=0.61, 95% CI 0.15 to 2.53) *(3)*. However, when results of two cohort studies were pooled (8,12), there was a significant increase in the risk of neonatal readmissions if discharge occurred within 24 hours of birth (RR=1.20, 95% CI 1.11 to 1.30).

Neonatal jaundice, dehydration and signs of congenital gastrointestinal and cardiac defects were the most common reasons for the excess neonatal readmissions. The overall quality of evidence was graded as *low*.

Maternal readmissions: There was no evidence of association between the time of discharge and maternal readmission for morbidity. The only RCT that evaluated this outcome showed no difference in risk of maternal readmission among women discharged within 24 hours or at a later time (RR=0.82, 95% CI 0.22 to 2.99) *(3)*. Pooled analysis of the two cohort studies also showed no effect on the risk of maternal readmission (RR=1.38, 95% CI 0.06 to 32.6). The overall quality of evidence was graded as *low*.

Breastfeeding practices at six weeks after birth: A single RCT showed no evidence of association between discharge within 24 hours after birth versus later and women not breastfeeding at six weeks after birth (RR=0.67, 95% CI 0.41 to 1.09) *(3)*. The overall quality of evidence was graded as *very low*.

Breastfeeding practices at six months after birth: Discharging mothers within 24 hours after birth versus later showed borderline evidence of a 26% increase in the risk of women not breastfeeding at six months (RR=1.26, 95% CI 1.00 to 1.60) *(3)*. The overall quality of evidence was *very low*.

Outcomes by discharge within 48 hours after birth versus later

Seven RCTs *(1–7)* that compared discharge within 48 hours of birth with that at a later time were identified. Therefore, the pooled results of the RCTs were used to draw conclusions. A sensitivity analysis pooling results of RCTs and three cohort studies was additionally conducted *(9,11,13)*.

Neonatal readmissions: The pooled estimate from four RCTs *(1–4)* showed that there was no evidence of association between discharging mothers within 48 hours after birth versus later and neonatal readmissions (RR=0.91, 95% CI 0.49 to 1.71). Pooled analysis of the three cohort studies *(9,11,13)* also showed no evidence of difference in risk of neonatal readmissions (RR=1.08, 95% CI 0.73 to 1.59). The overall quality of evidence was graded as *very low*.

Maternal readmissions: Pooled results from four RCTs *(1–3,5)* showed no evidence of association between discharging mothers within 48 hours after birth versus later and maternal readmissions (RR=1.09, 95% CI 0.46 to 2.56). The only observational study *(9)* also did not show any effect on the risk of maternal readmissions (RR=0.58, 95% CI 0.23 to 1.47). The overall quality of evidence was graded as *very low*.

Breast feeding practices at six weeks postpartum: There was evidence of a significant benefit of discharging mothers and newborns within 48 hours after birth versus a later time of discharge on continued breastfeeding at six weeks after birth. Pooled results from the six RCTs (1–5,7) showed a significant 13% reduction in the risk of women not breastfeeding

at six weeks after birth if the mother was discharged within 48 hours after birth versus later (RR=0.87, 95% CI 0.76 to 0.99). However, the only observational study (9) showed no effect of time of discharge on stopping breastfeeding at six weeks of age (1.04, pooled RR=0.94, 95% CI 0.92 to 1.18). The overall quality of evidence was graded as *very low*.

Breastfeeding practices at six months postpartum: Pooled results from three RCTs *(1,3,6)* showed a borderline increase in the risk of stopping breastfeeding by 6 months of age in the group of mothers and newborns discharged within 48 hours of birth (RR=1.06, 95% CI 0.95 to 1.18). There was significant heterogeneity between the studies (I^2=81.1%). The overall quality of evidence was graded as *very low*.

In conclusion, this systematic review showed very low to low quality evidence of increased risk of neonatal readmission and possibly of mothers stopping breastfeeding by six months in the group of mothers and newborns discharged within 24 hours of birth. There was no evidence of association between the risk of maternal readmission or stopping breastfeeding at six weeks and discharge within 24 hours of birth.

More evidence was available for examining the effects of discharge within 48 hours of birth. There is very low quality evidence that discharge within 48 hours does not increase the risk of maternal or neonatal readmission. The effect of time of discharge on breastfeeding was less clear. While there was evidence of benefit in terms of reduced risk of mothers stopping breastfeeding at six weeks, there was a suggestion of increased risk of stopping breastfeeding at six months if mothers and newborns were discharged within 48 hours of birth, compared to a later time of discharge.

Considerations for development of recommendation

Balance of benefits and harms: The possible risks associated with discharge within 24 hours of birth include neonatal readmission for morbidity and mothers stopping breastfeeding earlier than recommended. There seems to be no undue risk of adverse outcomes with discharge between 24 and 48 hours after birth. However, this evidence comes from research studies in which discharge at 24–48 hours was combined with home visits for continued postnatal care.

Values and preferences: The current practices of health facilities vary considerably. While many health facilities discharge women and newborns after normal vaginal delivery within a few hours, others insist on a hospital stay of 48 hours or longer. Policy-makers, health professionals and women and their families are likely to prefer discharge 24 hours after birth, rather than a later time of discharge.

Costs: In settings where discharge currently takes place within a few hours after birth, a mandatory stay in hospital for about 24 hours after birth is likely to increase costs for public health programmes and for families. On the other hand, costs would be reduced in settings where discharge currently takes place 48 hours or later after birth.

Timing and number of postnatal contacts

RECOMMENDATION 2

If birth is in a health facility, mothers and newborns should receive postnatal care in the facility for at least 24 hours after birth.

If birth is at home, the first postnatal contact should be as early as possible within 24 hours of birth.

At least three additional postnatal contacts are recommended for all mothers and newborns, on day 3 (48–72 hours) and between days 7–14 after birth, and six weeks after birth.

— *Strong recommendation, based on moderate quality evidence for newborn outcomes and low quality evidence for maternal outcomes*

Remarks:

- *Content of postnatal care to be received in first 24 hours, during days 3–14 and six weeks is defined later in these guidelines.*
- *The location of contact, i.e. home or health facility, is flexible. Postnatal care contacts may be complemented by additional mobile phone-based contacts between the health system and mothers.*
- *If possible, an extra contact for home births at 24–48 hours is desirable.*
- *If there are issues or concerns about the mother or baby, additional contacts may be required.*

Review question

In neonates born in low- and middle-income settings (P), what is the optimal number and timing of postnatal contacts (I) to improve neonatal survival and health (O)?

Summary of evidence

A systematic search for studies comparing number and timing of postnatal contacts did not yield any relevant studies. One systematic review evaluating the effect of home visits for postnatal care demonstrated high quality evidence of effectiveness of home visits in improving newborn survival *(14)*. However, limited information was available on the optimal number and timing of postnatal contacts from the studies included in this review. Therefore, other avenues were explored to provide the GDG information on which it could base its recommendations.

Since epidemiological considerations, such as distribution of neonatal mortality and morbidities, could provide indirect information on the number and timing of postnatal contacts, a systematic review was conducted to synthesize the evidence on the distribution of overall and cause-specific neonatal deaths, onset and peak of key neonatal morbidities, and timing of delivery of interventions that have been shown to be effective in reducing neonatal mortality (such as promotion of EBF, keeping the newborn warm, etc.).

Distribution of overall and cause-specific neonatal mortality

Nine studies from LMIC settings that reported day-specific mortality during the neonatal period were identified *(15–23)*. Most of the studies were retrospective; almost all of them used verbal autopsy to determine the cause of death.

Pooled analysis indicates that three fourths of the total deaths during the neonatal period occur in the first week of life (74.3%). During the first week, the first three days of life account for the highest number of deaths (37.6%, 8.4% and 10.7% of total neonatal deaths occur on days 0, 1 and 2 respectively).

A total of six studies provided the distribution of cause-specific mortality in the neonatal period *(16,19–21,24–25)*. Almost all deaths (98.2%) due to asphyxia occur in the first week of life. The first day (day 0) alone contributes to about three fourths of the total asphyxia deaths.

Less than half of the total deaths secondary to sepsis occur in the first week of life. About 30% of these deaths occur in the second week of life while around one fourth occur in weeks three to four.

More than four fifths of deaths due to prematurity (83.2%) occur in the first week of life. The first day (day 0) contributes to around 40% of these deaths. About 8–10% of the deaths occur in week 2 and the same amount in weeks 3–4 of life. Distribution of deaths due to malformations almost mimics that of prematurity deaths – about four fifths of these deaths (78.4%) occur in the first week of life with the first day (day 0) contributing to about 40% of deaths.

Distribution of common neonatal morbidities

Ten studies reported the age of onset of sepsis and/or jaundice in neonates *(26–36)*. No studies were identified that specifically reported the age of onset of two other key morbidities, namely hypothermia and feeding problems.

Sepsis: Data from four studies were used to obtain the approximate age of onset of neonatal sepsis *(26–29)*. The onset is in the first week of life in about 60% of neonates. Within the first week, a majority of the episodes occurs in the first 72 hours of life. About 18% of infants develop sepsis in each of the second and third weeks of life.

Jaundice: Only one study reported the age of onset of jaundice in neonates. About two thirds of infants develop jaundice on days 4 to 5 of life.

Time of delivery of effective interventions

Interventions to promote EBF: Two systematic reviews evaluated the effect of breastfeeding counselling by health workers or by peer groups in the neonatal period on EBF rates and/or morbidities in infancy *(37–38)*. Of the different studies included in these two reviews, 16 reported significant benefits in EBF rates at 1, 3 or 6 months of age and/or the incidence of diarrhoea in infancy *(39–54)*. The number of contacts in these studies varied from one to nine. Almost all these studies had at least one contact in the first week after birth. Many of them had visits in the second week as well.

Keeping infants warm: No randomized or quasi-randomized trials that evaluated the impact of keeping infants warm after discharge (hospital births) or after 24 hours (home births) were identified.

Hygienic skin care: No eligible studies were identified.

Hygienic cord care: Three eligible RCTs that enrolled over 50 000 babies were identified *(55–57)*. They were conducted in community settings in South Asia with high rates of home deliveries and high neonatal mortality. All three studies compared single or multiple application of chlorhexidine with standard dry cord care practices and reported significant reductions in neonatal mortality and omphalitis. The number of postnatal contacts in these studies varied from one to seven. Two of the three studies had visits in the first week only *(55–56)*.

Considerations for development of recommendations

The GDG formulated its recommendations considering the following findings of the evidence review:

- No RCTs have directly compared the effect of different numbers and timing of postnatal contacts.
- About 40% of neonatal deaths occur in the first 24 hours of life. This period accounts for a little less than three quarters of asphyxia-related and over 40% of prematurity-related deaths.
- About 40% each of prematurity-related and sepsis-related deaths and one quarter of asphyxia-related deaths occur in the 1–7 day period.
- About 30% of sepsis-related deaths occur in the second week of life, and one quarter occur in the last two weeks of the neonatal period.
- Almost all the studies that demonstrated beneficial effects of different interventions to promote breastfeeding had at least one contact in the first week of life; many of them had visits in the second week as well. The number of contacts varied from one to seven in these studies.
- Two of the three studies that showed beneficial effects of cord chlorhexidine application had seven contacts in the first 14 days of life.

Home visits in the first week of life

RECOMMENDATION 3

Home visits in the first week after birth are recommended for care of the mother and newborn.

— *Strong recommendation, based on moderate quality evidence for newborn outcomes and low quality evidence for maternal outcomes*

Remarks:

- *Postnatal visits are usually linked with home visits during pregnancy, particularly in high mortality settings.*
- *Home visits during pregnancy do not replace antenatal care; they promote utilization of it.*
- *Depending on the existing health system in different settings, these home visits can be made by midwives, other skilled providers or well-trained and supervised CHWs.*
- *Postnatal contacts also occur at clinic visits.*

Review question

In low and middle-income settings (P), do home visits by CHWs (I) compared to routine care (C) prevent neonatal and perinatal mortality (O)?

Summary of evidence

A systematic review was commissioned to evaluate the effects of home-based neonatal care provided by CHWs on neonatal mortality and/or perinatal mortality in resource-limited settings *(14)*. The review identified five CRCTs, all from South Asia (Bangladesh, India and Pakistan), involving 101 655 participants *(58–62)*. In addition, three non-randomized trials were included for a post-hoc sensitivity analysis of the impact on neonatal mortality *(63–*

65). Two studies in Africa (Ghana and the United Republic of Tanzania) are currently evaluating the effect of home visits for newborn care on newborn mortality.

The intervention in all five CRCTs included at least two home visits by female CHWs in the first week after birth (on day 1 and day 3). At these home visits, CHWs promoted optimal newborn care practices such as early initiation of EBF, keeping the baby warm, hygienic care and care seeking for illness. All trials implemented some community mobilization activities to improve uptake of the interventions. However, there were some differences as well. All trials except the one in Uttar Pradesh, India *(59)* had at least one additional home visit at the end of the first week. All trials except the one in Haryana, India *(62)* included home visits during pregnancy for a variety of activities including counselling, identification of maternal danger signs and referral and birth preparedness. In four of the trials – not the one in Uttar Pradesh, India *(59)* – CHWs were trained to identify sick newborns by directly assessing for danger signs at home visits. The CHWs referred a newborn with danger signs to a health facility; additionally CHWs in the Bangladesh trial *(58)* were trained to treat with injectable intramuscular antibiotics when referral was not possible.

Impact on neonatal mortality: All five CRCTs evaluated the impact of the CHW home visits on neonatal mortality *(58–62)*. The quality of the evidence was graded as *high*. There was significant evidence that the intervention led to 18% reduction in all-cause neonatal mortality (RR=0.82, 95% CI 0.76 to 0.89). Pooled analysis of the three non-randomized trials also showed a significant effect on neonatal mortality (RR=0.65, 95% CI 0.56 to 0.76). The effect size was higher in settings with a very high baseline neonatal mortality rate (NMR) (>50 per 1000 live births).

Impact on perinatal mortality: Evidence of the impact of home visits on perinatal mortality was available from three CRCTs involving a total of 87 788 participants *(59,61–62)*. The quality of the evidence was graded as high. The pooled results showed a significant 18% reduction in perinatal mortality because of CHW home visits (RR 0.82, 95% CI 0.76 to 0.89).

In conclusion, the evidence from South Asian resource-limited settings suggests that home visits by CHWs during the first week of life, combined with other interventions, are effective in reducing neonatal and perinatal mortality.

Considerations for development of recommendations

Balance of benefits and harms: A significant benefit was observed in NMR following home visits for newborn care during the first week of life, accompanied by home visits during pregnancy and community mobilization activities. There was also a significant reduction in the perinatal mortality rate (PMR). However, all studies were conducted in South Asia, and results from two African studies are not yet available. No data are available on any potential harms related to home visits.

Values and preferences: Health providers, policy-makers and families in LMIC settings are likely to give a high value to the benefit observed in the NMR following home visits during the postnatal period. They are also likely to value the intervention given that many developed countries have a policy of early hospital discharge (~24 hours after birth) followed by home visits by midwives for postnatal care in the first days after birth.

Costs: Home visits will have substantial health system costs. Given the shortage of health professionals in many LMICs, it may not be feasible to have midwives making home visits. Home visits by CHWs in such settings would be more feasible but require careful programme planning and adequate resource allocation.

CONTENT OF POSTNATAL CARE FOR THE NEWBORN

Assessment of the newborn

RECOMMENDATION 4

The following signs should be assessed during each postnatal care contact, and the newborn should be referred for further evaluation if any of the signs is present:

- ***Stopped feeding well***
- ***History of convulsions***
- ***Fast breathing (breathing rate >60 per minute)***
- ***Severe chest in-drawing***
- ***No spontaneous movement***
- ***Fever (temperature >37.5 °C)***
- ***Low body temperature (temperature <35.5 °C)***
- ***Any jaundice in first 24 hours of life, or yellow palms and soles at any age.***

The family should be encouraged to seek health care early if they identify any of the above danger signs in-between postnatal care visits.

— *Strong recommendation, based on low quality evidence*

Review question

Among newborns in resource-poor settings (P), how well do algorithms based on simple clinical signs for use by first level health workers or community level workers during postnatal visits (I) compared with clinicians' judgement (C) identify severe illnesses requiring referral to health facilities (O)?

Summary of evidence

Two community-based studies (Society for Education Action and Research in Community Health – SEARCH, and Project to Advance the Health of Newborns and Mothers – PROJAHNMO 2) *(66,67)* evaluated algorithms used by CHWs in routine home visit interventions. The gold standard in the SEARCH study (in Gadchiroli, India) was physician-coded sepsis deaths. The PROJAHNMO-2 study (in Mirzapur, India) used physician-confirmed need for hospitalization as the gold standard.

Two clinic-based multi-centre studies, the Young Infant Studies (YIS) 1 and 2 were carried out to identify signs that indicated severe disease among infants who were brought to a health provider for perceived illness by their caretakers *(68)*. These studies had laboratory and radiological support to the paediatrician diagnoses of severe disease requiring hospitalization. Being clinic based, their findings may not be directly generalizable for application in routine postnatal visits by CHWs or first level health workers. The YIS-1 algorithm has not been tested in any community-based dataset and was therefore not included in further analysis. In addition to being evaluated in the study database in which the algorithms were developed, the YIS-2 algorithm was evaluated in the PROJAHNMO-2 dataset. Similarly, the SEARCH algorithm was additionally evaluated in the YIS-2 and PROJAHNMO-2 data sets.

All four included studies that commenced with between 20 to 31 dangers signs and reduced the number of signs in the final algorithm during the validity analysis. The sample sizes for community-based studies were relatively small, and the primary outcomes were

rare, resulting in low statistical power for sensitivity estimation. The reported validities of the final algorithms from these studies within their own datasets are shown in **Table 3**.

Table 3. Sensitivity and specificity of four study algorithms

STUDY	ALGORITHM	GOLD STANDARD	SENSITIVITY	SPECIFICITY
YIS-1	Any 1 of 14 signs	Paediatrician's judgement	92%	30%
YIS-2 *(68)*	Any 1 of 7 signs	Paediatrician's judgement	85%	75%
SEARCH *(66)*	Any 2 of 7 signs	Sepsis deaths	100%	92%
PROJAHNMO-2 *(67)*	Any 1 of 11 signs	Paediatrician's judgement	50%	98%

A comparison of the validity of SEARCH, YIS-2 and PROJAHNMO studies to identify very severe disease and death was conducted using the Mirzapur trial database. The results of this comparison are shown in **Table 4**. About 2%, 7% and 6% of newborns respectively were found to have severe illness according to the algorithm.

Table 4. Comparison of validity of three study algorithms

ALGORITHM	SEVERE ILLNESS		DEATH	
	Sensitivity	Specificity	Sensitivity	Specificity
YIS-2 *(68)*	63% (35% to 85%)	96% (93% to 97%)	57% (44% to 68%)	93% (92% to 94%)
SEARCH *(66)*	6% (0% to 30%)	98% (96% to 99%)	3% (0% to 10%)	99.7% (99.5% to 99.8%)
PROJAHNMO-2 *(67)*	50% (25% to 75%)	98% (97% to 99%)	58% (46% to 70%)	93% (92% to 94%)

Although this evaluation also lacked statistical power because the outcome was rare, the YIS-2 and Mirzapur studies had higher sensitivities for detecting both severe illness and death, compared to the SEARCH algorithm. Specificities of all algorithms were very high. When the YIS-2 algorithm was modified to drop fast breathing, add jaundice and change temperature cut-offs (>38 °C and <36.5 °C), its sensitivity increased to 81% with no loss of specificity.

In conclusion, limited available evidence suggests that the YIS-2 algorithm works well in detecting severe illness during postnatal contacts. The validity of the YIS-2 algorithm may further improve with minor modifications suggested by the PROJAHNMO-2 study authors.

Considerations in development of recommendations

Balance of benefits and harms: The combination of danger signs that should be assessed during postnatal contacts should have a high sensitivity so that it can capture most neonates with severe illness. On the other hand, a high specificity is important to avoid unnecessary referrals causing overloading of the health facilities. The YIS-2 set of signs (particularly if modified) offers the best combination of sensitivity and specificity for use during postnatal care contacts among the available algorithms.

Values and preferences, and costs: Not relevant for this recommendation.

Exclusive breastfeeding

RECOMMENDATION 5

All babies should be exclusively breastfed from birth until 6 months of age. Mothers should be counselled and provided support for EBF at each postnatal contact.

— *Strong recommendation, based on moderate quality evidence*

Remarks:

- *This recommendation is applicable in all settings.*
- *EBF should be promoted during all antenatal and postnatal care contacts.*
- *Particular support for EBF should be provided when the mother has had a caesarian section or the baby is born preterm.*
- *WHO low-birth-weight feeding guidelines for LMIC (available at* **http://www.who.int/maternal_child_adolescent/documents/infant_feeding_low_bw/en/)**[1] *recommend exclusive breast-milk feeding for all preterm and low-birth-weight infants.*
- *The GDG reviewed evidence for neonatal outcomes; the six-month duration is based on existing WHO recommendations and an updated Cochrane review.*

Review question

In neonates (P), what is the effect of EBF (I) compared with predominant or partial breastfeeding in the first month of life (C) on neonatal mortality and morbidity (O)?

Summary of evidence

All of the evidence summarized below examining the effect of EBF in the first month of life on mortality or morbidity is based on observational studies.

Two studies, conducted in LMICs, evaluated the effect of EBF in the first month of life on the risk for neonatal mortality *(69, 70)*. The quality of evidence was graded as *moderate*. Mortality rates were significantly lower among exclusively breastfed neonates compared with those who were partially breastfed (pooled OR 0.27, 95% CI 0.15 to 0.49). There was no significant difference in effect of exclusive versus predominant breastfeeding on neonatal mortality (pooled OR 0.73, 95% CI 0.51 to 1.04).

Three studies from LMIC settings examined the effect of exclusive compared with partial breastfeeding on infection-related neonatal mortality *(69, 71, 72)*. The quality of evidence was graded as *moderate*. Exclusively breastfed neonates had significantly lower risk of infection-related mortality than did partially breastfed neonates (pooled OR 0.26, 95% CI 0.15 to 0.46).

Two studies conducted in LMIC settings evaluated the effect of EBF compared with partial breastfeeding on morbidity due to sepsis or other infections *(72, 73)*. The quality of evidence was graded as *low*. Exclusively breastfed neonates had significantly lower risk of sepsis or other infections compared with those who were partially breastfed (pooled RR 0.29, 95% CI 0.2 to 0.41).

Four studies, two of which were conducted in LMIC settings, examined the effect of exclusive versus partial breastfeeding on the risk of respiratory infections *(73–76)*. The quality of evidence was graded as *low*. Exclusively breastfed neonates had significantly lower risk of having an acute respiratory infection (ARI) (pooled RR 0.59, 95% CI 0.38 to 0.92 – random effects model: I^2=86%).

[1] Approved by WHO GRC.

Three studies, all from LMICs, evaluated the effect of exclusive versus partial breastfeeding on diarrhoea morbidity *(72, 73, 76)*. The quality of evidence was graded as *low*. Exclusively breastfed neonates had significantly lower risk of diarrhoea (pooled OR 0.34, 95% CI 0.16 to 0.72 – random effects model: I^2=88%).

In conclusion, there exists moderate quality evidence that exclusively breastfed neonates are at lower risk of all-cause mortality and infection-related mortality in the first month of life compared with partially breastfed neonates. Also, there is low quality evidence that exclusively breastfed neonates are at lower risk of sepsis, ARI and diarrhoea morbidity in the first month of life compared with partially breastfed neonates. The evidence available is too limited for the comparison of exclusive versus predominant breastfeeding in relation to morbidity and mortality in the first month of life.

Considerations for development of recommendations

Balance of benefits and harms: The evidence summarized above for all neonates indicates that there are significant benefits of exclusive compared to partial breastfeeding in reducing the risks of all-cause mortality and morbidity resulting from sepsis and other infections, ARI and diarrhoea in the first month of life. The evidence was insufficient to assess the relative benefits of exclusive versus predominant breastfeeding on neonatal mortality or morbidity.

Values and preferences: Given the high NMRs observed in LMICs, policy-makers and health care providers are likely to value the benefits of EBF on reducing the risk of neonatal mortality and morbidity.

Costs: EBF can be promoted at a low cost, which is outweighed by the benefits of this behaviour.

Cord care

RECOMMENDATION 6

Daily chlorhexidine (7.1% chlorhexidine digluconate aqueous solution or gel, delivering 4% chlorhexidine) application to the umbilical cord stump during the first week of life is recommended for newborns who are born at home in settings with high neonatal mortality (30 or more neonatal deaths per 1000 live births).

Clean, dry cord care is recommended for newborns born in health facilities, and at home in low neonatal mortality settings. Use of chlorhexidine in these situations may be considered only to replace application of a harmful traditional substance, such as cow dung, to the cord stump.

— *Strong recommendation, based on low to moderate quality evidence*

Review question

In all or a sub-population of newborns (P), does routine application of chlorhexidine to the umbilical cord stump (I) compared with dry cord care or usual cord practices (C) reduce the neonatal mortality rates and/or the incidence of systemic sepsis and omphalitis in the neonatal period (O)?

Summary of evidence

A systematic review was conducted to evaluate the effect of topical application of chlorhexidine to the umbilical cord as the Cochrane review on topical umbilical cord care was last updated in 2004 *(77)*. A total of five trials, involving about 56 600 neonates,

examined the effect of single or multiple chlorhexidine applications and reported the critical outcomes – NMR, omphalitis and time to cord separation *(55–57, 78, 79)*. None reported the incidence of neonatal sepsis.

Impact on neonatal mortality: Information on NMR among all live births was available for the three CRCTs *(55–57)*. All three studies were conducted in South Asian settings with predominantly home births and very high neonatal mortality. The quality of the evidence was graded as *low*. Pooled analysis showed an 11% reduction in the NMR (RR 0.86, 95% CI 0.77 to 0.95).

Impact on omphalitis: Four studies reported the incidence of omphalitis, defined as redness extending to the skin with or without pus, following chlorhexidine application to the cord *(55–57, 78)*. The quality of the evidence was graded as moderate. The pooled effect was a 30% reduction (95% CI 20% to 38%) in the rate of omphalitis.

Impact on time to cord separation: Two studies reported the time to cord separation following chlorhexidine application to the cord *(55, 57)*. The quality of the evidence was graded as *moderate*. The pooled effect was 1.3 days (95% CI 1.2 to 1.4) longer in the intervention group. Two other studies also reported the time to cord separation, but they could not be included in the meta-analysis because of incomplete data *(56, 78)*. The fifth study found a significantly higher risk of cord separation beyond 10 days of age in the chlorhexidine application group (RR 3.92, 95% CI 2.37 to 6.46) *(79)*.

Considerations for development of recommendations

Balance of benefits and harms: A significant but moderate-sized benefit was observed in the NMR following chlorhexidine application to the umbilical cord. There was also a significant reduction in the incidence of omphalitis. However, all the studies that showed the beneficial effects enrolled predominantly home births (>90%) from high mortality settings in South Asia. The findings are thus difficult to generalize to settings where the majority of births take place in health facilities and where NMRs are lower. Studies are ongoing to determine the effect of the intervention in African settings. The only concern observed with cord chlorhexidine application was the prolonged time to separation of the cord. No data are available on any other potential short- or long-term adverse effects.

Values and preferences: Health providers and policy-makers from LMIC settings with high NMR are likely to give a high value to the benefit observed in NMR following chlorhexidine application to the cord. Interference with other essential newborn care practices, such as skin-to-skin care and early initiation of breastfeeding, may be a concern if chlorhexidine application is done in the first hour after birth.

Costs: Chlorhexidine solution is not expensive; it can be made available in even resource-restricted settings.

Other postnatal care of the newborn

RECOMMENDATION 7

Bathing should be delayed until after 24 hours of birth. If this is not possible due to cultural reasons, bathing should be delayed for at least six hours.

Appropriate clothing of the baby for ambient temperature is recommended. This means one to two layers of clothes more than adults and use of hats/caps.

The mother and baby should not be separated and should stay in the same room 24 hours a day.

Communication and play with the newborn should be encouraged.

Immunization should be promoted as per existing WHO guidelines (http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/924159084X/en/index.html).

Preterm and low-birth-weight babies should be identified immediately after birth and should be provided special care as per existing WHO guidelines.

The above recommendations are based on existing WHO guidelines (**http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/924159084X/en/index.html**), for which the GDG did not feel the necessity of a new evidence review.

CONTENT OF POSTNATAL CARE FOR THE MOTHER

Assessment of the mother

RECOMMENDATION 8

First 24 hours after birth:

All postpartum women should have regular assessment of vaginal bleeding, uterine contraction, fundal height, temperature and heart rate (pulse) routinely during the first 24 hours starting from the first hour after birth.

Blood pressure should be measured shortly after birth. If normal, the second blood pressure measurement should be taken within six hours.

Urine void should be documented within six hours.

Beyond 24 hours after birth:

At each subsequent postnatal contact, enquiries should continue to be made about general well-being and assessments made regarding the following: micturition and urinary incontinence, bowel function, healing of any perineal wound, headache, fatigue, back pain, perineal pain and perineal hygiene, breast pain and uterine tenderness and lochia.

Breastfeeding progress should be assessed at each postnatal contact.

At each postnatal contact, women should be asked about their emotional well-being, what family and social support they have, and their usual coping strategies for dealing with day-to-day matters. All women and their families/partners should be encouraged to tell their health care professional about any changes in mood, emotional state or behaviour that are outside of the woman's normal pattern.

At 10–14 days after birth, all women should be asked about resolution of mild, transitory postpartum depression ("maternal blues"). If symptoms have not resolved, the woman's psychological well-being should continue to be assessed for postnatal depression, and if symptoms persist, evaluated.

Women should be observed for any risks, signs and symptoms of domestic abuse. Women should be told who to contact for advice and management.

All women should be asked about resumption of sexual intercourse and possible dyspareunia as part of an assessment of overall well-being two to six weeks after birth.

If there are any issues of concern at any postnatal contact, the woman should be managed and/or referred according to other specific WHO guidelines:

http://www.who.int/maternal_child_adolescent/documents/924159084x/en/index.html

http://www.who.int/maternal_child_adolescent/documents/9241545879/en/index.html

http://www.who.int/maternal_child_adolescent/documents/postpartum_haemorrge/en/index.html[1]

http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/9789241548335/en/index.html[2]

— *GDG consensus, based on existing WHO guidelines*

Review question

In all low-risk women after vaginal delivery (P), what are the assessments (I) to reduce maternal mortality and morbidity (O)?

Summary of evidence

A systematic review of evidence was commissioned to address this question. The review was undertaken using standard Cochrane techniques *(80)* for evidence on preventive interventions in the postnatal period, specifically in relation to puerperal sepsis, secondary PPH, hypertension, anaemia, postnatal depression and obstetric fistula. No studies were identified that addressed assessment of low-risk women after vaginal delivery to reduce maternal mortality and morbidity.

Considerations in development of recommendations

The panel noted the current lack of evidence relating to assessment of low-risk women after vaginal delivery, and reviewed existing WHO recommendations and the recommendations of the United Kingdom National Institute of Clinical Excellence on postnatal care *(81)*. Existing recommendations include periodic clinical assessment of the postpartum mother for major life-threatening complications and other morbidities, provision of information on physiological processes in the puerperium, and advice on danger signs in the postnatal period.

Balance of benefits and harms: While these interventions may have potential benefit in reducing maternal mortality and morbidity, there is no evidence of potential harms arising from these interventions. The panel recommended that the existing WHO recommendations remain valid.

Values and preferences: The lack of evidence for assessments and interventions in the postnatal period highlights the need for urgent high quality research into this area. However, even in the current situation, clear recommendations for routine postnatal care of the mother are needed for setting standards for quality of postnatal care.

Costs: Postnatal assessments require health workers who are adequately trained and equipped.

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[1] Approved by WHO GRC.

[2] Approved by WHO GRC.

Counselling

RECOMMENDATION 9

All women should be given information about the physiological process of recovery after birth, and told that some health problems are common, with advice to report any health concerns to a health care professional, in particular:

- ***Signs and symptoms of PPH: sudden and profuse blood loss or persistent increased blood loss; faintness; dizziness; palpitations/tachycardia***
- ***Signs and symptoms of pre-eclampsia/eclampsia: headaches accompanied by one or more of the symptoms of visual disturbances, nausea, vomiting, epigastric or hypochondrial pain, feeling faint, convulsions (in the first few days after birth)***
- ***Signs and symptoms of infection: fever; shivering; abdominal pain and/or offensive vaginal loss***
- ***Signs and symptoms of thromboembolism: unilateral calf pain; redness or swelling of calves; shortness of breath or chest pain.***

Women should be counselled on nutrition.

Women should be counselled on hygiene, especially handwashing.

Women should be counselled on birth spacing and family planning. Contraceptive options should be discussed, and contraceptive methods should be provided if requested.

Women should be counselled on safer sex including use of condoms.

In malaria-endemic areas, mothers and babies should sleep under insecticide-impregnated bed nets.

All women should be encouraged to mobilize as soon as appropriate following the birth. They should be encouraged to take gentle exercise and time to rest during the postnatal period.

— *GDG consensus, based on existing WHO guidelines*

The above recommendations are based on existing WHO guidelines (**http://www.who.int/maternal_child_adolescent/documents/924159084x/en/index.html**), for which the GDG did not feel the necessity of new evidence reviews.

Iron and folic acid supplementation

RECOMMENDATION 10

Iron and folic acid supplementation should be provided for at least three months after delivery.

— *GDG consensus, based on existing WHO guidelines* (**http://www.who.int/maternal_child_adolescent/documents/924159084x/en/index.html**)

Review question

In all low-risk, non-anaemic women after vaginal delivery (P), does use of dietary supplements (I) compared with usual care (C) reduce the occurrence of postpartum anaemia (O)?

Summary of evidence

The systematic review on preventive interventions for the mother in the postnatal period identified six RCTs addressing prevention of anaemia in the postnatal period *(82–87)*. These studies were carried out in Brazil, Canada, Czech Republic, Gambia, Switzerland and the United States of America (USA), and included a total of 348 women. Four studies included lactating women after delivery of a full-term infant *(82–85)*, of which two studies included adolescent women only *(82, 83)*. In all six trials, women had haemoglobin (Hb) levels of at least 10.0 g/dl *(83–88)*. The sample size of the studies ranged from 36 to 90 participants.

Five of the trials compared a drug intervention with a placebo *(82–85, 87)*; in the remaining study the control group received no treatment *(86)*. Two trials compared folic acid – either 300 mg per day or 1 mg per day respectively *(83, 84)*. One trial compared dietary supplements, comprising 18 mg of iron (ferrous fumarate), 15 mg of zinc (zinc oxide), 2 mg of copper (cupric oxide) and 162 mg of calcium (calcium phosphate dibasic) and other minerals and vitamins *(82)*. Two trials investigated iron sulphate – Mara and colleagues *(86)* compared 256.3 mg iron sulphate orally with and without folic acid, and Krafft and colleagues *(87)* compared 80 mg of iron sulphate orally each day with a placebo. The other study compared 5 mg riboflavin daily with a placebo *(85)*.

Women receiving iron supplements had higher Hb levels around three months postpartum (mean difference – MD – 3.4 g/dl, 95% CI 1.51 to 5.29 (*82*); MD 0.50 g/dl, 95% CI 0.17 to 0.83(*87*)). Folic acid supplementation was associated with higher Hb levels at three (MD 4 g/dl, 95% CI 3.04 to 4.96) and six months postpartum (MD 6 g/dl, 95% CI 5.04 to 6.96 (*84*)).

Overall there was lack of evidence for any reliable conclusions to be drawn. From the four small trials where data were available, they are insufficient for any reliable conclusions to be drawn about the relative benefits and risks of prophylactic interventions.

Considerations in development of recommendations

The current WHO recommendations (**http://www.who.int/maternal_child_adolescent/documents/924159084x/en/index.html**) include provision of iron and folic acid for at least three months after birth. The panel noted that there is currently no evidence to change this recommendation, and that WHO is working on developing a specific guideline for maternal nutrition interventions after birth. The panel recommended continuing with the existing WHO recommendations for iron and folic acid supplementation after birth while awaiting the final recommendations arising from the consultations on maternal nutrition interventions.

Balance of benefits and harms: Anaemia is a common problem during and after pregnancy, especially in settings with high maternal mortality rates. The potential benefit of iron and folic acid supplementation in reducing the burden of ill health associated with anaemia in these settings is likely to outweigh the risk of major harmful side effects.

Values and preferences: Some women experience unpleasant side effects with oral iron supplements, but these are not life threatening. Policy-makers value the importance of prevention and treatment of anaemia in countries where nutritional deficiencies are common.

Costs: Nutritional supplements carry costs, albeit relatively small.

Prophylactic antibiotics

RECOMMENDATION 11

The use of antibiotics among women with a vaginal delivery and a third or fourth degree perineal tear is recommended for prevention of wound complications.

The GDG considers that there is insufficient evidence to recommend the routine use of antibiotics in all low-risk women with a vaginal delivery for prevention of endometritis.

— *Strong recommendation based on very low quality evidence*

Review questions

Among low-risk women following vaginal delivery (P), what are the preventive interventions (I) for reducing mortality and morbidity due to sepsis (O)?

Among low-risk women following vaginal delivery (P), does the use of antibiotics (I) compared with usual care (C) reduce the occurrence of endometritis (O)?

Among low-risk women who have sustained third or fourth degree perineal tear following vaginal delivery (P), does the use of antibiotics (I) compared with usual care (C) reduce the occurrence of perineal wound complications (O)?

Summary of evidence

The systematic review on preventive interventions for the mother in the postnatal period identified four randomized trials addressing prevention of sepsis in the postnatal period *(88–91)*. These studies, carried out in Denmark, France, the USA and Zambia, included 1961 women who had delivered vaginally. In three of the trials, women with a gestational age of at least 37 weeks were eligible for inclusion *(89–91)*; the remaining trial did not state gestation at trial entry *(88)*. Two trials included singleton pregnancies *(89–90)*; Fernandez and colleagues *(91)* included multiple pregnancies also, while this information was not provided by Duggal and colleagues *(88)*. The sample size of the studies ranged from 107 to 1291 participants.

Two of the studies in high-income countries compared antibiotics with either a placebo or no antibiotic *(88, 91)*. Duggal and colleagues in the USA compared a second-generation cephalosporin (single dose of cefotetan or cefoxitin, 1 g IV in 100 ml saline) with a placebo given before repair of the perineal tear with the primary aim of prevention of postpartum perineal wound complications in women who had sustained either a third or fourth degree tear after normal vaginal delivery *(88)*. Fernandez and colleagues in France compared a single dose of amoxicillin-clavulanate (1.2 g) given one hour after delivery versus no antibiotic as a prophylaxis against postpartum endometritis in women who had delivered vaginally and were free from infection *(91)*. A trial carried out in Zambia evaluated midwife home visits for normally-delivered mothers and healthy full-term newborns *(90)*. The focus of this study was to evaluate the effect of a midwife home visiting (intervention) programme at 3, 7, 28 and 42 days after birth on the prevalence of health problems and breastfeeding behaviour. During each home visit, which lasted about one hour, the mother was asked about her perception of her own and her baby's health, what health problems she had observed, and what actions she had taken in case of symptoms. She was also asked about her breastfeeding pattern and what kind of social support she had at home, if any. The mother and infant were examined by the midwife and further care, counselling, advice and medical treatment were provided. The fourth trial, performed in Denmark, compared a synthetic analogue of ergonovine (methylergomtrine 0.2 mg thrice daily for three days) with a placebo *(89)*. The primary aim of this study was to determine the efficacy

of 72-hour prophylactic oral methylergomtrine in reducing PPH and endometritis during the puerperium for women with a single pregnancy and no pregnancy complications.

None of the trials reported sepsis. Reporting of other related outcomes was not consistent across studies. None of the studies reported maternal deaths.

Two studies involving 1643 women reported the occurrence of fever *(90–91)*. There was no statistical difference in occurrence of fever (temperature >38 °C) between women who received amoxicillin-clavulanate and those who received placebo in one trial in France (1291 women; OR 0.74, 95% CI 0.33 to 1.66) *(91)*. Ransjo-Arvidson and colleagues, reporting on 352 women in Zambia, noted no statistical difference in the occurrence of fever (no definition) (OR 0.47, 95% CI 0.16 to 1.42) *(90)*.

Two studies involving 1502 women reported the occurrence of endometritis (pyrexia ≥38 °C confirmed on two separate occasions and accompanied by pain on mobilization of the uterus or fetid lochia, and/or a leukocytosis of more than 10 000/mm^3) *(89, 91)*. Fernandez and colleagues reported lower occurrence of endometritis among women receiving amoxicillin-clavulanate compared to those receiving no treatment (OR 0.27, 95% CI 0.09 to 0.83) *(91)*. Among women receiving methylergometrine, occurrence of endometritis was not significantly different from those receiving placebo (211 women; OR 1.96, 95% CI 0.18 to 21.97) *(89)*.

One trial reported no significant difference in the occurrence of urinary tract infection among those receiving amoxicillin-clavulanate compared to those receiving no treatment (OR 0.50, 95% CI 0.17 to 1.46) or in the occurrence of lymphangiitis (OR 6.75, 95% CI 0.81 to 56.27) *(91)*.

One trial in Zambia reported no statistical difference in the occurrence of offensive lochia (reported at 42 days after childbirth) among women who were in the postnatal midwife home visiting programme and those in the control group (OR 1.32, 95% CI 0.45 to 3.88) *(90)*.

One trial involving 107 women in the USA reported the occurrence of perineal wound complications at two weeks postpartum among women who had sustained third or fourth degree perineal tears after vaginal delivery *(88)*. When compared to those who had received placebo, women who received cefotetan or cefoxitin 1 g IV had fewer perineal wound complications at two weeks postpartum (OR 0.38, 95% CI 0.09 to 0.91).

Considerations in development of recommendations

From the four small trials evaluated on the prevention of infection, there are insufficient data for any reliable conclusions to be drawn about the relative benefits and risks of such prophylactic interventions, including the timing of the intervention. The maximum number of trials in any of the comparisons was two and none of the trials evaluated was multi-centred. For women experiencing a vaginal delivery, a single dose of postnatal amoxicillin-clavulanate (1.2 gm IV) given one hour after delivery may decrease endometritis, but more data are needed before this practice can be recommended. The panel therefore decided not to make any recommendation regarding routine antibiotic prophylaxis following uncomplicated vaginal delivery for the prevention of puerperal sepsis.

Based on accepted infection prevention principles and practices, the panel agreed that women should be counselled on hygiene in the postnatal period, especially hand hygiene. For women who had sustained third or fourth degree perineal tears, the panel noted benefit in giving prophylactic antibiotics for prevention of perineal wound complications and therefore recommended antibiotic use for this specific indication.

Balance of benefits and harms: Puerperal sepsis is an important cause of maternal mortality and morbidity. Ensuring basic hygienic practices is beneficial in prevention of sepsis and is not associated with harms. Use of medications, including antibiotics, by the mother in the postnatal period may carry risks for the baby. There are concerns with inappropriate use of antibiotics in the postnatal period. However, selective use of antibiotics in high-risk conditions for sepsis (e.g. third and fourth degree perineal lacerations) helps to reduce morbidity.

Values and preferences: Not applicable.

Costs: Simple infection prevention practices, such as handwashing, are less expensive than antibiotics for routine prevention and treatment of puerperal sepsis.

Psychosocial support

RECOMMENDATION 12

Psychosocial support by a trained person is recommended for the prevention of postpartum depression among women at high risk of developing this condition.

— *Weak recommendation based on very low quality evidence*

The GDG considers that there is insufficient evidence to recommend routine formal debriefing to all women to reduce the occurrence/risk of postpartum depression.

— *Weak recommendation based on low quality evidence*

The GDG also considers that there is insufficient evidence to recommend the routine distribution of, and discussion about, printed educational material for prevention of postpartum depression.

— *Weak recommendation based on very low quality evidence*

Health professionals should provide an opportunity for women to discuss their birth experience during their hospital stay.

— *GDG consensus based on existing WHO guidelines*

A woman who has lost her baby should receive additional supportive care.

— Weak recommendation based on very low quality evidence

Remarks

- *For further guidance, see the mhGAP intervention guide for mental, neurological and substance use disorders in non-specialized health settings available at:* **http://whqlibdoc.who.int/publications/2010/97892415480 69_eng.pdf**.[1]
- *Based on the studies supporting this recommendation the GDG considered the following conditions as risk factors for postpartum depression: previous postpartum depression, previous mental illness, vulnerable population, traumatic childbirth, infant born preterm, stillbirth or neonatal death, infant admitted to intensive care and history of being a neglected child.*

— *GDG consensus, based on existing guidelines* (**http://whqlibdoc.who.int/publications/2010/97892415480 69_eng.pdf**)[2]

[1] Approved by WHO GRC.
[2] Approved by WHO GRC.

Review question

Among low-risk women following vaginal delivery (P), what are the preventive interventions (I) for reducing postpartum depression (O)?

Summary of evidence

Thirty-one studies were included in the systematic review of interventions to prevent depression in the postnatal period. These were carried out in several middle- and high-income settings, and included 19 224 women. Three studies considered drug therapy: two the use of antidepressants *(92, 93)* and one the use of progestogen *(94)*. Eleven investigated professional support interventions *(95–105)*, while three used peer support interventions *(106–108)*. A further five papers considered debriefing interventions *(109–113)*. Seven studies considered educational interventions: two *(97, 114)* used only printed material while the others *(97, 114–118)* combined it with verbal discussion or follow-up. One study considered a combined educational and exercise-based intervention *(119)*, and one used a baby massage intervention *(120)*. These studies are heterogeneous in design.

All of the included studies reported the incidence of maternal depression at different time-points. Depression was measured using a variety of tools, with some studies using more than one. The majority of reports (n=22) used the Edinburgh Postnatal Depression Score (EPDS) to measure depression. Various levels were used to define depression; two studies used a score of >9, two studies used a score of >10, and five studies used a score of >11, with the majority (n=11) using a score of >12. Two studies used the Beck Depression Inventory (BDI), with one defining depression as a score of >15 *(100, 104)*. Another two studies used the Hospital Anxiety and Depression (HAD) Scale *(109, 111)*. Two studies used the General Health Questionnaire (GHQ) *(104,105)*. A number of measures were used by single studies, including the Quick Inventory of Depressive Symptoms (QIDS) score >10 *(118)*, Depression Anxiety and Stress Scale-21 (DASS) score >13 *(110)*, Profile of Mood States (POMS) *(120)*, Montgomery-Asberg Depression Rating Scale (MADRS) *(94)*, and Hamilton Rating Scale for Depression (HAM-IV) *(92, 93)*. One study used a composite measure of depression, including EPDS, BDI and GHQ *(104)*.

There was little conclusive evidence to support many of the preventive interventions in the postnatal period. No evidence of effect was reported for postnatal antidepressant or progestogen interventions. There is some evidence of effect for professional support interventions for women identified as at risk of depression in the postpartum period, particularly at six weeks, four months and six months. The timing of the interventions varied, with three of the four studies which demonstrated evidence of effect commencing the intervention in the immediate post-birth period. The remaining study commenced the intervention at eight weeks post birth, once women had been screened and identified as at risk. There is evidence that debriefing may reduce the incidence of depression at three weeks and three months postnatally, but the overall quality of the evidence is very low, both studies being unblinded and having small sample sizes. The interventions in both studies were timed to occur prior to hospital discharge, with one study providing a two-week follow-up. There was no evidence to suggest that the incidence of depression was lower at six or 12 months postpartum, and overall there was no evidence of effect. Similarly, peer support interventions indicated some evidence of effect at three months postpartum, but there was no evidence of effect at six months postpartum. The timing of the intervention in this single study was from two weeks postpartum until 12 weeks postpartum. Educational interventions also demonstrated effect at three months postpartum, but again there was no evidence of effect at six months or overall. The intervention in these studies occurred prior to discharge in two of the studies and at six weeks postpartum in one study.

Overall, the quality of evidence was assessed as either low or very low. The majority of the studies comprised small sample sizes, were unblinded due to the nature of the interventions and were conducted in developed countries.

Considerations in development of recommendations

There was insufficient evidence to recommend specific interventions for prevention of depression in low-risk women following vaginal delivery. The panel noted that women and their families should be informed of possible changes in mood in the days following birth, which are often transient and resolve by 10–14 days postpartum. If symptoms persist, these should be evaluated. The panel noted that WHO has published guidance on interventions for mental disorders in non-specialized health settings.

Values and preferences: There may be stigma associated with mental health problems. This may affect the decision to seek professional care.

Costs: Medications and professional psychological support have cost implications.

Research gaps

The GDG identified important knowledge gaps that need to be addressed through primary research. In these guidelines, recommendations based on evidence quality that was rated as 'very low' or 'low' require further research. Conversely, further research is not a priority for those recommendations based on evidence of 'moderate' or 'high' quality.

The identified knowledge gaps were prioritized by considering whether such research would be feasible, innovative, original, likely to promote equity and contribute to the improvement of maternal and perinatal health. The prioritized list includes:

1. Evaluate effectiveness of the recommended package of postnatal care (content, number and timing of contacts) in improving maternal and newborn outcomes.
2. Evaluate the effectiveness of different strategies to implement postnatal care recommendations.
3. Find the optimal timing of discharging mothers and babies from health facilities in LMICs.
4. Evaluate the role of a post-discharge checklist during postnatal care contacts.
5. Evaluate the effectiveness and cost-effectiveness of providing postnatal care at home versus at health facilities.
6. Evaluate different approaches to provide psychosocial support to women after birth.
7. Combine cause- and time-specific maternal and neonatal mortality and morbidity data to make suggestions on appropriate timing of visits.
8. Evaluate the role of mHealth in improving the coverage and quality of postnatal care.
9. Epidemiology of maternal depression, tools to identify depression's contribution to suicide, prevention strategies.
10. Evaluate a package of interventions to prevent sepsis in the mother and newborn.
11. Maternal recall of contact points for tracking timing of postnatal care, in home or facility births, and in caesarean section or normal vaginal deliveries.
12. Prevalence and adverse effects of routine antibiotics after vaginal birth.
13. Effect of increasing caesarean section rate on postnatal care.
14. Qualitative research on care of small babies.
15. Evaluate intervention strategies for prevention of hypothermia.
16. Develop algorithms to identify sick newborns during postnatal care contacts at different time points, which have higher sensitivity than the currently-recommended algorithm, without significant loss of specificity.
17. Evaluate newborn danger signs that are feasible for the mother /family to recognize.

Dissemination, implementation and monitoring of these guidelines

The ultimate goal of these guidelines is to improve the quality of postnatal care and health outcomes for mothers and newborns. Therefore the dissemination and implementation of these guidelines are crucial steps that should be undertaken by the international community and local health care services.

Guidelines dissemination

The recommendations in these guidelines will be disseminated through a broad network of international partners, including WHO country and regional offices, ministries of health, WHO collaborating centres, other United Nations agencies and non-governmental organizations. They will also be published on the WHO website. A policy brief will be developed for a wide range of policy-makers, programme managers and clinicians, and then disseminated through WHO country offices.

Guidelines implementation

The first steps in implementation after the final approval of the guidelines will be to revise all WHO publications that deal with postnatal care. These include the clinical guides for maternal, newborn and child health: *Pregnancy, childbirth, postpartum and newborn care; Managing complications of pregnancy and childbirth; Managing newborn problems*; *Pocket book on hospital care for children*; and *Safe Childbirth Checklist*. The existing training package, *Essential newborn care course*, will also be updated, as well as the related tool for computer-assisted learning. The recommendations will also be incorporated into community level tools including *Caring for the newborn at home*. In addition, service standards for the immediate care of the newborn, care of the umbilical cord and routine postnatal care for the mother and the neonate will be developed. These tools will be made available as printed materials or in electronic format. They are already used in a majority of target countries.

The successful introduction of evidence-based policies related to postnatal care into national programmes and health care services depends on well-planned and participatory consensus-driven processes of adaptation and implementation. These processes may include the development or revision of existing national guidelines or protocols based on this document.

The recommendations contained in the present guidelines should be adapted into locally-appropriate documents to meet the specific needs of each country and health service. Modifications to the recommendations, where necessary, should be limited to weak recommendations and justifications for any changes made in an explicit and transparent manner.

An enabling environment should be created for the use of these recommendations, including changes in the behaviour of health care practitioners to enable the use of evidence-based practices. Local professional societies may play important roles in this process, and an all-inclusive and participatory process should be encouraged. WHO's MCA Department has substantial experience of introduction of WHO guidelines and tools into national programmes.

Monitoring and evaluating guidelines implementation

Monitoring and evaluation will be built into implementation, in order to provide important lessons for uptake and continued implementation. With regard to monitoring and evaluation of their impact on quality of care, priority will be given to the strong recommendations.

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Annex 1

GRADE Tables

RECOMMENDATION 1: TIMING OF DISCHARGE FROM THE HEALTH FACILITY

Question 1A. Discharge within 24 hours versus later

Population: Neonates
Intervention (exposed in observational studies): Discharge from hospital within 24 hours after birth
Control (unexposed in observational studies): Discharge from hospital after 24 hours of birth

QUALITY ASSESSMENT								SUMMARY OF FINDINGS
OUTCOME	NO. OF STUDIES	DESIGN	RISK OF BIAS	IMPRECISION	INCONSISTENCY	INDIRECTNESS	OVERALL QUALITY OF EVIDENCE	POOLED EFFECT SIZE (95% CI)
Neonatal readmission	3	1 RCT, 2 cohort studies	No serious risk of bias (RCT)	Serious imprecision: wide CI (RCT)	Serious inconsistency: RCT in opposite direction to observational studies	No serious indirectness	LOW due to imprecision and inconsistency	RCT RR 0.61 (0.15 to 2.53) Observational studies RR 1.20 (1.11 to 1.30)
Maternal readmission	3	1 RCT, 2 cohort studies	No serious risk of bias (RCT)	Serious imprecision: wide CI (RCT)	Serious inconsistency: RCT in opposite direction to observational studies	No serious indirectness	LOW due to imprecision and inconsistency	RCT RR 0.82 (0.22 to 2.99) Observational studies RR 1.38 (0.06 to 32.6)
Stopped breastfeeding at 6 weeks	1	RCT	No serious risk of bias	Serious imprecision: wide CI	Serious inconsistency: only 1 study	Serious indirectness: data only from high-income countries	VERY LOW due to imprecision, inconsistency and indirectness	RR 0.67 (0.41, 1.09)
Stopped breastfeeding at 6 months	1	RCT	No serious risk of bias	Serious imprecision: wide CI	Serious inconsistency: only 1 study	Serious indirectness: data from high-income countries	VERY LOW due to imprecision, inconsistency and indirectness	RR 1.26 (1.00, 1.60)

Question 1B. Discharge within 48 hours versus later

Population: Neonates
Intervention (exposed in observational studies): Discharge from hospital within 48 hours after birth
Control (unexposed in observational studies): Discharge from hospital after 48 hours of birth

QUALITY ASSESSMENT								SUMMARY OF FINDINGS
OUTCOME	NO. OF STUDIES	DESIGN	RISK OF BIAS	IMPRECISION	INCONSISTENCY	INDIRECTNESS	OVERALL QUALITY OF EVIDENCE	POOLED EFFECT SIZE (95% CI)
Neonatal readmission	7	4 RCT, 3 cohort studies	No serious risk of bias (RCTs)	Serious imprecision: wide CI (RCTs)	No serious inconsistency	Serious indirectness: data from high-income countries	LOW due to imprecision and indirectness	RCTs RR 0.91 (0.49 to 1.71) Observational studies RR 1.08 (0.73 to 1.59)
Maternal readmission	5	4 RCT, 1 cohort study	No serious risk of bias (RCTs)	Serious imprecision: wide CI (RCTs)	No serious inconsistency	Serious indirectness: data from high-income countries	LOW due to imprecision and indirectness	RCTs RR 1.09 (0.46 to 2.56) Observational study RR 0.58 (0.23 to 1.47)
Stopped breastfeeding at 6 weeks	7	6 RCT, 1 cohort study	No serious risk of bias (RCT)	Serious imprecision: pooled effect significant, but upper limit of CI close to null	No serious inconsistency	Serious indirectness: data from high-income countries	LOW due to imprecision and indirectness	RCTs RR 0.87 (0.76 to 0.99) Observational study RR 1.04 (0.92 to 1.18)
Stopped breastfeeding at 6 months	3	RCT	No serious risk of bias	Serious imprecision: wide CI	Serious inconsistency: study with maximum weight in opposite direction to pooled effect, I^2 >80%	Serious indirectness: data from high-income countries	VERY LOW due to imprecision, inconsistency and indirectness	RR 1.06 (0.95 to 1.18)

RECOMMENDATION 2: TIMING AND NUMBER OF POSTNATAL CONTACTS

No controlled studies were identified. Recommendations based on epidemiologic data.

RECOMMENDATION 3: HOME VISITS BY COMMUNITY WORKERS VERSUS ROUTINE CARE

Population: Neonates
Intervention (exposed in observational studies): Home visits by CHWs
Control (unexposed in observational studies): Routine care

QUALITY ASSESSMENT								SUMMARY OF FINDINGS
OUTCOME	NO. OF STUDIES	DESIGN	RISK OF BIAS	IMPRECISION	INCONSISTENCY	INDIRECTNESS	OVERALL QUALITY OF EVIDENCE	POOLED EFFECT SIZE (95% CI)
Neonatal mortality	8	5 CRCTs (similar findings in 3 additional non-randomized trials)	No serious risk of bias (RCTs)	No serious imprecision: pooled effect significant and upper limit of CI indicates meaningful benefit	No serious inconsistency	No serious indirectness: data from LMICs in South Asia	HIGH	RCTs RR 0.82 (0.76 to 0.89) Non-randomized trials 0.65 (0.56 to 0.76)
Perinatal mortality	3	All CRCTs	No serious risk of bias	No serious imprecision: pooled effect significant and upper limit of CI indicates meaningful benefit	No serious inconsistency: all 3 studies in the same direction	No serious indirectness: data from LMICs but in South Asia	HIGH	RR 0.82 (0.76 to 0.89)

RECOMMENDATION 4: DANGER SIGNS PREDICTING SEVERE NEWBORN ILLNESS TO BE ASSESSED DURING POSTNATAL CONTACTS

Population: Neonates
Intervention (exposed in observational studies): Algorithms for use by first level health workers during postnatal visits
Control (unexposed in observational studies): Clinicians' judgement

QUALITY ASSESSMENT								SUMMARY OF FINDINGS
OUTCOME	NO. OF STUDIES	DESIGN	RISK OF BIAS	IMPRECISION	INCONSISTENCY	INDIRECTNESS	OVERALL QUALITY OF EVIDENCE	POOLED EFFECT SIZE (95% CI)
YIS-2	2	1 cross sectional, 1 cohort study	No serious risk of bias (diagnostic test)	Serious imprecision: wide CIs for sensitivity in the community-based study (Study 1*)	Serious inconsistency; variable sensitivity in the two studies	No serious indirectness; one study was clinic based while the other was community based and represented the target population	LOW due to imprecision and inconsistency	Sensitivity Study1*: 63% (35% to 85%) Study2**: 85% (78% to 91%) Specificity Study1: 96% (93% to 97%) Study2: 75% (69% to 81%)
SEARCH	2	Cohort studies	No serious risk of bias (diagnostic test)	Serious imprecision: wide CIs for sensitivity in both studies	Serious inconsistency; variable sensitivity in both studies	No serious indirectness; one study was clinic based while the other was community based and represented the target population	LOW due to imprecision and inconsistency	Sensitivity Study1†: 6% (0% to 30%) Study2: 36% (16% to 56%) Specificity Study1†:98% (96% to 99%) Study2: 97% (95% to 98%)
PROJAHNMO-2 (Mirzapur)	1	Cohort study	No serious risk of bias (diagnostic test)	Serious imprecision: wide CIs for sensitivity	Serious inconsistency: only 1 study	No serious indirectness; community-based study	LOW due to imprecision and inconsistency	Sensitivity 50% (25% to 75%) Specificity 98% (97% to 99%)
Modified YIS-2 / Modified Mirzapur	1	Cohort study	Post-hoc analysis	Serious imprecision: wide CIs for sensitivity	Serious inconsistency: only 1 study	No serious indirectness; community-based study	LOW due to imprecision and inconsistency	Sensitivity: 81% (54% to 96%) Specificity 96% (93% to 98%)

§†The results for study1 are based on an algorithm evaluating any 1 (instead of any 2) out of 7 signs;
Study 1*= PROJAHNMO-2 (Mirzapur) evaluation study; Study 2**=YIS-2 evaluation

RECOMMENDATION 5: EXCLUSIVE BREASTFEEDING VERSUS PREDOMINANT/PARTIAL BREASTFEEDING IN THE FIRST MONTH OF LIFE

Population: Neonates
Intervention (exposed in observational studies): EBF in the first month of life
Control (unexposed in observational studies): Predominant or partial breastfeeding in the first month of life

QUALITY ASSESSMENT								SUMMARY OF FINDINGS
OUTCOME	NO. OF STUDIES	DESIGN	RISK OF BIAS	IMPRECISION	INCONSISTENCY	INDIRECTNESS	OVERALL QUALITY OF EVIDENCE	POOLED EFFECT SIZE (95% CI)
Neonatal mortality	2	Observational	Serious risk of bias: data from observational studies	No serious imprecision: pooled effect significant and upper limit of CI indicates meaningful benefit (for exclusive vs. partial breastfeeding)	No serious inconsistency: both studies in the same direction	No serious indirectness: data from LMICs	MODERATE due to risk of bias	Exclusive vs. partial OR 0.27 (0.15 to 0.49) Exclusive vs. predominant OR 0.73 (0.51 to 1.04)
Mortality due to infections (Neonatal)	3	Observational	Serious risk of bias: data from observational studies	No serious imprecision: pooled effect significant and upper limit of CI indicates meaningful benefit	No serious inconsistency: all studies in the same direction	No serious indirectness: data from LMICs	MODERATE due to risk of bias	Exclusive vs. partial OR 0.26 (0.15 to 0.46)
Morbidity – sepsis and other infections	2	Observational	Very serious risk of bias: data from observational studies and limitations in analysis	No serious imprecision: pooled effect significant and upper limit of CI indicates meaningful benefit	No serious inconsistency: both studies in the same direction	No serious indirectness: data from LMICs in Asia	LOW due to very serious risk of bias	Exclusive vs. partial RR 0.29 (0.20 to 0.41)
Morbidity – ARI	4	Observational	Serious risk of bias: data from observational studies	Serious imprecision: pooled effect significant but upper limit of CI close to null	No serious inconsistency: all studies in the same direction	No serious indirectness: data from LMICs	LOW due to risk of bias and imprecision	Exclusive vs. partial RR 0.59 (0.38 to 0.92)
Morbidity – diarrhoea	3	Observational	Very serious risk of bias: data from observational studies and limitations in analysis	No serious imprecision: pooled effect significant and upper limit of CI indicates meaningful benefit	No serious inconsistency: all studies in the same direction	No serious indirectness: data from LMICs	LOW due to very serious risk of bias	Exclusive vs. partial: OR 0.34 (0.16 to 0.72)

RECOMMENDATION 6: CHLORHEXIDINE APPLICATION TO UMBILICAL CORD VERSUS DRY CORD CARE

Population: Neonates
Intervention (exposed in observational studies): Single or multiple application of chlorhexidine to umbilical cord stump
Control (unexposed in observational studies): Dry cord care

QUALITY ASSESSMENT								SUMMARY OF FINDINGS
OUTCOME	NO. OF STUDIES	DESIGN	RISK OF BIAS	IMPRECISION	INCONSISTENCY	INDIRECTNESS	OVERALL QUALITY OF EVIDENCE	POOLED EFFECT SIZE (95% CI)
Neonatal mortality	3	CRCTs	Serious risk of bias: limitations in follow-up	Serious imprecision: pooled effect significant but upper limit of CI close to null	No serious inconsistency: all studies in the same direction	No serious indirectness: data from LMICs in South Asia	LOW due to risk of bias and imprecision	RR 0.86 (0.77 to 0.95)
Omphalitis (redness extending to the skin with or without pus)	4	RCTs (3 CRCTs; 1 RCT)	Serious risk of bias: limitations in analysis	No serious imprecision: pooled effect significant and upper limit of CI indicates meaningful benefit	No serious inconsistency: all studies in the same direction	No serious indirectness: data from LMICs in South Asia	MODERATE due to risk of bias	RR 0.70 (0.62 to 0.80)
Time to cord separation (in days)	2	All are CRCTs	Serious risk of bias: limitations in analysis	No serious imprecision: pooled effect significant, CI narrow	No serious inconsistency: all studies in the same direction	No serious indirectness: data from LMICs in South Asia	MODERATE due to risk of bias	Weighted MD 1.3 days (1.2 to 1.4)

RECOMMENDATIONS 7–9: GDG CONSENSUS BASED ON EXISTING WHO GUIDELINES

RECOMMENDATION 10: IRON AND FOLIC ACID SUPPLEMENTATION

10.1 Multivitamin and multimineral supplement

Population: Mothers in the immediate postnatal period
Intervention (exposed in observational studies): Multivitamin and multimineral supplement
Control (unexposed in observational studies): Usual diet

QUALITY ASSESSMENT								SUMMARY OF FINDINGS
OUTCOME	NO. OF STUDIES	DESIGN	RISK OF BIAS	IMPRECISION	INCONSISTENCY	INDIRECTNESS	OVERALL QUALITY OF EVIDENCE	POOLED EFFECT SIZE (95% CI)
Hb at 11 weeks postpartum (g/dl)	1	RCT	Serious risk of bias: limitations in selection of participants, measurement and follow-up	No serious imprecision: pooled effect significant, lower limit of CI indicates meaningful benefit	Serious inconsistency: only one study	No serious indirectness	LOW due to risk of bias and inconsistency	MD 3.4 (1.51 to 5.29)

10.2 Iron supplement

Population: Mothers in the immediate postnatal period
Intervention (exposed in observational studies): Iron sulphate 80 mg/day
Control (unexposed in observational studies): Placebo

QUALITY ASSESSMENT								SUMMARY OF FINDINGS
OUTCOME	NO. OF STUDIES	DESIGN	RISK OF BIAS	IMPRECISION	INCONSISTENCY	INDIRECTNESS	OVERALL QUALITY OF EVIDENCE	POOLED EFFECT SIZE (95% CI)
Hb at 12 weeks postpartum (g/dl)	1	RCT	No serious risk of bias	Serious imprecision: pooled effect not significant, wide CI	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to imprecision, inconsistency and indirectness	MD 0.5 (-0.17 to 0.83)

10.3 Folic acid supplement

Population: Mothers in the immediate postnatal period
Intervention (exposed in observational studies): Folic acid 1 mg/day
Control (unexposed in observational studies): Placebo

QUALITY ASSESSMENT								SUMMARY OF FINDINGS
OUTCOME	NO. OF STUDIES	DESIGN	RISK OF BIAS	IMPRECISION	INCONSISTENCY	INDIRECTNESS	OVERALL QUALITY OF EVIDENCE	POOLED EFFECT SIZE (95% CI)
Hb at 3 months postpartum (g/dl)	1	RCT	Serious risk of bias: limitation in selection of participants	No serious imprecision: pooled effect significant, lower limit of CI indicates meaningful benefit	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to risk of bias, inconsistency, and indirectness	MD 0.4 (0.3 to 0.5)
Hb at 6 months postpartum (g/dl)	1	RCT	Serious risk of bias: limitation in selection of participants	No serious imprecision: pooled effect significant, lower limit of CI indicates meaningful benefit	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to risk of bias, inconsistency and indirectness	MD 0.6 (0.5 to 0.7)

RECOMMENDATION 11: PROPHYLACTIC ANTIBIOTICS

Population: Mothers with perineal tear after delivery
Intervention (exposed in observational studies): Antibiotics (co-amoxyclav or cefotetan or cefoxitin or clindamycin)
Control (unexposed in observational studies): Control

QUALITY ASSESSMENT								SUMMARY OF FINDINGS
OUTCOME	NO. OF STUDIES	DESIGN	RISK OF BIAS	IMPRECISION	INCONSISTENCY	INDIRECTNESS	OVERALL QUALITY OF EVIDENCE	POOLED EFFECT SIZE (95% CI)
Endometritis	1	RCT	Very serious risk of bias: limitations in selection of participants, measurement, follow-up and analysis	No serious imprecision: pooled effect significant, upper limit of CI indicates meaningful benefit	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to very serious risk of bias, inconsistency and indirectness	OR 0.27 (0.09 to 0.83)
Perineal wound complications	1	RCT	Serious risk of bias: limitations in follow-up	Serious imprecision: pooled effect significant but upper limit of CI closer to null	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to serious risk of bias, imprecision, inconsistency and indirectness	OR 0.38 (0.09 to 0.91)

RECOMMENDATION 12: PSYCHOSOCIAL SUPPORT

Population: Postpartum mothers
Intervention (exposed in observational studies): Professional support
Control (unexposed in observational studies): Usual care

QUALITY ASSESSMENT								SUMMARY OF FINDINGS
OUTCOME	NO. OF STUDIES	DESIGN	RISK OF BIAS	IMPRECISION	INCONSISTENCY	INDIRECTNESS	OVERALL QUALITY OF EVIDENCE	POOLED EFFECT SIZE (95% CI)
Depression (EPDS >10) at 6 weeks postpartum	1	RCT	Very serious risk of bias: limitations in measurement and follow-up	No serious imprecision: pooled effect significant and upper limit of CI indicates meaningful benefit	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to very serious risk of bias, inconsistency and indirectness	RR 0.62 (0.43 to 0.89)
Depression (EPDS >12) at 6 weeks postpartum	1	RCT	No serious risk of bias	No serious imprecision: pooled effect significant and upper limit of CI indicates meaningful benefit	Serious inconsistency: only one study	Serious indirectness: data from high-income country	LOW due to inconsistency and indirectness	RR 0.28 (0.11 to 0.73)
Depression (EPDS >11) at 3 months postpartum	1	RCT	Serious risk of bias: limitation in measurement	Serious imprecision: wide CI	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to risk of bias, imprecision, inconsistency and indirectness	RR 1.35 (0.94 to 1.94)
Depression (EPDS>12) at 3 months	1	RCT	Very serious risk of bias: limitations in measurement and follow-up	Serious imprecision: wide CI	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to very serious risk of bias, imprecision, inconsistency and indirectness	RR 1.21 (0.78 to 1.85)
Depression (EPDS>12) at 4 months	1	CRCT	Very serious risk of bias: limitations in measurement and follow-up	No serious imprecision: pooled effect significant and upper limit of CI indicates meaningful benefit	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to very serious risk of bias, inconsistency and indirectness	RR 0.68 (0.54 to 0.84)

QUALITY ASSESSMENT								SUMMARY OF FINDINGS
OUTCOME	NO. OF STUDIES	DESIGN	RISK OF BIAS	IMPRECISION	INCONSISTENCY	INDIRECTNESS	OVERALL QUALITY OF EVIDENCE	POOLED EFFECT SIZE (95% CI)
Depression (BDI >15) at 4 months	1	?Quasi-RCT	Very serious risk of bias: limitations in selection and measurement	Serious imprecision: wide CI	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to very serious risk of bias, imprecision, inconsistency and indirectness	RR 0.75 (0.2 to 2.79)
Depression (EPDS >11) at 6 months	2	RCT	Serious risk of bias: limitations in measurement	Serious imprecision: wide CI	No serious inconsistency: both studies in same direction	Serious indirectness: data from high-income countries	VERY LOW due to risk of bias, imprecision and indirectness	RR 0.91 (0.58 to 1.42)
Depression (EPDS >12) at 6 months	3	RCT	Serious risk of bias: limitations in measurement	Serious imprecision: wide CI	No serious inconsistency: all studies in same direction	Serious indirectness: data from high-income countries	VERY LOW due to risk of bias, imprecision, and indirectness	RR 1.07 (0.7 to 1.64)
Depression (composite measure) at 6 months postpartum	1	RCT	No serious risk of bias	Serious imprecision: wide CI	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to imprecision, inconsistency and indirectness	RR 1.02 (0.53 to 1.97)
Depression (variously defined) at 6 months postpartum	6	RCT	Serious risk of bias: limitations in measurement	No serious imprecision	No serious inconsistency: most studies in same direction	Serious indirectness: data from high-income countries	LOW due to risk of bias and indirectness	RR 1.02 (0.94 to 1.1)
Depression (EPDS >12) at 12 months (community)	1	RCT	Serious risk of bias: limitations in measurement	Serious imprecision: wide CI	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to risk of bias, imprecision, inconsistency and indirectness	RR 0.95 (0.69 to 1.3)
Depression (EPDS >12) at 12 months (support)	1	RCT	Serious risk of bias: limitations in measurement	Serious imprecision: wide CI	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to risk of bias, imprecision, inconsistency and indirectness	RR 0.84 (0.6 to 1.17)

QUALITY ASSESSMENT								SUMMARY OF FINDINGS
OUTCOME	NO. OF STUDIES	DESIGN	RISK OF BIAS	IMPRECISION	INCONSISTENCY	INDIRECTNESS	OVERALL QUALITY OF EVIDENCE	POOLED EFFECT SIZE (95% CI)
Depression (composite measure) at 12 months	1	RCT	No serious risk of bias	Serious imprecision: wide CI	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to imprecision, inconsistency and indirectness	RR 0.82 (0.39 to 1.72)
Depression (various definitions) at final study outcome measure	11	RCT	Serious risk of bias: limitations in measurement	Serious imprecision: wide CI	No serious inconsistency: most studies in the same direction as pooled effect	Serious indirectness: data from high-income countries	VERY LOW due to risk of bias, imprecision and indirectness	RR 0.94 (0.88 to 1.01)
Depression (variously defined) in women 'at risk' at final study outcome	7	RCT	Serious risk of bias: limitations in measurement	No serious imprecision: pooled effect significant and upper limit of CI indicates meaningful benefit	No serious inconsistency: most studies in the same direction as pooled effect	Serious indirectness: data from high-income countries	LOW due to risk of bias and indirectness	RR 0.74 (0.64 to 0.86)
Depression (variously defined) in women not specifically 'at risk' at final study outcome	4	RCT	Serious risk of bias: limitations in measurement	No serious imprecision	No serious inconsistency: most studies in the same direction as pooled effect	Serious indirectness: data from high-income countries	LOW due to risk of bias and indirectness	RR 0.99 (0.91 to 1.07)

Population: Mothers with postnatal depression
Intervention (exposed in observational studies): Debriefing
Control (unexposed in observational studies): Usual care

QUALITY ASSESSMENT								SUMMARY OF FINDINGS
OUTCOME	NO. OF STUDIES	DESIGN	RISK OF BIAS	IMPRECISION	INCONSISTENCY	INDIRECTNESS	OVERALL QUALITY OF EVIDENCE	POOLED EFFECT SIZE (95% CI)
Depression (HAD>10) at 3 weeks postpartum	1	RCT	Serious risk of bias: limitations in measurement	No serious imprecision: pooled effect significant and upper limit of CI indicates meaningful benefit	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to risk of bias, inconsistency and indirectness	RR 0.16 (0.07 to 0.37)
Depression (DASS >13) at 3 months postpartum	1	RCT	No serious risk of bias	No serious imprecision: pooled effect significant and upper limit of CI indicates meaningful benefit	Serious inconsistency: only one study	Serious indirectness: data from high-income country	LOW due to inconsistency and indirectness	RR 0.23 (0.07 to 0.74)
Depression (EPDS >12) at 3 months postpartum	1	RCT	Serious risk of bias: limitations in measurement	No serious imprecision: pooled effect significant and upper limit of CI indicates meaningful benefit	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to risk of bias, inconsistency and indirectness	RR 0.25 (0.09 to 0.69)
Depression (GHQ 4/5) at 6 months postpartum	1	RCT	Serious risk of bias: limitations in measurement	Serious imprecision: wide CI	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to risk of bias, imprecision, inconsistency and indirectness	RR 0.73 (0.45 to 1.17)
Depression (EPDS >12) at 6 months	1	RCT	Serious risk of bias: limitations in measurement	Serious imprecision: wide CI	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to risk of bias, imprecision, inconsistency and indirectness	RR 1.2 (0.89 to 1.62)
Depression (EPDS>12) at 12 months postpartum	1	RCT	No serious risk of bias	Serious imprecision: wide CI	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to risk of bias, imprecision, inconsistency and indirectness	RR 0.99 (0.81 to 1.2)

QUALITY ASSESSMENT								SUMMARY OF FINDINGS
OUTCOME	NO. OF STUDIES	DESIGN	RISK OF BIAS	IMPRECISION	INCONSISTENCY	INDIRECTNESS	OVERALL QUALITY OF EVIDENCE	POOLED EFFECT SIZE (95% CI)
Depression (variously defined) at final outcome measure	5	RCT	Serious risk of bias: limitations in measurement	Serious imprecision: wide CI	No serious inconsistency: most studies in the same direction as pooled effect	Serious indirectness: data from high-income countries	VERY LOW due to risk of bias, imprecision and indirectness	RR 0.88 (0.76 to 1.02)

Population: Mothers with postnatal depression
Intervention (exposed in observational studies): Educational interventions
Control (unexposed in observational studies): Usual care

QUALITY ASSESSMENT								SUMMARY OF FINDINGS
OUTCOME	NO. OF STUDIES	DESIGN	RISK OF BIAS	IMPRECISION	INCONSISTENCY	INDIRECTNESS	OVERALL QUALITY OF EVIDENCE	POOLED EFFECT SIZE (95% CI)
Depression (EPDS >11) at 1 week postpartum	1	Quasi-RCT	Very serious risk of bias: limitations in selection, measurement and follow-up	Serious imprecision: wide CI	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to very serious risk of bias, inconsistency and indirectness	RR 0.18 (0.01 to 4.12)
Depression (EPDS >9) at 3 months postpartum	2	RCT	Serious risk of bias: limitations in measurement	Serious imprecision: wide CI	No serious inconsistency: both studies in same direction	Serious indirectness: data from high-income countries	VERY LOW due to risk of bias, imprecision and indirectness	RR 0.65 (0.42 to 1.0)
Depression (EPDS >11) at 3 months postpartum	1	RCT	Serious risk of bias: limitations in measurement	Serious imprecision: wide CI	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to risk of bias, inconsistency and indirectness	RR 1.17 (0.81 to 1.71)
Depression (EPDS >9) at 6 months postpartum	1	RCT	Serious risk of bias: limitations in follow-up	Serious imprecision: wide CI	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to risk of bias, inconsistency and indirectness	RR 0.65 (0.37 to 1.12)
Depression (QIDS >10) at 6 months postpartum	1	RCT	No serious risk of bias	Serious imprecision: wide CI	Serious inconsistency: only one study	Serious indirectness: data from high-income country	VERY LOW due to risk of bias, inconsistency and indirectness	RR 0.55 (0.24 to 1.25)

QUALITY ASSESSMENT								SUMMARY OF FINDINGS
OUTCOME	NO. OF STUDIES	DESIGN	RISK OF BIAS	IMPRECISION	INCONSISTENCY	INDIRECTNESS	OVERALL QUALITY OF EVIDENCE	POOLED EFFECT SIZE (95% CI)
Depression at 6 months postpartum (various measures)	3	RCT	Serious risk of bias: limitations in measurement	Serious imprecision: wide CI	No serious inconsistency: most studies in the same direction as pooled effect	Serious indirectness: data from high-income countries	VERY LOW due to risk of bias, imprecision and indirectness	RR 0.91 (0.68 to 1.21)
Depression (variously defined) at final study outcome	6	RCT	Serious risk of bias: limitations in measurement	Serious imprecision: wide CI	No serious inconsistency: most studies in the same direction as pooled effect	Serious indirectness: data from high-income countries	VERY LOW due to risk of bias, imprecision and indirectness	RR 0.81 (0.64 to 1.02)

Annex 2

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