September 2015 www.mcsprogram.org

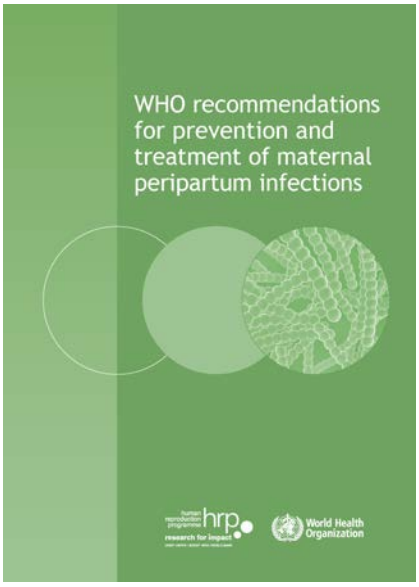
WHO Recommendations for Prevention and Treatment of Maternal Peripartum Infections

Highlights and Key Messages from the World Health Organization's 2015 Global Recommendations

Key Messages

- Bacterial infections around the time of childbirth account for about one-tenth of maternal deaths and contribute to severe morbidity and long-term disability for many affected women.
- Standard infection prevention and control measures are a cornerstone of peripartum infection prevention (e.g., hand hygiene and use of clean equipment).
- WHO recommendations for prevention and treatment of maternal peripartum infections include both recommended and non-recommended interventions during labour, childbirth, and the postpartum period.
- Clinical monitoring, early detection, and prompt treatment of peripartum infection with an appropriate antibiotic regimen are essential for reducing death and morbidity in affected women.
- Recommendations for antibiotic prophylaxis/treatment for specific indications balance health benefits for the mother and newborn with safety concerns (e.g., adverse effects) and the public health imperative to control antibiotic resistance.

Background



Bacterial infections around the time of childbirth are among the leading causes of maternal mortality worldwide and account for about one-tenth of the global burden of maternal death.[1,2] Apart from death, women who experience peripartum infections are prone to severe morbidity and long-term disabilities such as chronic pelvic pain, fallopian tube blockage, and secondary infertility. Maternal infections before or during childbirth are associated with an estimated 1 million newborn deaths annually.[3,4]

Several factors have been associated with increased risk of maternal peripartum infections, including pre-existing maternal conditions (e.g., malnutrition, diabetes, obesity, severe anaemia, bacterial vaginosis) and spontaneous or provider-initiated conditions during labour and childbirth (e.g., prolonged rupture of membranes, multiple vaginal examinations, manual removal of the placenta, caesarean section). Strategies to reduce maternal peripartum infections and their complications have been largely directed at preventive measures where such risk factors exist.

WHO recommendations prioritize evidence-based interventions for prevention and treatment of genital tract infections during labour, childbirth, and the puerperium. Globally, the most common intervention for preventing morbidity and mortality related to maternal peripartum infection is the use of antibiotics for prophylaxis and treatment. However, antibiotic misuse for obstetric conditions or procedures that are thought to carry risk of infection is common in clinical practice. Such inappropriate use of antibiotics among women giving birth has implications for global efforts to contain the emergence of antibiotic-resistant bacteria. Hence, the recommendations address both the appropriate and the inappropriate use of antibiotics for prevention and treatment of peripartum infections. However, the management of severe sepsis and septicaemic shock is outside of the scope of these recommendations.

This brief presents highlights of the recommendations including policy and program implications for translating the guidelines into action at the country level. Readers are referred to the full recommendations for an understanding of the methods and the rationale for specific individual recommendations (available at www.who.int/reproductivehealth/publications/maternal_perinatal_health/peripartum-infections-guidelines).

[1] Say L, Chou D, Gemmill A, Tuncalp O, Moller AB, Daniels J, et al. 2014. Global causes of maternal death: a WHO systematic analysis. *Lancet Global Health* 2(6):e323–33.
[2] Khan KS, Wojdyla D, Say L, Gulmezoglu AM, Van Look PF. 2006. WHO analysis of causes of maternal death: a systematic review. *Lancet* 367(9516):1066–74.
[3] Black RE, Cousens S, Johnson HL, Lawn JE, Rudan I, Bassani DG, et al. 2010. Global, regional, and national causes of child mortality in 2008: a systematic analysis. *Lancet* 375(9730):1969–87.
[4] Lawn JE, Cousens S, Zupan J, Lancet Neonatal Survival Steering Team. 2005. 4 million neonatal deaths: When? Where? Why? *Lancet* 365(9462):891–900.

Good Clinical Practice: Observe Standard Infection Prevention and Control Measures and Judicious Use of Antibiotics to Control Antimicrobial Resistance

- Identify and correct predisposing factors to infection (e.g., by providing nutritional advice and addressing nutritional deficiencies, anaemia, and other maternal medical conditions [e.g., diabetes]) during antenatal care.
- Promote hand hygiene, use of clean products (e.g., blood products), use of clean equipment, and aseptic surgical practices (e.g., standard skin preparation techniques and proper use of antiseptic agents for surgical site preparation).
- Maintain clean hospital environment (e.g., clean water, appropriate waste disposal, and sanitation).
- Develop and implement local protocols on infection prevention and control practices in accordance with existing WHO guidance.
- Promote judicious use of antibiotics (administer only for recommended indications; use narrowest antibacterial spectrum and simplest effective dose; verify woman's history of drug intolerance; monitor local bacteria and antibiotic susceptibility and resistance patterns).

Summary of Recommended and Non-Recommended Practices to Prevent and Treat Maternal Peripartum Infections

Pregnancy

Recommended
- Routine antibiotics for women with preterm prelabour rupture of membranes

Not Recommended
- Routine antibiotic prophylaxis during the second or third trimester for all women with the aim of reducing infectious morbidity
- Routine antibiotics for women with the following conditions:
  - threatened preterm labour with intact membranes
  - prelabour rupture of membranes at (or near) term

Labour

Recommended
- Digital exam every four hours for assessment of labour progress in active first stage
- Intrapartum antibiotics for women with group B Streptococcus (GBS) colonization to prevent newborn infection
- Ampicillin and gentamycin as first line treatment for chorioamnionitis

Not Recommended
- Routine vaginal cleansing with chlorhexidine during labour:
  - for the purpose of preventing infectious morbidities
  - in women with group B Streptococcus (GBS) colonization for prevention of early neonatal GBS infection
- Routine antibiotics for women with the following condition:
  - meconium-stained amniotic fluid

Childbirth

Recommended
- Vaginal cleansing with povidone-iodine immediately before caesarean section
- Routine antibiotics for women with the following conditions:
  - manual removal of placenta
  - third- or fourth-degree perineal tear
  - prophylactically, before incision, for any caesarean section (single dose of first-generation cephalosporin or penicillin)
- Ampicillin and gentamycin as first line treatment for chorioamnionitis

Not Recommended
- Routine antibiotics for women with the following conditions:
  - uncomplicated vaginal birth
  - operative vaginal birth (i.e., forceps or vacuum-assisted delivery)
  - episiotomy

Postnatal Period

Recommended
- Combination of clindamycin and gentamicin as first-line treatment for postpartum endometritis

Interventions for Prevention and Treatment of Maternal Peripartum Infections: Rationale and Implementation Guidance

Prevention of Maternal Peripartum Infections	
WHO Recommendation 2015	**Rationale and Implementation Guidance**
I. Prevention of Peripartum Infections	
Recommendation 1: Routine perineal/pubic shaving prior to giving vaginal birth is not recommended.	• No evidence to support a clinical benefit of routine perineal or pubic shaving before childbirth. The decision regarding perineal/pubic shaving should be left to the woman and not to her health care provider.
Recommendation 2: Digital vaginal examination at intervals of four hours is recommended for routine assessment of active first stage of labour in low-risk women.	• Multiple vaginal examinations are recognized contributors to infectious morbidities, especially in the presence of other risk factors for infection (e.g., prolonged rupture of membranes and long duration of labour).
Recommendation 3: Routine vaginal cleansing with chlorhexidine during labour for the purpose of preventing infectious morbidities is not recommended.	• No evidence supports a clinical benefit to routine vaginal cleansing with chlorhexidine during labour. • Women are likely to prefer minimal interference with the labour process, and some women may find the procedure invasive and discomforting. Health care providers and policymakers are likely to place a high value on saving health care costs.
Recommendation 4: Routine vaginal cleansing with chlorhexidine during labour in women with group B Streptococcus (GBS) colonization is not recommended for prevention of early neonatal GBS infection.	• No evidence supports routine vaginal cleansing with chlorhexidine during labour for preventing early onset GBS-related disease in preterm and term neonates. Routine vaginal cleansing with chlorhexidine appears to increase vaginal irritation.
Recommendation 5: Intrapartum antibiotic administration to women with group B Streptococcus (GBS) colonization is recommended for prevention of early neonatal GBS infection.	• This recommendation is based on clinical benefits for neonates (in reducing risk of early neonatal onset GBS infection) as there is insufficient evidence for the effect on maternal infectious morbidities. • Intrapartum antibiotic (ampicillin or penicillin G) should be administered to all women with documented GBS colonization. • In light of the challenges of implementing GBS screening for all pregnant women, particularly in low-resource settings, policymakers should develop local policy and guidance on screening for GBS colonization based on local prevalence of GBS colonization and burden of early neonatal GBS infection.
Recommendation 6: Routine antibiotic prophylaxis during the second or third trimester for all women with the aim of reducing infectious morbidity is not recommended.	• In light of the available evidence, potential benefits related to use of antibiotics during pregnancy to prevent infectious morbidities do not appear to outweigh potential harm, particularly for women without a high-risk pregnancy.
Recommendation 7: Routine antibiotic administration is not recommended for women in preterm labour with intact amniotic membranes.	• Potential harm, including neonatal deaths and cerebral palsy, in association with the use of routine antibiotic prophylaxis outweigh the clinical benefits of antibiotics in terms of reducing maternal infectious morbidity.
Recommendation 8: Antibiotic administration is recommended for women with preterm prelabour rupture of membranes.	• To avoid inadvertent antibiotic administration to women with intact amniotic membranes, antibiotics should only be administered when a definite diagnosis of preterm premature rupture of membranes (PPROM) has been made.
Recommendation 9: Routine antibiotic administration is not recommended for women with prelabour rupture of membranes at (or near) term.	• "Routine" use implies administration of antibiotics in the absence of clinical signs of infection or any additional risk factors for infection. "Near term" in this context refers to 36 weeks gestation and above.
Recommendation 10: Routine antibiotic administration is not recommended for women with meconium-stained amniotic fluid.	• Evidence is insufficient to support prophylactic antibiotics for women with meconium-stained amniotic fluid during labour in the absence of other indications. • Antibiotics should be administered when characteristics of the liquor suggest infection. • Personnel experienced in neonatal resuscitation should attend delivery of infants in whom thick meconium liquor is noted, as risk of meconium aspiration is higher.
Recommendation 11: Routine antibiotic prophylaxis is recommended for women undergoing manual removal of the placenta.	• Materials should be updated to promote good hygiene and aseptic technique to help reduce maternal peripartum infection associated with manual removal of the placenta.
Recommendation 12: Routine antibiotic prophylaxis is not recommended for women undergoing operative vaginal birth.	• Evidence suggests that antibiotic prophylaxis does not reduce the risk of maternal infections after operative vaginal birth.

Prevention of Maternal Peripartum Infections	
WHO Recommendation 2015	**Rationale and Implementation Guidance**
Recommendation 13: Routine antibiotic prophylaxis is recommended for women with a third- or fourth-degree perineal tear.	• Available evidence is insufficient to determine clinical benefits of routine administration of prophylactic antibiotics in women with third- or fourth-degree perineal tear postpartum. However, indirect evidence of a benefit exists for prophylactic antibiotics from potentially contaminated wounds (considering the bacterial flora in the rectum) in surgical practice, and it would be reasonable to use antibiotics to reduce the risk of infection.
Recommendation 14: Routine antibiotic prophylaxis is not recommended for women with episiotomy.	• There is a lack of evidence to determine the benefit or harm of routine administration of antibiotics to women who receive an episiotomy for vaginal birth. • Carefully performed episiotomies generally have a low rate of infection in settings where infection control measures are well-observed.
Recommendation 15: Routine antibiotic prophylaxis is not recommended for women with uncomplicated vaginal birth.	• "Uncomplicated vaginal birth" in this context connotes vaginal birth in the absence of any specific risk factor for or clinical signs of maternal peripartum infection.
Recommendation 16: Vaginal cleansing with povidone-iodine immediately before caesarean section is recommended.	• Vaginal preparation with povidone-iodine solution immediately prior to caesarean birth may reduce postoperative endometritis, particularly in women with ruptured membranes or those already in labour.
Recommendation 17: The choice of an antiseptic agent and its method of application for skin preparation prior to caesarean section should be based primarily on the clinician's experience with that particular antiseptic agent and method of application, its cost, and local availability.	• Skin preparation is a vital part of the overall care that must be given to women undergoing surgery to prevent surgical site infections before caesarean section. However, there is no strong evidence to recommend the use of one specific antiseptic agent over another. • Key steps include the exclusion of maternal allergy to the skin preparation agent prior to surgery, as well as standard preoperative skin preparation technique that is appropriate for the intended skin incision.
Recommendation 18: Routine antibiotic prophylaxis is recommended for women undergoing elective or emergency caesarean section.	• High-quality evidence demonstrates the clinical benefits of prophylactic antibiotics administered prior to/or during caesarean section, with the greatest benefit incurred when antibiotics are administered prior to incision.
Recommendation 18.1: For caesarean section, prophylactic antibiotics should be given prior to skin incision, rather than intraoperatively after umbilical cord clamping.	• Maximal benefit can be expected when prophylactic antibiotics are administered between 30–60 minutes before skin incision. • Evidence also supports the effectiveness of prophylactic antibiotics after umbilical cord clamping for the prevention of post-caesarean infectious morbidities. Therefore, antibiotics are still beneficial when used outside the suggested timeframe (i.e., 15–60 minutes before incision) and should be applied when the available time to administer a prophylactic antibiotic might be limited (e.g., emergency caesarean section).
Recommendation 18.2: For antibiotic prophylaxis for caesarean section, a single dose of first-generation cephalosporin or penicillin should be used in preference to other classes of antibiotics.	• No evidence demonstrates that any class of antibiotic is better than the other for prophylaxis in women undergoing caesarean section. However, first-generation cephalosporins and penicillin have an advantage over other classes of antibiotics in terms of cost and wide availability in all settings. • Due to the high risk of necrotizing enterocolitis among preterm babies, the use of "co-amoxiclav" for antibiotic prophylaxis should be avoided not only for caesarean delivery of preterm infants, but it might also be safer to avoid its use for caesarean delivery of term babies.

Treatment of Maternal Peripartum Infections	
WHO Recommendation 2015	**Rationale and Implementation Guidance**
II. Treatment of Peripartum Infections	
Recommendation 19: A simple regimen such as ampicillin and once-daily gentamicin is recommended as first-line antibiotics for the treatment of chorioamnionitis.	• Although there is no clear evidence as to whether antibiotics should be discontinued after birth or continued in the postpartum period, women who remain symptomatic are likely to benefit from longer antibiotic treatment for at least 24 to 48 hours after the symptoms and signs of infection (e.g., fever, uterine tenderness) have subsided.

Treatment of Maternal Peripartum Infections	
WHO Recommendation 2015	**Rationale and Implementation Guidance**
Recommendation 20: A combination of clindamycin and gentamicin is recommended as first-line antibiotics for the treatment of postpartum endometritis.	• Compared to cephalosporins and penicillins, the combination of clindamycin plus an aminoglycoside (especially gentamicin) appears more effective in the successful treatment of postpartum endometritis. In the majority of studies that demonstrated benefits of clindamycin and gentamicin over other regimens, clindamycin was administered as 600 mg IV every six to eight hours, and gentamicin was administered as 1–1.5 mg/kg or 60–80 mg IV or IM every eight hours. • Antibiotic treatment should continue for at least 24–48 hours after complete resolution of clinical signs and symptoms (e.g., fever, uterine tenderness, purulent lochia, and/or leucocytosis). • In situations where availability and cost of clindamycin is a limiting factor, policy makers should promote use of a penicillin class of drug (with gentamicin) as an alternative treatment regimen for postpartum endometritis.

Measures to Monitor Adherence with Guidelines to Reduce Infection-related Morbidity

	Suggested Indicators
Measures and indicators that can be adapted at regional and country levels to assess adherence to the guideline recommendations	• Proportion of women undergoing caesarean section who receive antibiotic prophylaxis, calculated as the number of women who receive antibiotic prophylaxis for caesarean section divided by the total number of women undergoing caesarean section.
	• Proportion of women with PPROM who receive antibiotic prophylaxis, calculated as the number of women with PPROM who receive antibiotic prophylaxis divided by the total number of women with PPROM.
	• Incidence of surgical wound infection among women undergoing caesarean section, calculated as the number of women with surgical wound infection after caesarean section divided by the total number of women undergoing caesarean section.

Conclusion: Policy and Programme Recommendations

The ultimate goal of the WHO recommendations is to improve quality of care and to reduce preventable death and disability associated with peripartum infection for mothers and newborns. It is recommended that countries update their policy and programme materials and activities to support adoption and implementation of these new guidelines, including the following actions:

Specific:

Ensure national standards, training curricula, clinical protocols, and program materials, including provider job aids and quality improvement tools, are updated to ***promote:***

- Routine antibiotic use for women with PPROM, including reliable diagnosis of PPROM and use of erythromycin as first line antibiotic.
- Routine administration of antibiotics for women undergoing elective or emergency caesarean section, emphasizing simplest and shortest (preferably one dose) antibiotic regimen, regardless of drug class or type of caesarean section (elective or emergency).
- Routine antibiotic use prior to skin incision for a caesarean section whenever possible, or later administration (e.g. after cord clamping) when circumstances do not allow pre-incision administration of antibiotics.
- Use of a recommended first line antibiotic regimen that is simple, responsive to local infectious burden, can be administered over a short duration, and follows the principles of antibiotic use to reduce emergence of resistant strains of bacteria.
- Use of a penicillin class of antibiotics (with gentamycin) as an alternative treatment for postpartum endometritis in settings where availability and cost of clindamycin is a limiting factor; and continuation of prescribed antibiotics for at least 24–48 hours after complete resolution of clinical signs and symptoms (e.g., fever, uterine tenderness, purulent lochia, and/or leucocytosis).

Ensure national standards, training curricula, clinical protocols and program materials, including provider job aids and quality improvement tools, are updated to ***discourage:***

- Multiple vaginal examinations for routine assessment of labour progress, especially in the presence of other risk factors for infection (e.g., prolonged rupture of membranes or long duration of labour).
- Routine vaginal cleansing with chlorhexidine for women in whom vaginal birth is anticipated.

- Routine antibiotic use for women undergoing assisted vaginal birth with forceps or vacuum extractor; or women with episiotomy or normal (uncomplicated) vaginal birth.
- Routine antibiotic use for women with threatened preterm labour and intact amniotic membranes.
- Routine antibiotic use for women with pre-labour ROM at term.

General:

- Strengthen and maintain the skills of health workers to enable them to implement the recommendations, including development of simple training/supervision materials, job aids, and tools to enhance adherence with recommended practices and cessation of non-recommended practices.
- Promote policies and support materials for routine clinical monitoring of women for signs of infection throughout labour and the postpartum period, linked to early infection diagnosis by laboratory investigation when needed.
- Develop, implement and monitor implementation of local infection prevention and control protocols in accordance with existing WHO guidance.
- Engage national obstetrics, general medicine, nursing, and midwifery associations to update their members (e.g., at annual meetings, through newsletters, in continuing medical education sessions, etc.) on the new recommendations and the evidence basis for recommendations.
- Support activities to improve the quality of maternal peripartum infection prevention and treatment care, with a focus on overcoming key health system and local service delivery barriers, including monitoring of simple process and outcome indicators to measure progress.
- Use existing platforms (e.g., short message service [SMS] for providers, monthly meetings) to remind providers of recommended practices.
- Strengthen availability and quality of a minimum set of data to support clinical decision-making, programme management, quality improvement and surveillance efforts aimed at improving maternal and newborn outcomes related to peripartum infections and reducing antimicrobial resistance due to antibiotic misuse.
- Increase provider and community awareness of the signs of maternal peripartum infections, including importance of early care-seeking, referral to appropriate care level and prompt evidence-based treatment of women with peripartum infections.
- Review and update facility and community health worker screening, prevention, treatment and referral pathways for women at increased risk of maternal peripartum infections due to pre-existing maternal conditions (e.g., malnutrition, diabetes, obesity, severe anaemia, bacterial vaginosis, or group B streptococcus infections).
- Organize services to achieve compliance with recommended hospital infection control measures and to support positive behavior change and engagement of providers and staff (e.g., staff training and continuous feedback, dissemination of information and educational materials, distribution of infection control equipment and materials, establishment of local protocols, infection surveillance, and clinical audit and feedback).
- To support these recommendations, design and implement programmes with a strong evaluation component, and engage in implementation research to generate essential programme learning on implementation strategies and approaches in various settings.
- Support activities to improve the quality of gestational age assessment to facilitate appropriate administration of antibiotics in the context of PPROM.

This brief is made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the terms of the Cooperative Agreement AID-OAA-A-14-00028.

WHO Department of Maternal, Newborn, Child and Adolescent Health
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