

GUIDE TO INFECTION CONTROL IN THE HEALTHCARE SETTING

Infection Control in Obstetrics

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KEY ISSUES

Neonatal sepsis and postpartum endometritis (PPE) are mostly caused by organisms in the mothers' vaginal flora. The risk of these infections can be substantially reduced by simple infection control measures. However, in under-resourced countries they still cause substantial morbidity and mortality, in both hospital and community settings.

KNOWN FACTS

- The most important microorganisms causing neonatal sepsis are Group B streptococci (GBS) and *Escherichia coli*.
- Neonatal GBS sepsis can be prevented by administering intravenous antibiotics to the mother during labour. The decision to provide such prophylaxis is guided by the presence of risk factors for neonatal GBS sepsis (see below), or by the presence of vaginal GBS colonization.
- Caesarean section is the most important risk factor for post-partum maternal infection and is associated with a 5- to 20-fold increased risk of infection compared to vaginal delivery.
- Single-dose antibiotic prophylaxis reduces the risk of infections after caesarean section (wound infection, endometritis and urinary tract infection) in all patients (both emergency and elective procedures).
- Outbreaks of classical childbed fever caused by Group A beta-hemolytic streptococci still occur, albeit sporadically. They warrant prompt investigations into the source, including a search for carriers among healthcare workers (HCW).
- During labor, there is frequent and often uncontrolled contact with blood and other body fluids. Transmission rates of bloodborne pathogens are high when preventive measures are neglected.

CONTROVERSIAL ISSUES

- There is debate about whether antibiotic prophylaxis in caesarean sections should be given before skin incision or after cord clamping. Current evidence suggests that the administration of prophylaxis before skin incision is superior to prophylaxis after cord clamping in reducing the risk of infection, with no evidence of increased risk of neonatal complications^{1,2}.

SUGGESTED PRACTICE

General Considerations

- Standard infection control measures should be taken before, during and after labour. During labour, gloves should be worn at all times and it is advisable to wear a gown, a mask and eye protection during all procedures.
- Antibiotic prophylaxis should be administered during vaginal delivery at 4 hour intervals to high risk patients (see below) to prevent GBS sepsis in the neonate.
- In case of a caesarean section, a single dose of antibiotic prophylaxis (e.g. weight-based cefazolin - 2,000mg iv for patient \leq 120kg, 3,000mg iv for patient $>$ 120kg) should be administered intravenously to all patients, preferably 30 min before incision.
- In limited resource settings, cleaning of the birth canal with a disinfectant during vaginal examinations and other (instrumental) procedures can be used to reduce the risk of both neonatal sepsis and maternal infections.
- Vaginal exams should be kept to a minimum to limit the risk of infection.

- Anti-tetanus prophylaxis should be provided in case of delivery outside of the hospital and in case of unsafe abortion.
- In settings with high infection risk, post-delivery care of the cord stump should be performed with chlorhexidine washings.

Neonatal Sepsis

- The most important pathogens causing neonatal sepsis are group B streptococci (GBS) and *Escherichia coli*. The newborn becomes colonized with these micro-organisms during the passage through the birth canal.
- Prevention of infections with GBS can be achieved by providing intravenous high dose antibiotics every 4 hours until delivery to women who are colonised with GBS and/or to women with risk factors for neonatal GBS sepsis (delivery at <37 weeks gestation, membrane rupture for > 18 hours, intra-partum temperature > 100.4 F (38.0 C)).
- The feasibility and cost-effectiveness of screening for GBS colonisation during pregnancy depend on the setting.
- GBS prophylaxis should always be given to women who had GBS bacteriuria earlier in the course of pregnancy, and to those who previously had a child with GBS sepsis. High dose intravenous penicillin or ampicillin are the drugs of first choice. In patients who are allergic to penicillin, clindamycin is administered.

Post-Partum Endometritis

- Post-partum endometritis (PPE) is a serious complication of delivery. Infections are often polymicrobial, caused by the mother's endogenous flora, and outbreaks are rare.
- The incidence of PPE is much higher following caesarean sections than following vaginal deliveries.

- As for the prevention of any surgical infection, general principles to prevent PPE include sound surgical technique, skin antisepsis and timely antimicrobial prophylaxis.
- Although emergency Caesarean sections are associated with a higher infection rate than elective procedures, antibiotic prophylaxis is effective in both high-risk patients (in labour after membrane rupture) and low risk patients (intact membranes, not in labour)³. In addition, single dose prophylaxis (cefazolin plus metronidazole) is recommended by WHO following operative vaginal delivery, manual removal of the placenta, curettage of the uterus, or in case of fourth degree tears⁷.
- Despite adequate antimicrobial prophylaxis, the rate of PPE after caesarean section remains high (10–20%), and further prevention depends largely on the elimination of risk factors, such as reducing the number of vaginal examinations during labour.
- Manual removal of the placenta after a caesarean section is associated with a higher incidence of endometritis than spontaneous extraction of the placenta, which is preferred when possible

Bloodborne Pathogens during Delivery

- Blood borne pathogens are a threat to mother, child and healthcare worker during delivery.
- Scalp electrodes are contraindicated if the mother is infected with hepatitis B, C or HIV.
- In mothers with hepatitis B, the newborn should be immunized after delivery.
- In mothers infected with HIV, antiretroviral therapy during pregnancy and in the newborn reduces the risk of vertical transmission⁹.
- Blood exposure occurs frequently during labour. Gloves are frequently punctured. Needle stick injuries and splashes occur frequently.

Therefore, gloves should be worn at all times, and it is advisable to wear gowns, masks and eye protection⁷.

Herpes Simplex Virus (HSV)

- Mothers with active genital HSV infections should be handled with barrier precautions. Healthcare workers and the mother should wear gloves when touching the infected area or materials (gauzes etc.).

SUGGESTED PRACTICE IN UNDER-RESOURCED SETTINGS:

General Considerations

- In under-resourced countries, vaginal deliveries often take place in settings with limited resources and under unhygienic circumstances.
- Cheap and accessible interventions to reduce the risk of both neonatal and maternal infections are necessary. Examples of such measures include cleaning of the birth canal with an antiseptic and washing of the cord stump with chlorhexidine.

Neonatal Sepsis

- In resource-poor settings, implementation of sterile procedures during cord clamping, and proper care of the cord area are of major importance.
- Infection of the cord stump (omphalitis) is an important cause of neonatal morbidity and mortality in community and primary care settings in under-resourced countries, and recent review of the evidence shows that a substantial reduction in neonatal mortality can be achieved when using antiseptics to care for the cord stump instead of dry cord care (as recommended by the World Health Organisation) (RR all-cause mortality 0.77, 0.63 to 0.94)⁴.

Post-Partum Endometritis

- In resource-poor settings, when antibiotic prophylaxis is not available, cleaning of the birth canal with an antiseptic (chlorhexidine 0.25-0.50%) at every vaginal examination during active labour can prevent both maternal and neonatal infections.
- Data from non-randomised studies have suggested a reduction in infection risk as well as in colonisation rate⁴, but evidence from subsequent randomised trials is inconclusive^{5,6}. The effectiveness of this intervention may strongly depend on the background infection risk, and because it is a safe and inexpensive measure to reduce the risk of infection, it should certainly be used when other alternatives are not available.

SUMMARY

The importance of infection control in obstetrics was established when Semmelweis made his historical observations during the second half of the nineteenth century. Standard hygienic precautions by health care professionals are the best way to avoid health care-associated spread of pathogens. In addition, simple measures can largely prevent infections that are caused by micro-organisms of the mother's endogenous flora. Most infectious complications of delivery are now relatively rare, but in under-resourced countries the burden of neonatal and maternal postpartum morbidity and mortality due to bacterial infections remains high.

REFERENCES

1. Sun J et al. Prophylactic administration of cefazolin prior to skin incision versus antibiotics at cord clamping in preventing postcaesarean infectious morbidity: a systematic review and meta-analysis of randomized controlled trials. *Gynecol Obstet Invest* 2013;75:175–178.
2. Sullivan SA, Smith T, Chang E, et al. Administration of cefazolin prior to skin incision is superior to cefazolin at cord clamping in preventing postcaesarean infectious morbidity: a randomized, controlled trial. *Am J Obstet Gynecol* 2007;196:455.e1-e5.
3. Smail FM, Gyte GML. Antibiotic prophylaxis versus no prophylaxis for preventing infection after cesarean section. *Cochrane Database of Systematic Reviews* 2010, Issue 1. Art. No.: CD007482. DOI: 10.1002/14651858.CD007482.pub2.
4. Imdad A, Bautista RMM, Senen KAA, et al. Umbilical cord antiseptics for preventing sepsis and death among newborns. *Cochrane Database of Systematic Reviews* 2013 May 31;(5):CD008635.
5. Stade BC, Shah VS, Ohlsson A. Vaginal chlorhexidine during labour to prevent early-onset neonatal group B streptococcal infection. *Cochrane Database of Systematic Reviews* 2004, Issue 3. Art. No.: CD003520. DOI: 10.1002/14651858.CD003520.pub2.
6. Lumbiganon P, Thinkhamrop J, Thinkhamrop B, Tolosa JE. Vaginal chlorhexidine during labour for preventing maternal and neonatal infections (excluding Group B Streptococcal and HIV). *Cochrane Database of Systematic Reviews* 2004, Issue 4. Art. No.: CD004070. DOI: 10.1002/14651858.CD004070.pub2.
7. [World Health Organization 2000. Managing complications in pregnancy and childbirth: a guide for midwives and doctors.](#)
8. Mead PB, Hess SM, Page SD. Prevention and Control of Nosocomial Infections in Obstetrics and Gynecology in *Prevention and Control of Nosocomial Infections* (3rd Edition), RP Wenzel (Ed). Philadelphia: Williams and Wilkins, 1997; 995–1016.

9. [Siegfried N, van der Merwe L, Brocklehurst P, Sint TT. Antiretrovirals for reducing the risk of mother-to-child transmission of HIV infection. Cochrane Database of Systematic Reviews 2011, Issue 7. Art. No.: CD003510. DOI: 10.1002/14651858.CD003510.pub3](#)