Best Practices for Infection Prevention and Control in Perinatology
In All Health Care Settings that Provide Obstetrical and Newborn Care, PIDAC 2012

Perinatal Infections

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Outline:

- Maternal Immunization
- Group B Streptococcus
- Herpes Simplex Virus
- Hepatitis B Virus
- Hepatitis C Virus
- Human Immunodeficiency Virus
- Varicella Zoster Virus
- Influenza
Maternal Immunization
Maternal Immunization

• Immunization can reduce the occurrence of vaccine preventable diseases and benefit both mother and newborn

• For women entering childbearing age, susceptibility to rubella, varicella, pertussis should be determined and vaccine offered pre-pregnancy, if indicated

• All women of childbearing age should be evaluated for the possibility of pregnancy before immunization

• Household/family members should have up to date immunization to protect pregnant women and their newborns
  • influenza, pertussis, varicella
Maternal Immunization

• Live and/or live attenuated viral vaccines should not be administered during pregnancy
  • Counsel to delay pregnancy for 4 weeks

• Inactivated viral/bacterial vaccines are generally considered safe during pregnancy

• Pregnant women should be strongly encouraged to receive annual influenza vaccine at any time during pregnancy or lactation to protect themselves and their newborn

• Pregnant women not previously vaccinated with acellular pertussis vaccine should be encouraged to be vaccinated to protect their newborn
Maternal Immunization - Rubella

• Ante-natal screening for immunity to rubella
  • Screening is not necessary for women with documented evidence of rubella immunity (serology) or documented receipt of vaccine
  • Re-screening is not necessary in subsequent pregnancies
  • Booster doses are not considered necessary

• 1/3 of cases of CRS occur in 2nd and subsequent pregnancies
  • Women found susceptible during pregnancy should receive one dose of MMR post-partum, before discharge

• Immunize foreign-born adolescents and non-pregnant women from countries where rubella vaccine is not routine

• Health care workers should have documented immunity to rubella

Group B Streptococcus
Group B Streptococcus
*Streptococcus agalactiae*

- commonest cause of neonatal sepsis and meningitis in North America
- bowel commensal flora
  - secondarily colonizes female lower genital tract
  - genital tract colonization is intermittent; up to 30% of pregnant women may be colonized at term
GBS: risk factors for early onset disease

- gestation < 37 weeks
- fever > 37.5 °C during labour
- prolonged rupture of membranes ≥ 12-18 hours
- previous sibling with invasive GBS
- GBS bacteriuria during current pregnancy
Recommendations for prevention of perinatal early-onset GBS:

CDC 1996

Screening based approach:
• all pregnant women screened at 35-37 weeks
• intrapartum prophylaxis to all GBS carriers
• If GBS result not known, give prophylaxis if have a risk factor

Risk-factor based approach:
• GBS screening not done
• intrapartum prophylaxis if have a risk factor
Incidence of early- and late-onset invasive group B streptococcal disease
Screening vs Risk Factor Strategies

• Screening approach > 50% more effective than risk-based approach in preventing perinatal GBS: (RR 0.46)
  • NEJM 342:15-20, Jan 2000
  • NEJM 347:233-239, July 2002

• CDC Revised Guideline 2002 MMWR 51:RR-11:
  • Recommendation: universal prenatal GBS screening
Incidence of early- and late-onset invasive group B streptococcal disease

FIGURE 1. Rate* of early-onset and late-onset† invasive group B streptococcal disease in infants, by year — Active Bacterial Core surveillance system,§ United States, 1996–2004

* Per 1,000 live births.
† Ages 0–6 days for early-onset; ages 7–89 days for late-onset.
Perinatal GBS Screening

Use culture technique that maximizes the likelihood of GBS recovery

• swab:
  • distal vagina (introitus) and rectum
  • do not do cervical swab
  • label clearly if penicillin allergy requiring susceptibility testing

• medium:
  • selective broth with antimicrobials
  • direct culture + subculture to blood agar
GBS antimicrobial resistance

- penicillin preferred:
  - narrower spectrum - less likely to select resistant organisms
  - all isolates sensitive
  - also sensitive to cefazolin and vancomycin

- resistance to erythromycin and clindamycin increasing

- erythromycin resistance frequently associated with clindamycin resistance; may appear susceptible in vitro but have inducible resistance
GBS Intrapartum Chemoprophylaxis

Recommended:
• penicillin G 5mU IV load, then 2.5mU IV q4h until delivery

Alternative:
• ampicillin 2gm IV load, then 1gm IV q4h until delivery

Penicillin allergic:
• Not high risk for anaphylaxis (no previous immediate hypersensitivity):
  • cefazolin 2 g IV load, then 1 g q8h until delivery
• High risk for anaphylaxis and isolate sensitive:
  • clindamycin 900 mgm IV q8h until delivery, or
  • erythromycin 500 mgm IV q6h until delivery
• High risk for anaphylaxis and isolate resistant or susceptibility unknown:
  • vancomycin 1 g IV q12h until delivery
Intrapartum Prophylaxis Indicated:

- previous infant with invasive GBS disease
- GBS bacteriuria during current pregnancy
- positive GBS screening culture during current pregnancy
  - unless a planned cesarean delivery, in the absence of labour or amniotic membrane rupture, is performed
- unknown GBS status (culture not done, incomplete, or results unknown) and any of the following:
  - delivery at <37 weeks’ gestation
  - amniotic membrane rupture ≥ 18 hr
  - intrapartum temperature ≥38.0 °C
Intrapartum Prophylaxis NOT Indicated:

- previous pregnancy with a positive GBS screening culture (unless a culture was also positive during the current pregnancy)
- planned caesarean delivery performed in the absence of labour or membrane rupture (regardless of maternal GBS culture status)
- negative vaginal and rectal GBS screening culture in late gestation during the current pregnancy regardless of intrapartum risk factors
Management of Infant of GBS positive mother

• Term asymptomatic newborns with adequate IAP do not require therapy, but should be observed for 48 hours

• Newborns should be assessed and managed by a pediatrician or neonatologist if:
  • the newborn is pre-term
  • the newborn is symptomatic
  • there has been inadequate IAP
  • there are maternal risk factors such as chorioamnionitis or fever
Herpes Simplex Virus
Herpes Simplex Virus (HSV) in the Perinatal Period

- Transmission of HSV requires contact with lesions; patients with HSV infection are of minimal risk to other patients
  - Regardless of the presence or absence of lesions, all personnel/parents are to follow Routine Practices
- Most women who deliver infants with neonatal HSV infections have no history of genital HSV infection and no lesions at the time of delivery
  - The risk of transmission of infection to infants is greatly increased with maternal primary genital infection
Herpes Simplex Virus (HSV) in the Perinatal Period - oral and genital

• Educate the parents and other care givers regarding the risk that HSV may pose to the neonate both while in hospital and after discharge from hospital.

• Educate the parents and other care givers regarding the various protective measures so that they will understand the need to continue them at home.

• Parents and other care givers should not handle other newborns.
Non-active Stage – History of HSV

• Cesarean delivery for the prevention of neonatal HSV infection is NOT justified in women with a history of HSV genital infection but no active disease at time of delivery.

• Antepartum maternal cultures fail to predict the infant’s risk of exposure to HSV at delivery and are not recommended in the absence of genital lesions.
Active Stage – Genital HSV lesions present:

- In the presence of genital/perineal HSV lesions, Caesarean section is recommended. Cesarean section reduces, but does not eliminate the risk of newborn infection. A Caesarean section may reduce the risk of neonatal HSV infection if performed within 4-6 hours of membrane rupture.

- Many experts recommend Caesarean delivery even if the membranes have been ruptured for longer than 6 hours.
Active Stage – Genital HSV lesions present:

- If mother has active genital HSV, scalp electrodes should **not** be used. (Scalp electrode can become a point of entry for the virus.)

- If mother has evidence of active genital HSV, if direct test and/or virus culture have not been carried out previously, appropriate specimens should be taken for viral testing. For the diagnosis of HSV Infection in the mother take the following specimens:
  - Culture genital lesions, if present
  - Culture the cervix
Genital and Oral Lesions: Post-Partum Period

• Rooming-in is allowed when the mother demonstrates knowledge of protective measures.

• Infected family members must also observe preventive measures when handling infant. Neonatal transmission from infected spouses has been documented.

• Breast feeding is encouraged unless lesions are present on the breast (direct contact between lesion and infant could infect infant), and provided that reasonable care is taken.
Genital and Oral Lesions: Post-Partum Period

- Parents with naso-labial herpes should wear a mask or dry dressing that covers her/his lesion(s) while handling the infant, to prevent parent touching lesion and to prevent parent kissing infant with open lesions.
- Parents with extensive lesion(s) should be evaluated individually and may be excluded from infant contact and/or admission to the nursery.
Genital and Extragenital Lesions: Post-Partum Period

• Parents with herpetic whitlow should be evaluated and counseled individually by the responsible physician. Parents with hand lesions should use recommended hand hygiene measures and wear gloves before handling their infants. However there is no evidence that gloves are effective in preventing transmission in this instance.

• Other household members with herpetic whitlow should not have direct contact with the infant until the lesion is healed.
Asymptomatic Newborn Born to Mother with Active Genital HSV Infection

- Initial symptoms of HSV infection can occur at birth or as late as 6 weeks after birth.
- Rooming-in is strongly encouraged.
- Use Contact Precautions for duration of incubation period.
- Infants born after C-section and membranes ruptured < 4 hours.
  - Risk of transmission of infection is low but not zero. Contact Precautions should be considered.
Asymptomatic Newborn Born to Mother with Active Genital HSV Lesion

• All infants, regardless of method of delivery or primary or recurrent infection in the mother, must be closely observed for signs of sepsis, skin or mucous membrane lesions, convulsions, respiratory distress, i.e. pneumonia. Any suspicious lesions or symptoms should be reported to the responsible physician immediately.

• 24-48h after birth, samples for HSV culture should be taken using appropriate viral transport medium from asymptomatic babies from:
  • Urine, stool, rectum, mouth, eyes, nasopharynx.
Symptomatic newborn:

For diagnosis of neonatal HSV take the following specimens for virology:

- Fluid from vesicles
- Scrapings from base of vesicles
- Cerebrospinal fluid (CSF)
- Swab of mouth and nasopharynx
- Swab of eyes
- Urine
- Stool culture and rectal swab
Treatment of newborn with suspected HSV infection

• Positive cultures from infants longer than 24-48 hours after birth are likely to indicate viral replication and infant infection

• Antiviral therapy should be initiated if culture results from the infant are positive or if HSV is strongly suspected for other reasons
  • Intravenous acyclovir is the drug of choice for the treatment of neonatal HSV infection

• Before therapy is initiated, a cerebrospinal fluid (CSF) sample should be obtained for virology, as the results will influence the duration of treatment

• These infants should be managed on Contact Precautions
Hepatitis B Virus
Infants born to HBsAg positive mothers

- Infants born to HBsAg-positive mothers are at risk of developing Hepatitis B virus (HBV) infection
- The risk is highest when the mother is also HB “e” antigen positive or has a high viral load
- Consideration should be given to referring HBeAg-positive mothers to an expert (prenatally) for assessment for antiviral therapy
- Routine prenatal testing for HBsAg is recommended for all pregnant women and should be documented on the chart
Infants born to HBsAg positive mothers

• Significant reductions in vertical transmission of HBV with the administration of Hepatitis B immune globulin (HBIG) and Hepatitis B vaccine; if vaccine and HBIG are administered immediately after birth, less than 5% of infants become carriers, a reduction in transmission of nearly 90%.

• HBIG does not interfere with active immunization; immediate protection and long-lasting immunity can be conferred with simultaneous administration of HBIG and vaccine.

• Give HBIG IM as soon as possible and within 12 hours after birth; at the same time, give Hepatitis B vaccine at another site.
Hepatitis B Virus

• If the mother’s HBsAg status is unknown, a STAT* HBsAg should be done at delivery. In the absence of access to STAT hepatitis testing:
  • Infants >2kg: Hepatitis B vaccine alone should be administered within 12 hours after birth. In the event a HBsAg-positive result for the mother subsequently becomes available within 7 days of delivery, HBIG should then be administered. If the mother has risk factors, consider also giving HBIG at birth.
  • Infants ≤2kg: Both HBIG and HBV should be administered within 12 hours

*STAT = result within 12 hours
Infants born to HBsAg positive mothers

- HBV vaccine should be repeated at one and six months of age
  - Notify local Public Health of infants born to known HBsAg positive mothers to facilitate the infant receiving the subsequent injections
  - **Note:** For Preterm Infants who weigh less than 2kg at birth, four doses are recommended

- Infants should receive serological testing for anti-HBs and HBsAg between 9 and 18 months of age to monitor the success of this prophylaxis
Hepatitis B Virus

• Breastfeeding is **not** contraindicated in a HBsAg positive mother, if the infant receives HBIG and the first dose of vaccine as outlined above

• Use Routine Practices to manage both mother and infant

• **HBsAg positive father:** Infants born to mothers who are HBsAg negative but the father is a chronic HBsAg positive carrier, do not require HBIG but should receive the Hepatitis B vaccine, as the infant is a household contact of a carrier
Hepatitis C Virus
Hepatitis C Infected Mothers

• Hepatitis C infection is spread primarily by parenteral exposure to blood and blood products from Hepatitis C virus (HCV) infected persons. The prevalence of HCV in the pregnant population in Canada is low.

• Maternal-infant transmission is estimated to be approximately 5-6%; in HIV co-infected mothers, transmission is much higher.

• No effective interventions have been identified to decrease the risk of vertical transmission of HCV.
Who is at risk for Hepatitis C?

Examples, not an all inclusive list:

• Receipt of blood products prior to 1992 when screening the of blood products commenced.
• I VDU sharing needles and blood contaminated equipment
• Females with HIV should be screened for HCV
• Tattoos, piercing, etc., if not done safely
Hepatitis C Infected Mothers: Breastfeeding

• Maternal HCV infection is not a contraindication to breastfeeding.

• Mothers infected with HCV should be advised that transmission of HCV by breastfeeding has not been documented and breastfeeding is not contraindicated. The decision to breastfeed should be based on an informed discussion between the mother and the health care professional.

• Mothers who are HCV-positive and choose to breastfeed should consider abstaining if their nipples are cracked and bleeding.
Hepatitis C Infected Mothers

• Infants of women known to be infected with HCV should be evaluated for HCV infection at 18 months of age, when maternal antibodies transferred through the placenta will no longer confound the results of serological testing.

• Children found to be HCV positive should be referred to a paediatric hepatologist, gastroenterologist or infectious diseases physician, as antiviral therapy may be indicated.

• Use Routine Practices to manage both mother and infant
Human Immunodeficiency Virus
Reduction of Perinatal HIV Transmission

• Women account for 26% of individuals with HIV infection in Canada; the majority of these women are of childbearing age.

• Early diagnosis and management of HIV infection in these women, and expert management of pregnant HIV-infected (and at-risk) women and their newborns, can significantly reduce the risk of perinatal HIV transmission
Reduction of Perinatal HIV Transmission

• The number of infants born to HIV-infected mothers in Canada has increased progressively since 1996; however, the proportion of HIV-exposed infants who have become infected has decreased from 33% in 1996 to <1.7% in 2009.

• Maternal, perinatal and neonatal management may include the use of antiretroviral therapy for both mother and infant. Antiretroviral therapy can be safely administered during pregnancy and delivery and to the newborn, with minimal risk of toxicity to the newborn.
Reduction of Perinatal HIV Transmission

- All pregnant women should be screened for HIV, with appropriate counseling and consent, regardless of prior testing. Testing should occur at the first pre-natal visit; if there is suspected ongoing exposure to HIV infection, testing should be repeated in each trimester.

- For women with no pre-natal care and unknown HIV status at the time of labour and delivery:
  - do an HIV risk assessment
  - obtain rapid (point of care) HIV testing if high risk
  - offer HIV prophylaxis if high risk and rapid HIV testing not available
Who is at risk for HIV?

• Geographic risks related to recent immigration from
  • sub-Saharan Africa
  • south and southeast Asia

• Behavioural risks:
  • unprotected sexual intercourse with multiple partners
  • injection drug users
Reduction of Perinatal HIV Transmission:

• Physicians with expertise in caring for HIV-infected women during pregnancy and delivery, and their newborn infants, should be consulted as early as possible during pregnancy to
  a) facilitate coordination of care, and
  b) provide advice regarding the appropriate management during pregnancy, labour and delivery, and the post-partum period (for both mother and newborn).

• Follow-up with adult and paediatric HIV specialists should be arranged for both mother and newborn, preferably prior to discharge from hospital post-partum.
Reduction of Perinatal HIV Transmission:

- Prior to delivery, information regarding the mother’s HIV status should be communicated to both the delivery suite and to the health care providers who will provide care for the newborn immediately after birth.

- Use Routine Practices when caring for HIV positive women and their newborns.

- During labour, scalp fetal heart monitoring, scalp pH sampling, intrauterine pressure measurements and artificial rupture of membranes should be avoided to reduce risk of transmission to the infant.

- **Breast feeding and administration of expressed breast milk is contraindicated** if the mother is known to be HIV-infected, or is considered to be at high risk for HIV infection until results of HIV testing are known.
Reduction of Perinatal HIV Transmission

- Mode of delivery should be determined by an HIV specialist in conjunction with an obstetrician experienced in caring for HIV-infected women. In general, the following principles apply:
  - Vaginal delivery can be considered if infection is well controlled (viral load < 50 copies/mL)
  - Caesarean section is the recommended mode of delivery if the viral load is >1000 copies/mL
  - If HIV viral load is between 50 and 999 copies/mL Caesarean section should be considered
Intrapartum Care

• Antiretroviral therapy during labour and delivery should be directed by an HIV specialist; in general, intravenous zidovudine (ZDV) is recommended
  • Additional antiretroviral medications for the woman may be recommended depending on the mother’s HIV status.
Post-partum Care: Infant

• Consult with a paediatric HIV specialist as soon as possible

• Antiretroviral prophylaxis: zidovudine should be given as soon as possible after birth and within 12 hours; usually continued for 6 weeks

• Additional medications may be recommended depending on maternal status.

• Test the infant for HIV DNA within 14-21 days after birth; if negative, repeat at 1-2 months and 4-6 months of age
Varicella Zoster Virus (Chickenpox, Shingles)
Varicella (chickenpox) in Perinatology

• In susceptible pregnant women, varicella can result in significant maternal and fetal/newborn morbidity and mortality
  • Varicella vaccine should be recommended to non-pregnant women of childbearing age
  • Health care providers on maternal-newborn units should be immune to varicella
  • Family and household contacts of pregnant women should be immune to varicella
  • Exposed susceptible pregnant women should be offered varicella immune globulin (VarIg) within 96 hours of exposure
Varicella (chickenpox) in Perinatology

If the mother has chickenpox and the infant is healthy

- Routine Practices and Airborne Precautions used
  - Only immune staff to care for mother; exclude susceptible personnel
  - Mother/infant contact permitted; breastfeeding permitted
  - Precautions remain in place until lesions are crusted.
- Provide varicella immune globulin (VarIg) to infants where onset of maternal disease is <5 days prior to delivery or within 48 hours after delivery.
Herpes Zoster (shingles)

Mother-localized

• Routine Practices for mother and infant
• Single room recommended
• Care provided by immune staff only
• Mother/infant contact permitted. Total rooming-in preferred. Mother may not go to nursery/NICU until lesions are crusted.
• Breastfeeding permitted if lesions are not on breast.
Herpes Zoster (shingles)

Mother-disseminated

• Routine Practices and Airborne Precautions for mother
• Care provided by immune staff only

• If infant is term
  • Rooming-in preferred
  • Mother/infant contact permitted; breastfeeding permitted if lesions are not on breast

• If infant is in NICU
  • Mother may NOT go to the NICU until lesions are crusted
  • Mother may provide EBM
Herpes Zoster (shingles)

- VarIg is not indicated for infant >28 weeks if the mother has zoster
  - the infant has passive immunity to virus by maternal transfer of antibodies
Influenza
Influenza in Perinatology

- Pregnant women are at increased risk of severe influenza illness, hospitalization and death from complications of influenza.
- Newborns are at increased risk of severe influenza and hospitalization.
- Maternal influenza immunization protects both mothers and their newborns.
- Influenza vaccine is safe for women at all stages of pregnancy and lactation.
- Pregnant women should be strongly encouraged to receive influenza vaccine; CDC and NACI target group for influenza vaccine.
- Household and other close contacts of pregnant women and newborns should also receive influenza vaccine.
- HCWs who care for pregnant women and newborns should receive annual influenza vaccine.
Influenza in Perinatology

- Hospitalized pregnant women with acute respiratory infection should be managed on Droplet/Contact Precautions.
- Educate mothers with acute respiratory infection regarding the risks of transmission to their newborn and measures to mitigate transmission, e.g. hand hygiene, wearing mask, respiratory etiquette.
  - offer the option of having newborn room in with mother or receive care in the nursery.
- Family and visitors should refrain from visiting if they have acute respiratory infection.
  - educate regarding hand hygiene, respiratory etiquette, mask use within 2 meters of mother/newborn.
Recommendations for Perinatal Infections

• All maternal/newborn programs should have a process in place to ensure women of childbearing age receive appropriate immunization.

• All maternal/newborn programs should have policies and procedures in place to prevent vertical transmission of GBS, HSV, HBV and HIV and to prevent transmission of influenza.
Questions and Discussion