STANDARDS, LIMITS AND CONDITIONS FOR PRESCRIBING, ORDERING AND ADMINISTERING THERAPEUTICS[1]

Table of Contents

1.1 DRUGS WHICH MAY BE INDEPENDENTLY PRESCRIBED, ORDERED AND ADMINISTERED BY A MIDWIFE 13

Antibiotics 13
A) Antibiotics for Urinary Tract Infection 13
Amoxicillin (Amoxil®, Polymox®, Trimox®) 14
Cephalexin (Keflex®) 15
Nitrofurantoin (Macrobid®; Macrodantin®) 16
Cefixime (Suprax®) 17
B) Antibiotics for Group B Strep Prophylaxis 18
Ampicillin 19
Penicillin G 19
Cefazolin 20
Clindamycin 21
Vancomycin 22
C) Antibiotics for Mastitis 25
Cephalexin (Keflex®) 25
Cloxacillin 27
Clindamycin: 28
D) Erythromycin Ophthalmic Ointment 29

Anaesthetics 30
Bupivacaine hydrochloride 30
Lidocaine hydrochloride 31

Analgesics 32
Acetaminophen with Tramadol 32

Anti-fungals 34
Clotrimazole 34
Miconazole 35
Nystatin 36
APNO (All Purpose Nipple Ointment) - mupirocin, betamethasone, miconazole 37
Triamcinolone - neomycin sulfate - nystatin - gramicidin 38

[1] Formerly *Standards, Limits and Conditions for Prescribing, Ordering and Administering Drugs*

Anti-nauseants / Anti-emetics **39**
Doxylamine succinate-pyridoxine hydrochloride (Diclectin®) *(updated March 2018)* 39
Dimenhydrinate 40
Metoclopramide 41
Ranitidine (Zantac®) 41
Prochlorperazine *(added May 2018)* 42

Anti-virals **44**
Acyclovir and Valacyclovir 44
Oseltamivir 46

Benzodiazepine Receptor Antagonists **49**
Flumazenil 49

Corticosteroids **50**
Hydrocortisone compounds *(updated September 2018)* 50

Galactagogues **51**
Domperidone 51

Compression Stockings **52**

Histamine Antagonists **54**
Diphenhydramine Hydrochloride 54

Immune Globulins **55**
Hepatitis B Immune Globulin (HBIg) 55
Rh_0 (D) Immune Globulin (Human) *(updated March 2018)* 55

Inhalants **58**
Nitrous Oxide pre-mixed 50/50 with Oxygen 58
Oxygen 59

Intravenous Fluids **59**
Normal saline, Ringer's lactate, 5% dextrose in water 59

Narcotic antagonists **60**
Naloxone Hydrochloride 60

Nitrates **61**
Nitroglycerin 61

Non-steroidal anti-inflammatories **63**
Diclofenac 63
Naproxen 64

Sympathomimetics **65**
Epinephrine hydrochloride 65

Uterotonic agents **67**
Carboprost tromethamine 67

Ergonovine maleate 68
Misoprostol 69
Oxytocin 71

Vaccines *(updated March 2018)*..... 73
Inactivated Influenza Vaccine 74
Hepatitis B Vaccine 75
Measles / Mumps / Rubella (MMR) Vaccine 76
Varicella Vaccine 77
Tetanus Toxoid, Reduced Diphtheria Toxoid and Acellular Pertussis (Tdap) Vaccine 78

Vitamin and mineral prophylaxis and therapy..... 78
Phytonadione *(updated December 2017)* 79
Folic Acid 79

2.1 DRUGS WHICH MAY BE INDEPENDENTLY PRESCRIBED, ORDERED AND ADMINISTERED BY A MIDWIFE WITH SPECIALIZED PRACTICE CERTIFICATION OR WHICH MAY BE ADMINISTERED AFTER CONSULTING WITH AND ON THE ORDER OF A PHYSICIAN. *(UPDATED MARCH 2018)*..... 81

Cervical Ripening/ Induction Agents 81
Prostaglandins E2/Dinoprostone (Cervidil®, Prepidil®, Prostin E2®) 81
Prostaglandins E1/Misoprostol (Cytotec©) 82

Oxytocin Intravenous Infusion..... 83

Controlled Substances for use in prodromal and active labour and for use in the early postpartum period can be found in the *CMBC Standards, Limits and Conditions for Prescribing, Ordering and Administering Controlled Substances*.

For antibiotic treatment of Sexually Transmitted Infections, please refer to the *Standards, Limits and Conditions for Prescribing, Ordering and Administering Drugs for Sexually Transmitted Infections*.

For Hormonal Contraceptives, please refer to the *Standards, Limits and Conditions for Prescribing, Ordering and Administering Hormonal Contraceptives*.

Cross Reference to the *Standards, Limits and Conditions for Prescribing, Ordering and Administering Therapeutics*

This cross reference to CMBC's *Standards, Limits and Conditions for Prescribing, Ordering and Administering Therapeutics* is an inclusive list, organised by purpose or clinical indication. Midwives may not independently prescribe, order or administer any other therapeutics unless, on the advice of CMBC's multidisciplinary Standards of Practice Committee, these standards are amended consistent with the Schedule A and B of the Midwives Regulation or the government amends the Schedules to the Midwives Regulation.

The clinical indications are listed in alphabetical order followed by the category of treatment, then by name.

Alloimmunization Prevention

Rh (D) Immune Globulin (Human) (WinRho®)

Anaphylaxis

Histamine Antagonists
Diphenhydramine Hydrochloride (Benadryl®)
Sympathomimetic
Epinephrine hydrochloride
Epinephrine hydrochloride (EpiPen®)

Breast Milk Production

Galactagogue
Domperidone (Motilium®)

Candidiasis

Anti-fungals – Nipple treatment
APNO (All Purpose Nipple Ointment) - mupirocin, betamethasone, miconazole
Miconazole (Monistat®) derm cream
Triamcinolone - neomycin sulfate - nystatin – gramicidin (Kenacomb®)

Anti-fungals – Oral thrush treatment
Nystatin (Nilstat®, Mycostatin®)

Anti-fungals – Vaginal treatment
Clotrimazole (Canesten®)
Miconazole (Monistat®)

Episiotomy and Repair

Local Anaesthesia
Bupivacaine Hydrochloride (Marcaine®) – amide type anaesthetic
Lidocaine Hydrochloride (Xylocaine®) – amide type anaesthetic
Chloroprocaine (Nesacaine®) – ester type anaesthetic

Group B Streptococcus Prophylaxis

Antibiotics
Ampicillin
Cefazolin,
Clindamycin
Penicillin G
Vancomycin

Hemorrhoids

Corticosteroids
Hydrocortisone compound

Herpes Simplex Virus

Anti-virals
Acyclovir
Valacyclovir hydrochloride

Hydration

Intravenous Fluids
Normal saline (0.9% NaCl)
Ringer's lactate
5% dextrose in water (D5W)

Hypertonic Uterine Contractions

Nitrates
Nitroglycerin

Hypovolemia

Intravenous Fluids
Normal saline (0.9% NaCl)

Immunization

Inactivated Influenza Vaccine
Hepatitis B Vaccine
Measles/Mumps/Rubella (MMR)
Varicella Vaccine
TDaP vaccine

Induction/Augmentation of Labour (specialized practice certification required for prescribing)

Prostaglandins E2/Dinoprostone (Cervidil®, Prepidil®, Prostin E2®)
Prostaglandins E1/Misoprostol (Cytotec©)
Oxytocin

Influenza Treatment

Anti-virals
Oseltamivir (Tamiflu®)
Zanamivir (Relenza®)

Labour Pain Management

Inhalants
Nitrous Oxide pre-mixed 50/50 with Oxygen (Entonox® or Nitronox®)

Mastitis

Antibiotics
Cephalexin (Keflex®)
Clindamycin
Cloxacillin

Narcotic-Induced Depression

Narcotic Antagonist
Naloxone Hydrochloride (Narcan®)

Nausea and Vomiting

Anti-Nausea/Anti-Emetic
Dimenhydrinate (Gravol®)
Doxylamine succinate-pyridoxine hydrochloride (Diclectin®)
Metoclopramide (Maxeran®)
Ranitidine (Zantac®)
Prochlorperazine (Buccastem®, Compazine®, Nu-Prochlor®, Prorazin®, Stemetil®)

Opthalmia Neonatorium Prophylaxis

Erythromycin Ophthalmic Ointment

Perineal Laceration/Repair

Local Anaesthesia
Bupivacaine Hydrochloride (Marcaine®) – amide type anaesthetic
Lidocaine Hydrochloride (Xylocaine®) – amide type anaesthetic
Chloroprocaine (Nesacaine®) – ester type anaesthetic

Postpartum Hemorrhage

Uterotonic agents
Carboprost tromethamine (Hemabate®)
Ergonovine maleate
Misoprostol (Cytotec©)
Oxytocin

Postpartum Pain Management

Non-steroidal anti-inflammatories
Diclofenac (Voltaren®)
Naproxen (Anaprox®, Naprelan®, Naprosyn®)

Analgesics
Acetaminophen with Tramadol (Tramacet®)

Urinary Tract Infection

Antibiotics
Amoxicillin (Amoxil®, Polymox®, Trimox®)
Cefixime (Suprax®)
Cephalexin (Keflex®)
Nitrofurantoin (Macrobid®, Macrodantin®)

Varicose Veins
Compression stockings

Vitamin and mineral prophylaxis and therapy

Phytonadione (Vitamin K1)
Folic Acid

PREGNANCY DRUG RISK CATEGORIES

Category	Definitions[2]	Clinical Application
Category A	Controlled studies in clients fail to demonstrate a risk to the fetus in the first trimester (and there is no evidence of a risk in later trimesters), and the possibility of fetal harm appears remote.	For all practical purposes, there are no Category A drugs.
Category B	Either animal-reproduction studies have not demonstrated a fetal risk but there are no controlled studies in pregnant clients or animal-reproduction studies have shown an adverse effect (other than a decrease in fertility) that was not confirmed in controlled studies in clients in the first trimester (and there is no evidence of a risk in later trimesters).	Category B drugs include prenatal vitamins, acetaminophen and several other medications used routinely and safely during pregnancy. If there is a clinical need for a Category B drug, it is considered safe to use it.
Category C	Either studies in animals have revealed adverse effects on the fetus (teratogenic or embryocidal or other) and there are no controlled studies in clients or studies in clients and animals are not available. Drugs should be given only if the potential benefit justifies the potential risk to the fetus.	Category C drugs have not been shown to be harmful to fetuses (if they had been, they wouldn't be Category C drugs). However, there are some reasons to be more concerned about these drugs than Category B drugs. If the pregnant patient will benefit from a Category C drug, it is generally used, although most obstetricians would prefer a Category B drug if it will give equivalently good results.
Category D	There is positive evidence of human fetal risk, but the benefits from use in pregnant clients may be acceptable despite the risk (e.g., if the drug is needed in a life-threatening situation or for a serious	Category D drugs have some significant risks. They should be used during pregnancy only when the alternatives are worse.

[2] Canadian Pharmacists Association. (2010). *Compendium of Pharmaceuticals and Specialties (CPS).* Ottawa, ON: CPA.

	disease for which safer drugs cannot be used or are ineffective.)	
Category X	Studies in animals or human beings have demonstrated fetal abnormalities or there is evidence of fetal risk based on human experience or both, and the risk of the use of the drug in pregnant clients clearly outweighs any possible benefit. The drug is contraindicated in clients who are or may become pregnant.	Category X drugs should not be used during pregnancy.

PREGNANCY DRUG RISK DEFINITIONS OF RECOMMENDATIONS[3]

COMPATIBLE
The human pregnancy experience, either for the drug itself or drugs in the same class or with similar mechanisms of action, is adequate to demonstrate that the embryo-fetal risk is very low or nonexistent. Animal reproduction data are not relevant.

NO (LIMITED) HUMAN DATA – PROBABLY COMPATIBLE
There may or may not be human pregnancy experience, but the characteristics of the drug suggest that it does not represent a significant risk to the embryo-fetus. For example, other drugs in the same class or with similar mechanisms are compatible or the drug does not obtain significant systemic concentrations. Animal reproduction data are not relevant.

COMPATIBLE – MATERNAL BENEFIT – EMBRYO – FETAL RISK
There may or may not be human pregnancy experience, but the potential maternal benefit far outweighs the known or unknown embryo-fetal risk. Animal reproduction data are not relevant.

HUMAN DATA SUGGEST LOW RISK
There is limited human pregnancy experience, either for the drug itself of drugs in the same class or with similar mechanisms of action, including the 1st trimester, suggesting that the drug does not represent a significant risk of developmental toxicity (growth restriction, structural anomalies, functional/behavioral deficits, or death) at any time in pregnancy. The limited human pregnancy data outweigh any animal reproduction data.

NO (LIMITED) HUMAN DATA – ANIMAL DATA SUGGEST LOW RISK
Either there is no human pregnancy experience or the few pregnancy exposures have not been associated with developmental toxicity (growth restriction, structural anomalies, functional/behavioral deficits, or death). The drug does not cause developmental toxicity (at doses that did not cause maternal toxicity) in all animal species studied at doses $\leq$ 10 times the human dose based on body surface area of area under the plasma concentration vs. time curve; a measure of the systemic exposure of a drug (AUC).

[3] Briggs, Gerald G., Freeman, Roger K. (2015) *Drugs in Pregnancy and Lactation* Tenth Edition.

NO (LIMITED) HUMAN DATA – ANIMAL DATA SUGGEST MODERATE RISK
Either there is no human pregnancy experience or the few pregnancy exposures have not been associated with developmental toxicity (growth restriction, structural anomalies, functional/behavioral, deficits, or death). The drug causes developmental toxicity (at doses that did not cause maternal toxicity) in one animal species at doses ≤ 10 times the human dose based on body surface area or AUC.

NO (LIMITED) HUMAN DATA – ANIMAL DATA SUGGEST RISK
Either there is no human pregnancy experience or the few pregnancy exposures have not been associated with developmental toxicity (growth restriction, structural anomalies, functional/behavioral deficits, or death). The drug causes developmental toxicity (at doses that did not cause maternal toxicity) in two animal species at doses ≤ 10 times the human dose based on body surface area or AUC.

NO (LIMITED) HUMAN DATA – ANIMAL DATA SUGGEST HIGH RISK
Either there is no human pregnancy experience or the few pregnancy exposures have not been associated with developmental toxicity (growth restriction, structural anomalies, functional/behavioral deficits, or death). The drug causes developmental toxicity (at doses that did not cause maternal toxicity) in three or more animal species at doses ≤ 10 times the human dose based on body surface area or AUC.

CONTRAINDICATED – 1ST TRIMESTER
Human exposures in the 1st trimester, either to the drug itself or to drugs in the same class or with similar mechanisms of action, have been associated with developmental toxicity (growth restriction, structural anomalies, functional/behavioral deficits, or death). The drug should not be used in the 1st trimester.

CONTRAINDICATED – 2ND AND 3RD TRIMESTERS
Human exposures in the 2nd and 3rd trimesters, either to the drug itself or to drugs in the same class or with similar mechanisms of action, have been associated with developmental toxicity (growth restriction, structural anomalies, functional/behavior deficits, or death). The drug should not be used in the 2nd and 3rd trimesters.

CONTRAINDICATED
Human exposures at any time in pregnancy, either to the drug itself or to drugs in the same class or with similar mechanisms of action, have been associated with developmental toxicity (growth restriction, structural anomalies, functional/behavioral deficits, or death). Animal reproduction data, if available, confirm the risk. The drug should not be used in pregnancy.

NO (LIMITED) HUMAN DATA – NO RELEVANT ANIMAL DATA
There is no human pregnancy data or relevant data in animals, or the human pregnancy experience, that may or may not include the 1st trimester, is limited. The risk in pregnancy cannot be assessed.

HUMAN DATA SUGGEST RISK IN 1ST TRIMESTER
Evidence (for the drug or similar drugs) suggests that there may be an embryo-fetal risk for developmental toxicity (growth restriction, structural anomalies, functional/behavioral deficits, or death) in the 1st trimester but not in the 2nd and 3rd trimesters. The human pregnancy data outweigh any animal reproduction data.

HUMAN DATA SUGGEST RISK IN 1ST AND 3RD TRIMESTERS
Evidence (for the drug or similar drugs) suggests that there may be an embryo-fetal risk for developmental toxicity (growth restriction, structural anomalies, functional/behavioral deficits, or death) in the 1st and 3rd trimesters but not in the 2nd trimester. The human pregnancy data outweigh any animal reproduction data.

HUMAN DATA SUGGEST RISK IN 2ND AND 3RD TRIMESTERS
Evidence (for the drug or similar drugs) suggests that there may be a fetal risk for developmental toxicity (growth restriction, structural anomalies, functional/behavioral deficits, or death) in the 2nd and 3rd trimesters but not in the 1st trimester. The human pregnancy data outweigh any animal reproduction data.

HUMAN DATA SUGGEST RISK IN 3RD TRIMESTER
Evidence (for the drug or similar drugs) suggests that there may be a fetal risk for developmental toxicity (growth restriction, structural anomalies, functional/behavioral deficits, or death) in the 3rd trimester, or close to delivery but not in the 1st or 2nd trimesters. The human pregnancy data outweigh any animal reproduction data.

HUMAN (AND ANIMAL) DATA SUGGEST RISK
The human data for the drug or drugs in the same class or with the same mechanism of action, and animal reproduction data if available, suggest there may be a risk for developmental toxicity (growth restriction, structural anomalies, functional/behavioral deficits or death) throughout pregnancy. Usually, pregnancy exposure should be avoided, but the risk may be acceptable if the maternal condition requires the drug.

LACTATION DRUG RISK CATEGORIES[4]

L1 Compatible:
Drug which has been taken by a large number of breastfeeding mothers without any observed increase in adverse effects in the infant. Controlled studies in breastfeeding clients fail to demonstrate a risk to the infant and the possibility of harm to the breastfeeding infant is remote; or the product is not orally bioavailable in an infant.

L2 Probably Compatible:
Drug which has been studied in a limited number of breastfeeding clients without an increase in adverse effects in the infant. And/or, the evidence of a demonstrated risk which is likely to follow use of this medication in a breastfeeding client is remote.

L3 Probably Compatible:
There are no controlled studies in breastfeeding clients, however the risk of untoward effects to a breastfed infant is possible, or controlled studies show only minimal non-threatening adverse effects. Drugs should be given only if the potential benefit justifies the potential risk to the infant. (New medications that have absolutely no published data are automatically categorized in this category, regardless of how safe they may be.)

L4 Possibly Hazardous:
There is positive evidence of risk to a breastfed infant or to breastmilk production, but the benefits of use in breastfeeding mothers may be acceptable despite the risk to the infant

[4] Hale, T. W., Rowe, Hilary E., (2014). *Medications in Mother's Milk (16th edition)*. Plano, TX: Hale Publishing.

(e.g. if the drug is needed in a life-threatening situation or for a serious disease for which safer drugs cannot be used or are ineffective).

L5 Hazardous:

Studies in breastfeeding mothers have demonstrated that there is significant and documented risk to the infant based on human experience, or it is a medication that has a high risk of causing significant damage to an infant. The risk of using the drug in breastfeeding clients clearly outweighs any possible benefit from breastfeeding. The drug is contraindicated in clients who are breastfeeding an infant.

BREASTFEEDING DRUG RISK DEFINITIONS OF RECOMMENDATIONS[5]

COMPATIBLE
Either the drug is not excreted in clinically significant amounts into human breast milk or its use during lactation does not, or is not expected to, cause toxicity in a nursing infant.

HOLD BREASTFEEDING
The drug may or may not be excreted into human breast milk, but the maternal benefit of therapy far outweighs the benefits of breast milk to an infant. Breastfeeding should be held until maternal therapy is completed and the drug has been eliminated (or reaches a low concentration) from her system.

NO (LIMITED) HUMAN DATA – PROBABLY COMPATIBLE
Either there is no human data or the human data are limited. The available data suggest that the drug does not represent a significant risk to a nursing infant.

NO (LIMITED) HUMAN DATA – POTENTIAL TOXICITY
Either there is no human data or the human data are limited. The characteristics of the drug suggest that it could represent a clinically significant risk to a nursing infant. Breastfeeding is not recommended.

HUMAN DATA SUGGEST POTENTIAL TOXICITY
Human data suggest a risk to a nursing infant. The drug is best avoided during breastfeeding. Depending on the drug short-term use by the mother may be possible, but the infant should be closely monitored for potential adverse effects.

NO (LIMITED) HUMAN DATA – POTENTIAL TOXICITY (MOTHER)
Either there is no human data or the human data are limited. The characteristics of the drug suggest that breastfeeding could represent a clinically significant risk to the mother such as further loss of essential vitamins or nutrients. Breastfeeding is not recommended.

CONTRAINDICATED
There may or may not be human experience, but the combined data suggest that the drug may cause severe toxicity in a nursing infant, or breastfeeding is contraindicated because of the maternal condition for which the drug is indicated. Clients should not breastfeed if they are taking the drug or have the condition.

[5] Briggs, Gerald G., Freeman, Roger K. (2015) *Drugs in Pregnancy and Lactation* Tenth Edition.

STANDARDS, LIMITS and CONDITIONS for PRESCRIBING, ORDERING and ADMINISTERING THERAPEUTICS[6]

1.1 Drugs which may be independently prescribed, ordered and administered by a midwife.

The following standards, limits and conditions apply to the schedule of drugs and substances which midwives are able to independently prescribe, order and administer in the community, hospital or other sites of midwifery practice. This list is inclusive. Midwives may not independently prescribe, order or administer any other drugs or substances unless, on the advice of CMBC's Multidisciplinary Standards of Practice Committee, these standards are amended consistent with the Schedule A and B of the Midwives Regulation or the government amends the Schedules to the Midwives Regulation.

These *Standards* provide indications, routes of administration and upper dosage limits where appropriate, for drugs which may be prescribed, ordered or administered by midwives. Following these *Standards* is mandatory for all registered midwives.

Management decisions on clinical data should be based on local dosage and administration where these differ from those provided in this standard.

Antibiotics

Choice of antibiotic[7,8] – It is important to review the sensitivity patterns of bacteria in your local area or health authority.

Antibiotic treatment of sexually transmitted infections requires specialized certification, please refer to the *Standards, Limits and Conditions for Prescribing, Ordering and Administering Drugs for Sexually Transmitted Infections*.

A) Antibiotics for Urinary Tract Infection

Amoxicillin (Amoxil®, Polymox®, Trimox®),
Cephalexin (Keflex®),
Nitrofurantoin (Macrobid®, Macrodantin®), and
Cefixime (Suprax®)

Urinary tract infection (UTI) is the most common bacterial infection during pregnancy. Due to predisposing factors such as urinary stasis and vesicoureteral reflux, there are greater risks of upper UTIs during pregnancy. Untreated upper UTIs are associated with low birth weight, prematurity, premature labour, hypertension and/or preeclampsia, anemia, and amnionitis. Asymptomatic bacteriuria found on a midstream urine culture is a risk factor for an upper UTI. Timely treatment reduces the risk of symptomatic infection with its associated risks. A follow-up culture for test of cure should be obtained at one week after completion of treatment; up to 30 percent will fail to clear asymptomatic bacteriuria. If a repeat urine culture is positive or if symptoms remain, physician referral is required.

[6] Formerly *Standards, Limits and Conditions for Prescribing, Ordering and Administering Drugs*
[7] Drug Information Lexicomp. (n.d.). *Cephalexin, nitrofurantoin, cefixime.* Retrieved from www.uptodate.com
[8] Vancouver Island Health Authority. (2012). *Infection prevention and control manual.* Retrieved from www.viha.ca

Amoxicillin (Amoxil®, Polymox®, Trimox®)

Penicillin antibiotics act as a broad spectrum bactericidal against many gram-positive and gram-negative microorganisms. This is achieved through the inhibition of biosynthesis of cell wall mucopeptide.

Indications and Clinical Use:
For treatment of uncomplicated asymptomatic or symptomatic urinary tract infections (UTIs) in pregnancy and the postpartum caused by *Enterococcus faecalis*, *Escherichia coli,* or *Proteus mirabilis*.

Contraindications:
Documented hypersensitivity or allergy to amoxicillin or to any other penicillin antibiotic.

Warnings and Precautions:
Reduces efficacy of oral contraceptives; adjust dose in renal impairment; may enhance chance of candidiasis. Prolonged use may result in fungal or bacterial superinfection, including *C. difficile*-associated diarrhea (CDAD) and pseudomembranous colitis; CDAD has been observed >2 months post-antibiotic treatment.

Use with caution in asthmatic patients.

Breastfed infants may develop slightly looser stools than normal. Modification of bowel flora and allergic sensitization of the infant may occur[9].

Pregnancy:
Human Data Suggest Risk in 1st and 3rd Trimesters

Lactation:
Category L1 - Compatible

Adverse Reactions:
Upset stomach, diarrhea, vomiting, vaginal infection and mild skin rash. The following should be reported to a medical practitioner immediately: severe skin rash, itching, hives, difficulty breathing or swallowing, wheezing, unusual bleeding or bruising, sore throat, painful mouth or throat sores, jaundice and diarrhea.

Dosage and Administration:
Asymptomatic bacteriuria (ASB):
Amoxicillin (Amoxil®, Polymox®, Trimox®): 500 mg orally every 8 hours (tid) for 3 days

Acute cystitis:
Amoxicillin (Amoxil®, Polymox®, Trimox®): 250-500 mg orally every 8 hours (tid) for 10 days

May be taken with food

[9] Drug Information Lexicomp. (n.d.). *Amoxicillin drug information*. Retrieved from www.uptodate.com

Onset of Action:
Oral: Rapid; food does not interfere with absorption.

Half-Life:
1-1.4 hours

Cephalexin (Keflex®)

A first generation cephalosporin antibiotic. It interferes with the bacteria's cell wall formation by weakening the cell wall, causing it to rupture and killing bacteria.

Indications and Clinical Use:
For the treatment of asymptomatic or symptomatic urinary tract infection. It does not cover methicillin-resistant Staph Aureus (MRSA), which may account for about 21% of the staph aureus cultured[10]. It is also used to treat other bacterial infections such as pneumonia and bone, ear and skin that are not included in the *Midwives Regulation - Schedule A and B*.

Cephalexin provides good coverage for 1) streptococcus & staphylococcus; and modest coverage for 2) Escherichia coli, Klebsiella and Proteus (EKP) gram negative bacteria implicated in urinary tract infections.

Contraindications:
Documented anaphylaxis to any penicillin antibiotic.

Warnings and Precautions:
Prolonged use may result in fungal or bacterial superinfection, including *C. difficile*-associated diarrhea (CDAD) and pseudomembranous colitis; CDAD has been observed >2 months post-antibiotic treatment. Use with caution in patients with renal impairment; modify dosage in severe impairment.

Breastfed infants may develop slightly looser stools than normal.

Pregnancy:
Compatible – generally accepted that cephalosporins are safe to use during pregnancy

Lactation:
Category L1 – Compatible – generally considered to be compatible with breast-feeding

Adverse Reactions:
Upset stomach, diarrhea, vomiting, vaginal infection and mild skin rash. The following should be reported to a medical practitioner immediately: severe skin rash, itching, hives, difficulty breathing or swallowing, wheezing, unusual bleeding or bruising, sore throat, painful mouth or throat sores, jaundice and diarrhea.

Dosage and Administration:
Asymptomatic Bacteriuria:
Cephalexin (Keflex®): 250 mg orally every 6 hours (qid) for 3 days

[10] Vancouver Island Health Authority (VIHA) 2011

Cystitis:
Cephalexin (Keflex®): 250 mg orally every 6 hours (qid) for 7-14 days or
500 mg orally every 12 hours (bid) for 7-14 days

May be taken with or without food. Taking with food may minimize gastrointestinal distress. Taking an active probiotic concurrently may help minimize changes to GI flora.

Onset of Action:
Rapid absorption, peak in about 1 hour.

Half-Life:
Adults: 0.5-1.2 hours; prolonged with renal impairment

Elimination:
Urine (80% to 100% as unchanged drug) within 8 hours

Maximum milk concentration occurs at 4 hours after a single oral dose and gradually disappears by 8 hours after administration.

Nitrofurantoin (Macrobid®; Macrodantin®)

Inhibits bacterial enzyme systems thus interferes with metabolism and cell wall synthesis.

Indications and Clinical Use:
For the prevention and treatment of urinary tract infections caused by susceptible gram-negative and some gram-positive organisms; *E. coli*, *S. aureus, Enterococcus, Klebsiella,* and *Enterobacter.* Pseudomonas, Serratia, and most species of Proteus are generally resistant to nitrofurantoin.

Contraindications:
Contraindicated, at term (37-42 weeks)[11]**,**[12] **during labour, or when onset of labour is imminent** as it may cause hemolytic anemia in infants, most often in the Mediterranean population.

Warnings and Precautions:
Caution is advised with G6PD deficiency or anemia. Although rare, severe hepatic reactions have been associated with nitrofurantoin (onset may be insidious); discontinue immediately if hepatitis occurs. Has been associated with peripheral neuropathy (rare); risk may be increased by renal impairment, diabetes, vitamin B deficiency, or electrolyte imbalance.

Pregnancy:
Human Data Suggest Risk in 3rd Trimester

Lactation:
Category L2 - Limited Human Data – Probably Compatible
Use with caution in newborns at risk for hyperbilirubinemia.

[11] Cimolai, N., Cimolai, T. (2007, June 19). Nitrofurantoin and pregnancy. *CMAJ, 176*(13), 1860-1861.
[12] Hooton, T. M. (2012). *Acute uncomplicated cystitis and pyelonephritis in wome*n. Retrieved from www.uptodate.com

Adverse Reactions:
Nausea, vomiting, diarrhoea, drowsiness and dizziness, peripheral neuropathy (reversible) and respiratory symptoms (drug-induced pneumonitis).

Dosage and Administration:
Sustained release (commonly Macrobid®): 100 mg orally with food every 12 hours (bid) for 5 to 7 days, or
Regular release – 50-100 mg orally with food every 6 hours (qid) for 3 days if UTI is asymptomatic and 7 days if symptomatic.

Take with meals to improve absorption and decrease adverse effects.

Onset of Action:
Metabolized according to sustained or regular release. Slower absorption in sustained release.

Peak antibacterial concentrations: approximately 30 minutes.

Half-Life:
20-60 minutes

Cefixime (Suprax®)

An oral antibiotic of the cephalosporin class, related to penicillin. This drug has an extended spectrum of activity including about 95% coverage of E. Coli, which is the most common organism causing UTI in pregnancy.

Indications and Clinical Use:
Used for the treatment of urinary tract infection in pregnancy (UTI). This drug should be considered as a second line for treatment of UTI in pregnancy due to concerns of developing resistance.

Contraindications:
Allergy to cephalosporin group of antibiotics

Warnings and Precautions:
Chance of cross-reactivity is low (around 3%) if the patient is penicillin sensitive, however do not use it for highly allergic (eg. anaphylactic) patients. Use with caution in patients with colitis.

Alteration of GI flora may occur, as with all antibiotics, see *Probiotic Use with Antibiotic*s.

Pregnancy:
Compatible

Lactation:
Category L2 - Limited Data – Probably Compatible

Adverse Reactions:
Diarrhea, gas, loose stools, nausea and stomach upset.

Dosage and Administration:
The dose is 400 mg daily for 7 days.
Administer with food if GI upset occurs.

Onset of Action:
Time to peak, serum: 2-6 hours; delayed with food.

Half-Life:
3-4 hours.

B) Antibiotics for Group B Strep Prophylaxis

Choice of antibiotic[13] - It is important to review the sensitivity patterns of bacteria in your local area or health authority.

Ampicillin, Penicillin G, Cefazolin, Clindamycin, and Vancomycin

For treating asymptomatic Group B Strep, the midwife may order these antibiotics following the Perinatal Services of BC (PSBC) or other appropriate hospital protocol. All of these antibiotics have similar activity against GBS and all cross the placenta. Ampicillin, having a broader spectrum of anti-microbial activity than Penicillin, may be more likely to lead to selection or resistant organisms than would widespread use of Penicillin.

Group B streptococcus (GBS) bacteria is a gram-positive coccus commonly found in the gastrointestinal tract. It is estimated that between 10 and 30% are colonized with the Group B streptococcus at any given time including at the time of birth. The GBS bacteria can migrate out of the digestive tract and into the vaginal canal and into the urethra and colonize the bladder. GBS bacteriuria occurs in 2% to 4% of all pregnancies and is associated with urinary tract disease (see Antibiotics for Urinary Tract Infection above), endometritis, wound infection and an increased risk of neonatal disease. Heavy colonization of GBS has been associated with preterm labour and preterm premature rupture of membranes. GBS can potentially cause devastating complications for the newborn infant such as sepsis, pneumonia, meningitis and death.

The antibiotic regimen of choice for intrapartum chemoprophylaxis is intravenous Penicillin G or Ampicillin. Penicillin G is generally considered preferable to Ampicillin. If allergic to Penicillin, intravenous Cefazolin may be administered if low risk for anaphylaxis, or intravenous Clindamycin if high risk for anaphylaxis **and** the GBS is confirmed to be sensitive to Clindamycin, or intravenous Vancomycin if at high risk for anaphylaxis and the GBS is not sensitive to Clindamycin. If Vancomycin is being considered, an antenatal referral for penicillin skin testing to confirm the penicillin allergy is recommended. The incidence of anaphylactic reaction to Penicillin ranges from .04 to .004 (4 in 10,000 to 4 in 100,000).

[13] Drug Information Lexicomp. (n.d.). *Ampicillin, Penicillin G, Cefazolin, Clindamycin, Vancomycin drug information.* Retrieved from www.uptodate.com

Ampicillin

A broad spectrum anti-microbial synthetic Penicillin inhibiting bacterial cell wall synthesis. It is an antibacterial agent with a broad spectrum of bactericidal activity against Penicillin-susceptible Gram-positive organisms and other common Gram-negative pathogens.

Indications and Clinical Use:
Intravenous Ampicillin for intrapartum chemophophylaxis against GBS infection.

Contraindications:
Hypersensitivity to Ampicillin or any other component of the formulation or to other penicillin's.

Warnings and Precautions:
*Clostridium difficile associated diarrhea (CDAD) has been reported and can occur over two months after the use of many antibacterial agents, including Ampicillin. CDAD ranges in severity from mild diarrhea to fatal colitis. Treatment with antibacterial agents alters the normal flora of the colon which in turn leads to the overgrowth of *C. difficile*.

Use with caution in asthmatic and renal impaired patients.

Breastfed infants may develop slightly looser stools than normal.

Pregnancy Category:
Human Data Suggest Risk in 1st Trimester

Lactation Category:
Category L1 - Compatible

Adverse Reactions:
Fever, rash, nausea and vomiting, penicillin encephalopathy and seizure.

Dosage and Administration:
IV: 2 g initial dose followed by 1 g every 4 hours until delivery.
Administer over 10-15 minutes (1-2 g).

Onset of Action:
Peak serum concentrations occur immediately once administration is complete.

Half- life:
0.7-1.5 hours in adults. Serum concentrations may still be detectable within 6 hours of administration.

Penicillin G

Inhibits mucopeptide synthesis of bacterial cell wall. Penicillin G is a bactericidal against penicillin-susceptible microorganisms.

Indications and Clinical Use:
Intravenous Penicillin G is the **antibiotic of choice** for intrapartum chemophophylaxis.

Contraindications:
History of a hypersensitivity reaction to any penicillin.

Warnings and Precautions:
Administer drug with caution to cephalosporin-sensitive patients due to possible cross-reactivity.
Use with caution in patients with histories of significant allergies and/or asthma.
Use with caution in patients with renal impairment and in patients with a history of seizure disorder.
Breastfed infants may develop slightly looser stools than normal.

Pregnancy:
Compatible

Lactation:
Category L1 - Compatible

Adverse Reactions:
Anxiety, confusion, dizziness, tremors, nausea, vomiting and diaphoresis.

Dosage and Administration:
IV: 5 million units followed by 2.5 – 3.0 million units every 4 hours until delivery.

Onset of Action:
IV: Peak serum concentrations occur immediately once administration is complete and within 1 hour.

Half-Life:
30-50 minutes

Elimination:
Urine (58% to 85% as unchanged drug)

Cefazolin

First generation cephalosporin antibiotic. Cefazolin inhibits bacterial cell wall synthesis by binding to one or more of the penicillin-binding proteins, thus inhibiting cell wall biosynthesis.

Indications and Clinical Use:
If allergic to Penicillin, and at low risk for anaphylaxis, intravenous Cefazolin may be administered.

Contraindications:
Hypersensitivity to cefazolin sodium, any component of the formulation, or other cephalosporins

Warnings and Precautions:
Use with caution in patients with a history of penicillin allergy.
Use with caution in patients with renal impairment.
Use with caution in patients with a history of seizure disorder.

Breastfed infants may develop slightly looser stools than normal.

Pregnancy:
Compatible

Lactation:
Category L1 - Compatible

Adverse Reactions:
Fever, seizure, rash, pruritus, Stevens-Johnson syndrome, diarrhea, nausea, vomiting, abdominal cramps, colitis and oral candidiasis

Dosage and Administration:
IV: 2 g followed by 1 g every 8 hours until delivery.

Onset of Action:
IV: Peak serum concentrations occur immediately once administration is complete and within 0.5-2 hours.

Half-Life:
90-150 minutes

Elimination:
Urine (80% to 100% as unchanged drug)

Clindamycin

Clindamycin is a lincosamide, a type of antibiotic that works by inhibiting bacterial protein synthesis.

Indications and Clinical Use:
Used as a second choice treatment for GBS if penicillin allergic. Intravenous Clindamycin is recommended if at high risk for anaphylaxis **and** the GBS is confirmed to be sensitive to Clindamycin.

Contraindications:
Known hypersensitivity or allergy.

Warnings and Precautions:
Prolonged use may result in fungal or bacterial superinfection, including *C. difficile*-associated diarrhea (CDAD) and pseudomembranous colitis. With any diarrhea after taking Clindamycin, maternal stool should be tested for *C. difficile*. A positive test for *C. difficile* is a reason for physician consult. CDAD has been observed >2 months post-antibiotic treatment.

Pregnancy:
Compatible

Lactation
Category L2 - Limited Data – Probably Compatible

Clindamycin has the potential to cause adverse effects on the breastfed infant's gastrointestinal flora. If oral or intravenous clindamycin is required during breastfeeding, it is not a reason to discontinue breastfeeding, but an alternate drug may be preferred. Monitor the infant for possible effects on the gastrointestinal flora, such as diarrhea, candidiasis (thrush, diaper rash) or rarely, blood in the stool indicating possible antibiotic-associated colitis.

Adverse Reactions:
Upset stomach, diarrhea, vomiting, vaginal infection and mild skin rash.

The following side effects should be reported to a medical practitioner immediately: severe skin rash, itching, hives, difficulty breathing or swallowing, wheezing, unusual bleeding or bruising, sore throat, painful mouth or throat sores, jaundice and diarrhea (in particular with Clindamycin).

Dosage and Administration:
IV: 900 mg every 8 hours until delivery.

Onset of Action:
Absorption is rapid; widely distributed into most body tissues and fluids, including gallbladder, liver, kidneys, bone, sputum, bile, and pleural and synovial fluids.

Half-Life:
2-3 hours

Vancomycin

A glycopeptide anti-infective antibiotic. Inhibits bacterial cell wall synthesis by blocking glycopeptide polymerization which alters cell-membrane permeability.

Indications and Clinical Use:
Intravenous Vancomycin is recommended if at high risk for anaphylaxis and the GBS is not sensitive to Clindamycin.

Contraindications:
Hypersensitivity to Vancomycin or any component of the formulation. Avoid in patients with previous hearing loss.

Warnings and Precautions:
Use with caution in patients with renal impairment.
Rapid IV administration may result in erythema, flushing, hypotension, urticaria, and/or pruritus.

Pregnancy:
Compatible

Lactation:
Category L1 - Limited Human Data – Probably Compatible

Small amounts of Vancomycin are excreted in human milk. When given intravenously, the small amount that distributes to the milk would not be expected to cause systemic toxicity due to the lack of GI absorption. Effects could include modification of bowel flora.

Adverse Reactions:
Anaphylaxis, hypotension, pruritus, rash, Stevens-Johnson syndrome, urticaria, vasculitis, nausea, chills, drug fever, hypotension and flushing of the face, neck, upper chest, and extremities.

Dosage and Administration:
IV: 1 g every 12 hours until delivery.

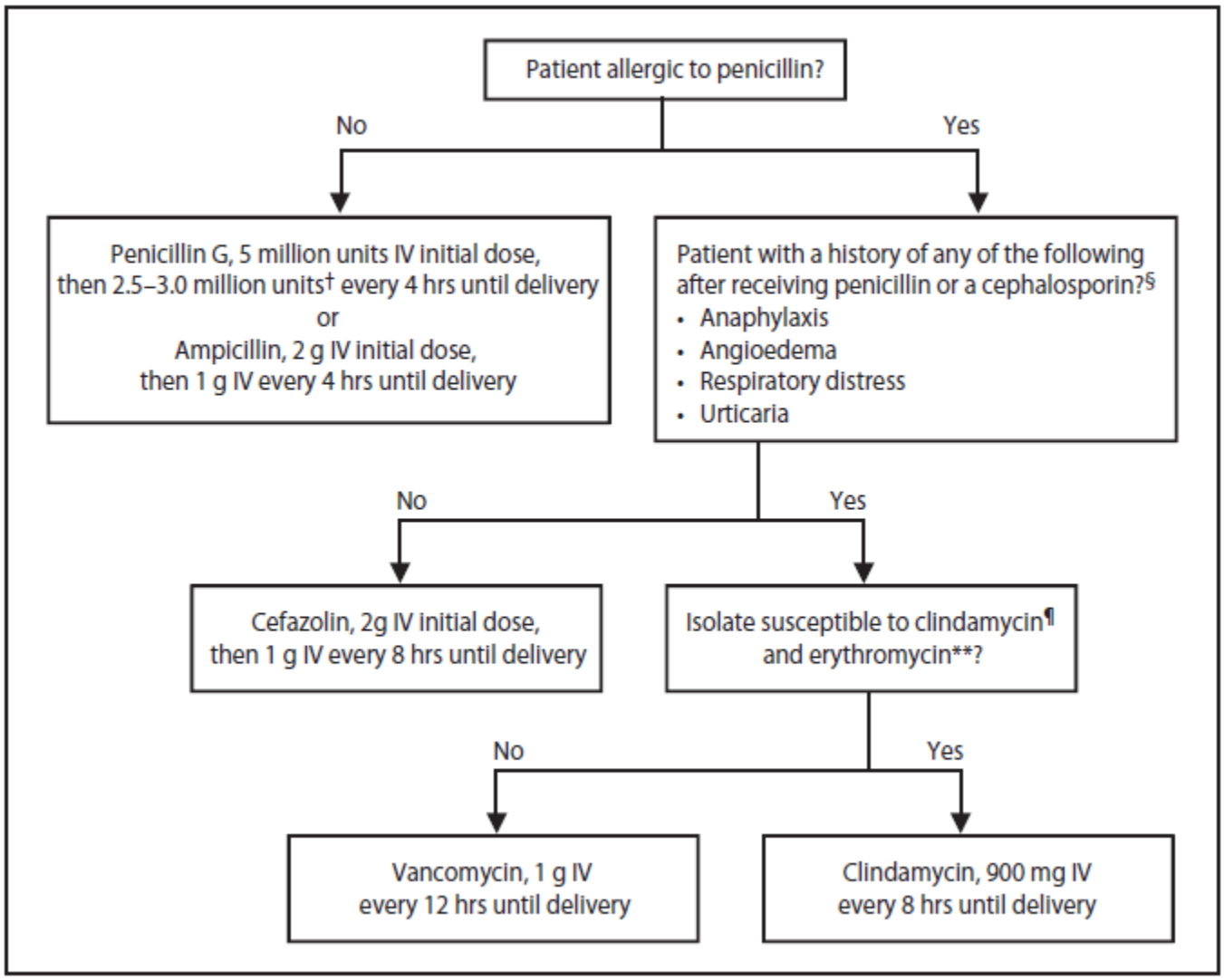
Onset of Action:
IV: Immediately after completion of infusion

Half-Life:
5-11 hours.

Elimination:
Urine (80% to 90% as unchanged drug)

Recommended regimens for intrapartum antibiotic prophylaxis for prevention of early-onset group B streptococcal (GBS) disease*

SOGC 2014 summary excerpt



C) Antibiotics for Mastitis

Choice of antibiotic[14]- It is important to review the sensitivity patterns of bacteria in your local area or health authority.

Cephalexin (Keflex®), Cloxacillin and Clindamycin

For treatment of symptoms consistent with mastitis for more than 24 hours. If the symptoms are worsening (increased pain, spreading of the redness, enlargement of the hardened area) for less than 24 hours, it is reasonable to start the antibiotics sooner. Whether mastitis is resolving with or without antibiotic treatment, symptoms should progressively resolve and should have disappeared over 2 to 5 days. Fever will usually be gone within 24 hours, the pain within 24 to 48 hours, and the breast hardness within the next few days. The redness may remain for a week or longer.

Breastfeeding should continue through the treatment of mastitis, even when on antibiotics as these are considered safe in breastfeeding. **Continuation of breastfeeding is considered safe and is encouraged.**

Cephalexin or Cloxacillin – both about equally effective.
Cloxacillin may be used if there is no allergy to penicillin.
Cephalexin may be used if there is a rash-only reaction to penicillin as the chance of cross-reaction is only about 3%.
Cloxacillin and cephalexin should be avoided if there is a serious allergy to penicillin (anaphylaxis; hives; throat edema; bronchoconstriction; serum sickness; hemolytic anemia; exfoliative dermatitis; organ dysfunction).

Clindamycin may be used if there is a serious penicillin allergy as above, or as a second choice if the infection is unresponsive to either cephalexin or cloxacillin.

The overall rate of susceptibility of Staph aureus to these three antibiotics is about the same, around 80%, however clindamycin is effective in about 75% of the methicillin-resistant bacteria (MRSA). Check local resistance patterns.

Cephalexin (Keflex®)

Cephalexin is a first generation cephalosporin antibiotic. It interferes with the bacteria's cell wall formation by weakening the cell wall, causing it to rupture and killing bacteria.

Indications and Clinical Use:
For the treatment of mastitis as well as treatment of asymptomatic or symptomatic urinary tract infection. Used to treat the gram positive cocci (staphylococcus aureus) that commonly cause mastitis. It does not cover methicillin-resistant Staph Aureus (MRSA), which may account for about 21% of the staph aureus cultured[15]. It is also used to treat other bacterial infections such as pneumonia and bone, ear and skin that are not included in the *Midwives Regulation - Schedule A and B*.

[14] Dixon, J.M. (2012). *Lactational Mastitis.* Retrieved from www.uptodate.com
[15] Gregson, D., Henwick, S., Swaine, F.B. (2011). *Medical Microbiology Services Review Final Report.* Retrieved from www.viha.ca/NR/rdonlyres/4A984B51-2DF9-48A0-98F1-0B4613573A80/0/medical_microbiology_services_review2011.pdf

Cephalexin provides good coverage for 1) streptococcus & staphylococcus; and modest coverage for 2) Escherichia coli, Klebsiella and Proteus (EKP) gram negative bacteria implicated in urinary tract infections.

Contraindications:
Documented anaphylaxis to any penicillin antibiotic.

Warnings and Precautions:
Prolonged use may result in fungal or bacterial superinfection, including *C. difficile*-associated diarrhea (CDAD) and pseudomembranous colitis; CDAD has been observed >2 months post-antibiotic treatment.

Use with caution in patients with renal impairment; modify dosage in severe impairment. Breastfed infants may develop slightly looser stools than normal.

Pregnancy:
Compatible

Lactation:
Category L1 - Compatible

Adverse Reactions:
Upset stomach, diarrhea, vomiting, vaginal infection and mild skin rash.

The following should be reported to a medical practitioner immediately: severe skin rash, itching, hives, difficulty breathing or swallowing, wheezing, unusual bleeding or bruising, sore throat, painful mouth or throat sores, jaundice and diarrhea.

Dosage and Administration:
Mastitis:
Cephalexin (Keflex®): 500 mg orally every 6 hours (qid) for 10-14 days

Note: Dose and duration of therapy can vary depending on infecting organism, severity of infection, and clinical response of patient. Treat severe staphylococcal infections for at least 14 days.

May be taken with or without food. Taking with food may minimize gastrointestinal distress. Taking an active probiotic concurrently may help minimize changes to GI flora.

Onset of Action:
Rapid absorption, peak in about 1 hour.

Half-Life:
Adults - 0.5-1.2 hours; prolonged with renal impairment

Elimination:
Urine (80% to 100% as unchanged drug) within 8 hours

Maximum milk concentration occurs at 4 hours after a single oral dose and gradually disappears by 8 hours after administration.

Cloxacillin

Cloxacillin is a penicillin-type antibiotic and is closely related to methicillin. Interferes with bacteria cell wall formation by weakening the cell wall, causing rupture and killing bacteria.

Indications and Clinical Use:
Mastitis as a complication of lactation. It is also used in other skin and soft tissue infections which are not in the *Midwives Regulation - Schedule A and B.*

Cloxacillin is particularly effective in Staph Aureus infections, and covers about 79% of those bacteria[16]. The remainder (about 21%) are "methicillin resistant staph aureus" MRSA, which may be susceptible to clindamycin.

It is generally not used to treat streptococcal infections as there are other more specific choices, or UTIs as it has limited gram negative coverage.

Contraindications:
Hypersensitivity to Cloxacillin. Any other penicillin allergy.

Warnings and Precautions:
Prolonged use may result in fungal or bacterial superinfection, including *C. difficile*-associated diarrhea (CDAD) and pseudomembranous colitis; CDAD has been observed >2 months post-antibiotic treatment.

Use with caution in patients with renal impairment; modify dosage in severe impairment. Breastfed infants may develop slightly looser stools than normal.

Pregnancy:
No (Limited) Human Data – Probably Compatible
Lactation:
Category L2 – Limited Data – Probably Compatible

Adverse Reactions:
Upset stomach, diarrhea, vomiting, vaginal infection and mild skin rash.

The following side effects should be reported to a medical practitioner immediately: severe skin rash, itching, hives, difficulty breathing or swallowing, wheezing, unusual bleeding or bruising, sore throat, painful mouth or throat sores, jaundice and diarrhea.

Dosage and Administration:
Cloxacillin: 500 mg orally every 6 hours for 10-14 days.
Cloxacillin should be taken 1 hour before or 2 hours after meals with water. Serum levels are reduced by 50% with food intake.
Taking an active probiotic concurrently may help minimize changes to GI flora

[16] Gregson, D., Henwick, S., Swaine, F.B. (2011). *Medical Microbiology Services Review Final Report.* Retrieved from www.viha.ca/NR/rdonlyres/4A984B51-2DF9-48A0-98F1-0B4613573A80/0/medical_microbiology_services_review2011.pdf

Onset of Action:
Rapid onset, peak in about 1 hour.

Half-Life:
Adults - 0.5-1.5 hours

Clindamycin:

Clindamycin is a lincosamide which is a type of antibiotic that works by inhibiting bacterial protein synthesis. Used as the second choice for mastitis. Clindamycin is one of the best alternatives for the gram positive cocci most often causing mastitis as it also covers methicillin-resistant Staph Aureus (MRSA) (76%)[17]. It is active against gram-positive aerobes and most anaerobes. The concern with clindamycin is that it may predispose to *C. difficile* diarrhea, which is why it is a second choice agent.

Indications and Clinical Use:
Second-line choice for treatment of mastitis if penicillin allergic or if sensitivities indicate resistance to cephalexin or cloxacillin. It is also used in other skin, soft tissue, and pelvic infections which are not in the *Midwives Regulation - Schedule A and B*.

Contraindications:
Known hypersensitivity

Warnings and Precautions:
Prolonged use may result in fungal or bacterial superinfection, including *C. difficile*-associated diarrhea (CDAD) and pseudomembranous colitis. With any diarrhea after taking Clindamycin, maternal stool should be tested for *C. difficile*. A positive test for *C. difficile* is a reason for physician consult. CDAD has been observed >2 months post-antibiotic treatment.

Pregnancy:
Compatible

Lactation:
Category L2 - Limited Data – Probably Compatible

Clindamycin has the potential to cause adverse effects on the breastfed infant's gastrointestinal flora. If oral or intravenous clindamycin is required during breastfeeding, it is not a reason to discontinue breastfeeding, but an alternate drug may be preferred. Monitor the infant for possible effects on the gastrointestinal flora, such as diarrhea, candidiasis (thrush, diaper rash) or rarely, blood in the stool indicating possible antibiotic-associated colitis.

Adverse Reactions:
Upset stomach, diarrhea, vomiting, vaginal infection and mild skin rash.

The following side effects should be reported to a medical practitioner immediately: severe skin rash, itching, hives, difficulty breathing or swallowing, wheezing, unusual

[17] Vancouver Island Health Authority (VIHA) 2011

bleeding or bruising, sore throat, painful mouth or throat sores, jaundice and diarrhea (in particular with Clindamycin).

Dosage and administration:
Clindamycin: 450 mg orally every 6 hours (qid) for 10-14 days

Clindamycin can be taken with or without food. However, since Clindamycin may cause an upset stomach, taking it with food or milk is recommended. Taking an active probiotic concurrently may help minimize changes to GI flora.

Onset of Action:
Absorption is rapid; widely distributed into most body tissues and fluids, including gallbladder, liver, kidneys, bone, sputum, bile, and pleural and synovial fluids.

Time of serum level peak is: Oral: Within 60 minutes.

Half-Life:
Adults - 2-3 hours.

Probiotic use with Antibiotics

For minimizing antibiotic-associated diarrhea the use of an oral probiotic is now considered evidence-based. The narrower the spectrum of the antibiotic, the lower the chance of disrupting the normal gastrointestinal tract flora. Some antibiotics, such as clindamycin are associated with a higher risk of diarrhea. The use of active-culture Balkan style yogurt or active probiotic culture yogurt may be helpful in reducing this risk. Recommended probiotics include lactobacillus, acidophilus and bifidus. These are available without a prescription.

D) Erythromycin Ophthalmic Ointment

Macrolide type antibiotic ointment interferes with microbial protein synthesis.

Indications and Clinical Use:
Prophylaxis of ophthalmia neonatorum. Prevention of ophthalmia neonatorum due to *Neisseria gonorrhoerae* or *Chlamydia trachomatis* or other bacteria.

Placed in the newborn's eyes within one hour of birth as required by British Columbia law *(See B.C. law re: informed refusal)*.

Contraindications:
Hypersensitivity to erythromycin or any component.

Adverse Reactions:
Hypersensitivity, minor ocular irritation and redness.

Dosage and Administration:
Ointment, ophthalmic: 0.5% (1 g, 3.5 g)
Instill 1 application of 1 cm ribbon into each conjunctival sac.
Wipe each eyelid gently with sterile cotton; instill 1 cm ribbon of ointment in each lower conjunctival sac; massage eyelids gently to spread the ointment; after 1 minute, excess

ointment can be wiped away with sterile gauze. Avoid contact of applicator tip with skin or eye.

Anaesthetics

Bupivacaine hydrochloride

(Marcaine®) Without epinephrine. Bupivicaine is an amide-type local anesthetic that blocks the initiation and conduction of nerve impulses.

Indications and Clinical Use:
Used to anaesthetize the perineum and vaginal walls for repair of laceration or an emergency episiotomy.

Contraindications:
Hypersensitivity to bupivacaine, amide type local anesthetics (lidocaine, mepivacaine, ropivacaine), or any component of the formulation.

Warnings and Precautions:
Use with caution in patients with cardiovascular disease including patients with hypotension or heart block.

Use with caution in patients with hepatic impairment.

Pregnancy:
Compatible
Bupivacaine is approved for use at term in obstetrical anesthesia or analgesia.

Lactation:
Category L2 - Limited Data – Probably Compatible

Adverse Reactions:
Hypotension, bradycardia, palpitation, restlessness, anxiety, dizziness, pruritus, urticarial and anaphylaxis.

Dosage and Administration:
Usual Concentration: 0.25% (2.5 mg/mL). Maximum individual dose should not exceed 2 mg/kg of body weight and in general the maximum total dose should not exceed 175 mg or 70 mL. Usual maximum dose is 12.5 mg to 37.5 mg or 5-15 mL.

Subcutaneous administration is the route of choice – only the lowest dose needed to provide effective anesthesia should be administered. Injections should always be made slowly and with frequent aspirations to avoid inadvertent rapid intravascular administration which can produce increased systemic absorption and toxicity.

Onset of Action:
10-15 minutes (slightly slower acting than lidocaine)

Half-Life:
2.7 hours
Time to peak, plasma: 30-45 minutes

Elimination:
Urine (6% as unchanged drug)

Lidocaine hydrochloride

(Xylocaine®) Without epinephrine. Lidocaine is an amide-type local anesthetic. Blocks the initiation and conduction of nerve impulses.

Indications and Clinical Use:
Used to anaesthetize the perineum and vaginal walls for repair of laceration or an emergency episiotomy.

Contraindications:
Hypersensitivity to lidocaine, amide type local anesthetics (bupivacaine, mepivacaine, ropivacaine), or any component of the formulation.

Midwives are encouraged to consult with anesthesia antenatal, in the event that a sensitivity or allergy to anesthetic agents is suspected.

An allergy to lidocaine is unlikely when used without epinephrine. The concern is often an adverse drug reaction to the adrenaline (epinephrine) that is found in a combined lidocaine/epinephrine product. The epinephrine is added to constrict the blood vessels to help concentrate the local anesthetic at the site where it is needed. If epinephrine enters the circulatory system, it can cause tachycardia. In an anxious person this could trigger a panic attack.

Warnings and Precautions:
Use with caution if there is hepatic dysfunction due to an increased risk of lidocaine toxicity.

Pregnancy:
Compatible

Lactation:
Category L2 - Limited Human Data – Probably Compatible

Adverse Reactions:
Hypotension, anxiety, dizziness, nausea, vomiting, dyspnea, allergic reactions and anaphylaxis.

Dosage and Administration:
Lidocaine comes in numerous concentrations (e.g. 1%, 2%).

Usual concentration: 1% (10 mg per mL) or 2% (20 mg per mL). Maximum individual dose should not exceed 4.5 mg/kg (or 300 mg).

Subcutaneous administration is the route of choice – only the lowest dose needed to provide effective anesthesia should be administered. Injections should always be made slowly and with frequent aspirations to avoid inadvertent rapid intravascular administration which can produce increased systemic absorption and toxicity.

Onset of Action:
5-10 minutes

Half-Life:
1.5-2 hours

Elimination:
Urine (<10% as unchanged drug, ~90% as metabolites)

Analgesics

Acetaminophen with Tramadol

(Tramacet®). Acetaminophen and Tramadol is an analgesic, opioid combination medication. Tramadol is more potent than codeine and most closely resembles the opiates.

Acetaminophen component: Inhibits prostaglandin synthesis in the central nervous system and peripherally blocks pain impulse; it produces antipyresis from inhibition of the hypothalamic heat-regulating center.

Tramadol component: Binds to opiate receptors in the CNS causing inhibition of ascending pain pathways, altering pain perception and response to pain; also inhibits norepinephrine and serotonin uptake, and modifies ascending pain pathways.

Indications and Clinical Use:
Combined Acetaminophen and Tramadol is used **for ≤ 72 hours** to relieve acute short-term moderate to severe pain in the postpartum period following vaginal and/or operative delivery**.**

Contraindications:
Hypersensitivity to acetaminophen, tramadol, opioids, or any component of the formulation; opioid-dependent patients; narcotics, centrally-acting analgesics or psychotropic drugs; hepatic dysfunction.

Tramadol is contraindicated during or within 14 days following monoamine oxidase (MAO) inhibitor therapy first generation antidepressant drugs. The MAO inhibitor antidepressants are older antidepressants, now reserved for extremely resistant cases of depression unresponsive to new agents: Isocarboxazid (Marplan®), Phenelzine (Nardil®), Tranylcypromine (Parnate®), Moclobemide (generics).

Warnings and Precautions:
Acetaminophen: Do not exceed the maximum recommended dose (4000 mg = 4 g) per 24 hours. Liver toxicity has been reported following chronic abuse of acetaminophen at **>** 200 mg**/**kg/day.

Tramadol: May cause CNS depression and/or respiratory depression and may impair physical or mental abilities.

Use with caution in patients taking tranquilizers and/or antidepressants, or those with an emotional disturbance including depression; history of seizure disorder.

*CNS depressants: Use with caution and reduce dosage when administering to patients receiving other CNS depressants.

Tramadol may enhance the neuroexcitatory and/or seizure-potentiating effect of MAO Inhibitors. Consider alternatives to combined treatment with tramadol and monoamine oxidase inhibitors due to an increased risk of serotonin syndrome and seizures.

*Serotonin syndrome: Avoid, if possible, use with serotonergic agents such as triptans (migraine treatment), lithium, sibutramine, meperidine, dextromethorphan, St John's wort, any anti-depressant including: TCAs, MAO inhibitors (use with extreme caution; contraindicated in Canadian product labeling), SNRIs, and SSRIs (such as citalopram, sertraline, fluoxetine etc.) venlafaxine, trazodone; use caution with drugs which impair metabolism of tramadol (ie, CYP2D6 and 3A4 inhibitors); concomitant use may increase the risk of serotonin syndrome.

A history of anaphylactoid reactions to opioids may increase risks for similar reactions to tramadol.

Healthcare provider should be alert to problems of abuse, misuse, and diversion.

Pregnancy:
Acetaminophen – Human Data Suggest Low Risk; Compatible
Tramadol - Human Data Suggest Risk
There is a risk of congenital birth defects if exposure occurs during organogenesis. Continuous intake leads to the potential complication of neonatal withdrawal. Long term neurobehavior effects of the neonate are unknown.

Lactation:
Acetaminophen – Category L1 - Compatible
Tramadol – Category L3 - Limited Data - Probably Compatible
Tramadol is considered suitable for short term use in lactation as about 3% of the dose enters milk. However, the U.S Food & Drug Administration has issued a warning against the use of Tramadol during lactation and in pediatric patients due to adverse events. This medication has an active metabolite via the CYP 2D6 enzyme, thus caution is recommended. In addition, experience with this medication is limited in the neonatal/pediatric population. If this medication is given in lactation, the lowest effective dose should be given for the shortest possible period of time. The neonate should also be monitored for signs of sedation, such as not waking up to feed at regular intervals. If ongoing narcotic is required postpartum consider other alternative agents such as hydromorphone.

Adverse Reactions:
Acetaminophen – Diarrhoea, gastric upset with overdose.

Tramadol - Sedation, respiratory depression, nausea, vomiting, constipation, pruritus, hives, angioedema, bronchospasm, toxic epidermal necrolysis, Stevens-Johnson syndrome have been reported.

Rare reactions including anaphylactoid fatalities have been reported following initial dosing. Adverse events were observed in animal studies. Tramadol has been shown to cross the human placenta when administered during labor. Post marketing reports following tramadol use during pregnancy include neonatal seizures, withdrawal syndrome, fetal death, and stillbirth. Not recommended for intrapartum use.

Dosage and Administration:

Tramacet® is a combination medication consisting of the following:
Acetaminophen: 325 mg plus Tramadol: 37.5 mg
Usual dose: PO1- 2 tablets every 4 to 6 hours as needed for pain
Maximum dose: PO 8 tablets per 24 hours

Note: if 8 tablets are taken daily, this equals: acetaminophen 2600 mg/day. Maximum dose of acetaminophen is 4,000 mg/day, a top up with plain acetaminophen (4 x 325 mg or 2 x 500 mg) per 24 hours is considered safe.

May be administered with or without food.

Onset of Action:
Acetaminophen: < less than 1 hour
Tramadol: 60-90 minutes.
Time to peak effect: Tramadol: 2-3 hours

Half-Life:
Adult – Acetaminophen – 2 hours, Tramadol - 6-8 hours, 7-9 for the active metabolite
Neonate – Acetaminophen – 7 hours, Tramadol – 3.6 hours in children (no data in neonates)

Prescription:
Acetaminophen with tramadol may be prescribed in hospital or in the community. It does not require a duplicate prescription pad. A prescription cannot exceed three days. No refills.

Anti-fungals[18]

Clotrimazole

(Canesten®) Anti-fungal agent which binds to phospholipids in the cell membrane altering cell wall permeability.

Indications and Clinical Use:
For the treatment of susceptible fungal infections; vaginal and nipple Candidiasis.

Contraindications:
Hypersensitivity to Clotrimazole or any component of the formulation

Warnings and Precautions:
Avoid contact with eyes when using topical formulation.

[18] Drug Information Lexicomp. (n.d.). *Clotrimazole, miconazol, nystatin drug information*. Retrieved from www.uptodate.com

Any excess cream or ointment should be removed from the nipples before nursing.

Pregnancy:
Compatible

Lactation:
Category L1 - Compatible

Clotrimazole has poor oral bioavailability and is unlikely to adversely affect the breastfed newborns, including topical application to the nipples[19].

Adverse Reactions:
Vulvar/vaginal burning, itching, soreness and edema.

Dosage and Administration:
Intravaginal or topical.

- Canesten® 1% vaginal cream: 1 full applicator intravaginally for 6 consecutive days, at bedtime.
- Canesten® 100 mg vaginal inserts: 1 insert intravaginally for 6 consecutive days at bedtime.
- Canesten® 2% vaginal cream: 1 full applicator intravaginally for 3 consecutive days at bedtime.
- Canesten® combi-pak 3-day therapy: 1 insert intravaginally for 3 consecutive days at bedtime. The cream should be spread onto the irritated area once or twice a day as needed, for up to 7 consecutive days.
- Canesten® combi-pak 1-day therapy: 1 insert intravaginally for 1 day, at bedtime. The cream should be spread onto the irritated area once or twice a day as needed, for up to 7 consecutive days.
- Canesten® Topical Cream or Solution: Thinly apply and massage sufficient solution or cream into the affected area and surrounding skin areas twice daily, in the morning and evening. To be successful, the cream or solution should be applied regularly and in sufficient quantities. Continue treatment for 2 weeks.

The blue section of the CPS contains Information for the Patient for Canesten® Vaginal and Canesten® Topical.

Miconazole

(Monistat®). Anti-fungal agent which inhibits biosynthesis. This causes damage to the fungal cell wall membrane and increases permeability.

Indications and Clinical Use:
For the treatment of vulvovaginal candidiasis and other fungal skin and mucous membrane infections.

Contraindications:
Hypersensitivity to Miconazole or any component of the formulation.

[19] National Library of Medicine's LactMed Database. (n.d.). *Clotrimazole levels and effects while breastfeeding*. Retrieved from www.drugs.com/breastfeeding/clotrimazole.html

Warnings and Precautions:
Avoid contact with eyes when using topical formulation.
Discontinue use if sensitivity or irritation occurs.
Any excess cream or ointment should be removed from the nipples before nursing.

Pregnancy:
Compatible

Lactation:
Category L2 - No Human Data – Probably Compatible

Miconazole has poor oral bioavailability and unlikely to adversely affect the breastfed newborns, including topical application to the nipples[20].

Adverse Reactions:
Allergic dermatitis, burning, maceration, irritation and itching.

Dosage and Administration:
Topical or Intravaginal.

- Monistat® 7 cream: 15 g applicator-full intravaginally once daily at bedtime for 7 consecutive days.
- Monistat® 7 vaginal suppositories: 1 (100 mg) suppository intravaginally daily at bedtime for 7 consecutive days.
- Monistat® derm cream: Apply a thin layer of cream topically to cover the affected area twice daily. Continue treatment for 2 weeks.
- Monistat® 3 vaginal ovules: 1 (400 mg) ovule intravaginally daily at bedtime for 3 consecutive days.

Nystatin

(Nilstat® Mycostatin®). Anti-fungal agent which binds to sterols in fungal cell membrane, changing the cell wall permeability.

Indications and Clinical Use:
For the treatment of Candidiasis, particularly of the mouth (thrush) and intestines of infants and children. A less potent antifungal than clotrimazole or miconazole for vaginal candida.

Contraindications:
Hypersensitivity to Nystatin or any component of the formulation

Pregnancy:
Compatible

Lactation:
Category L1 - Compatible

Adverse Reactions:
Diarrhea, stomach pain, nausea and vomiting.

[20] National Library of Medicine's LactMed Database. (n.d.). *Miconazole use while breastfeeding*. Retrieved from www.drugs.com/breastfeeding/miconazole.html

Dosage and Administration:
Oral drops: 100,000 units (1 mL) every 6-8 hours (tid – qid). Continue therapy for at least 48 hours after clinical cure to prevent relapse.

Also available in topical and vaginal formats but is less effective than other antifungals.

Onset of Action:
24 – 72 hours

APNO (All Purpose Nipple Ointment) - mupirocin, betamethasone, miconazole

All Purpose Nipple Ointment (APNO) or Jack Newman's Nipple Cream®. The antibiotic murpirocin combats or prevents bacterial infections, including staphylococcus; the corticosteroid betamethasone reduces inflammation and the pain associated with inflammation; and the antifungal miconazole combats or prevents monilial infections and relieves associated pruritis.

The corticosteroid is absorbed through normal intact skin, with percutaneous absorption increased in the presence of skin irritation or inflammation. The antibacterial and antifungal agents are absorbed where the skin is inflamed.

Indications and Clinical Use:
Used as a topical treatment for irritation of the nipple, with or without secondary bacterial infection.

Contraindications:
It should not be used on viral or tubercular lesions, or by anyone with a systemic viral infection or a history of allergy to any of the ingredients.

Warnings and Precautions:
If burning, itching, or local irritation increases with use, treatment should be discontinued. While generally well tolerated, APNO should not be used over large areas of the skin, and is not intended for prolonged use.

If the condition has not improved within a week, physician consultation is indicated.

Pregnancy:
Category C
Topical use to small area is not associated with problems

Lactation:
Topical use of these ingredients is not associated with problems

Dosage and Administration:
This cream is compounded by a pharmacist using 15 grams mupirocin ointment (Bactroban® 2%), and 15 grams betamethasone ointment (0.1%) to which is added miconazole powder to a final concentration of 2% (clotrimazole powder may be substituted for miconazole, if miconazole is unavailable). Antifungal cream may be used if powder is unavailable. Ibuprofen powder may be added to a final concentration of 2% to manage pain. Changes to the formula may be made from time to time as new evidence emerges.

The cream should be applied sparingly to the nipples after each breastfeed and not washed or wiped off, even prior to the next feed. If Gentian violet is being used, the cream should not be applied at the same time.

Onset of Action:
Only a small amount of topically applied mupirocin is absorbed into the systemic circulation where it is rapidly metabolized.

Triamcinolone - neomycin sulfate - nystatin - gramicidin

(Kenacomb®) cream or ointment reduces inflammation, relieves pruritis and combats or prevents monilial and bacterial infections. The corticosteroid is absorbed through normal intact skin, with percutaneous absorption increased in the presence of skin irritation or inflammation. The antibacterial and antifungal agents are absorbed where the skin is inflamed.

Indications and Clinical Use:
Used as a topical treatment for candidiasis of the nipple, with or without secondary bacterial infection, as well as candidiasis-related diaper rash in the healthy newborn.

Contraindications:
It should not be used on viral or tubercular lesions, or by anyone with a systemic viral infection or a history of allergy to any of the ingredients.

Warnings and Precautions:
If burning, itching, or local irritation increases with use, treatment should be discontinued. Kenacomb® is not recommended for use in pregnancy. While generally well tolerated, kenacomb® should not be used over large areas of the skin, particularly in the newborn, and is not intended for prolonged use to treat candidiasis of the nipple or candidiasis-related diaper rash.

If the condition has not improved within a week, physician consultation is indicated.

Pregnancy:
Triamcinolone – Human and Animal Data Suggest Risk
Neomycin – Human Data Suggest Low Risk
Nystatin - Compatible

Lactation:
Triamcinolone and Neomycin - Category L3 -No Data – Probably Compatible
Topical use to small area is not associated with problems
Nystatin – Category L1 Compatible
Gramicidin – Category L3 – No Data – Probably Compatible

Adverse Reactions:
Contact dermatitis, dryness, pruritus and secondary skin infection.

Dosage and Administration:
Each gram contains 100,000 units nystatin, 2.5 mg neomycin base (as sulphate), 0.25 mg gramicidin, and 1.0 mg triamcinolone.

Apply a thin layer to affected areas 2-3 times/day.

Anti-nauseants / Anti-emetics

Doxylamine succinate-pyridoxine hydrochloride (Diclectin®) *(updated March 2018)*

Doxylamine succinate competes with histamine for H_1-receptor sites, which block chemoreceptor trigger zones, which control the symptoms of nausea and vomiting. The pyridoxine hydrochloride component is a vitamin which has antiemetic effects.

Indications and Clinical Use:
Nausea and vomiting in pregnancy (NVP) is a common medical condition of pregnancy, affecting up to 80% of all pregnancies. When fixed together in a delayed-release formula, doxylamine succinate and pyridoxine hydrochloride can be prescribed at the onset of symptoms to manage NVP. It can also be prescribed pre-emptively at the onset of pregnancy for multiparas at high risk of NVP.

Contraindications:
Hypersensitivity to doxylamine, pyridoxine, or any component of the formulation; narrow-angle glaucoma; stenosing peptic ulcer; pyloroduodenal obstruction; bladder neck obstruction; or at risk for asthmatic attack.

Warnings and Precautions:
May cause CNS depression, including drowsiness, disorientation, dizziness, headache, paradoxical central nervous system stimulation, and vertigo, which may impair physical or mental abilities. Use with caution in patients with hypertensive disorders, asthma and thyroid dysfunction.

Pregnancy:
Compatible

Lactation:
Category L3 - No Human Data – Probably Compatible

Doxylamine may be excreted in breast milk, and can result in sedative effects in nursing infants. Approved use of doxylamine and pyridoxine is limited to the prenatal period.

Adverse Reactions:
Palpitation, tachycardia, dizziness, drowsiness, headache, constipation, diarrhea, dry mucous membranes and epigastric pain.

Dosage and Administration:
10 mg of doxylamine combined with 10 mg of pyridoxine (delayed release formula) up to four tablets daily (one in the morning, one in the afternoon, two at bedtime). Take on an empty stomach. Titrate dose up to eight tablets a day as needed. Adjust schedule and dose according to severity of symptoms.

Half-Life:
10-12 hours

Elimination:
Urine

Dimenhydrinate

(Gravol®) is categorized in a class of drugs called antihistamines. Competes with histamine for H_1-receptor sites on effector cells in the respiratory tract, gastrointestinal tract and blood vessels; blocks chemoreceptor trigger zones.

Indications and Clinical Use:
To counteract the side effects of nausea and vomiting. While it is considered safe, Gravol® may produce some sedation and as such, may be used for therapeutic rest during prodromal or early labour, particularly where anxiety is a factor.

Contraindications:
Hypersensitivity or previous reactions to dimenhydrinate or any component of the formulation.

Warnings and Precautions:
Use with caution in patients with asthma, peptic ulcer, cardiac arrhythmias and thyroid dysfunction.

Pregnancy:
Compatible
Lactation:
Category L2- No Human Data – Probably Compatible

Adverse Reactions:
Palpitations, hypotension, confusion, nervousness, restlessness, headache, insomnia, tingling, heaviness and weakness of hands, vertigo, dizziness, blurred vision, nasal stuffiness, dryness of nose and throat, nausea, vomiting, diarrhea, constipation, dry mouth, tightness of chest and wheezing.

Dosage and Administration:
Usual Concentration: each mL contains 50 mg
50-100 mg PO every 4-6 hours, maximum dose 400 mg/day
25-50 mg IM, IV, every 4 hours, maximum dose 100 mg every 4 hours
25 mg IV should be administered slowly over 2 min

Dimenhydrinate in the injectable form is indicated when the oral or suppository form is impractical.
For severe nausea and vomiting in hospital setting, Gravol® may also be administered through the IV route.

Onset of Action:
20 to 30 minutes

Half-Life:
8.5 hours

Metoclopramide

(Maxeran®is a dopamine receptor antagonist which works in the chemoreceptor trigger zone of the brain thereby reducing emesis, increasing gastric emptying and intestinal muscle contractions, and increasing the tone of the lower esophageal sphincter.

Indications and Clinical Use:
Primarily indicated in adults for symptomatic short-term treatment of delayed gastric emptying, gastroesophageal reflux, and nausea and vomiting. Metoclopramide can be administered during pregnancy and labour for the treatment of nausea, vomiting and hyperemesis (see CMBC's *Indications for Discussion, Consult and Transfer of Care*).

Contraindications:
Hypersensitivity or known allergy to metoclopramide; when stimulation of gastro-intestinal motility may cause hemorrhage, perforation or obstruction of GIT; history of seizure disorder.

Warnings and Precautions:
Metoclopramide is also a prolactin stimulant and may increase milk production. It is not within the midwife scope to prescribe metoclopramide as a galactagogue (domperidone is the preferred medication in Canada.).

Pregnancy:
Compatible

Lactation:
Category L2 – Significant Data - Compatible

Adverse Reactions:
Drowsiness, GI disturbances, constipation or diarrhea, hyper/hypotension, high doses in young people may cause extrapyramidal or dystonic reactions (potentially reversed with diphenhydramine Benadryl®).

Dosage and Administration:
Oral: 5-10 mg/dose q8h

IV/IM: 5-10 mg IV or IM q8h. Administer IV injection slowly, maximum rate 10 mg over 2 minutes; or may dilute 10 mg with 50 mL of NS and infuse slowly over 15-30 minutes.

Onset of Action:
Oral: 30-60 minutes;
Intramuscular: 10 to 15 minutes;
Intravenous: 1 to 3 minutes

Half-Life:
5 to 6 hours

Ranitidine (Zantac®)

(Zantac®) belongs to a group of drugs called histamine-2 blockers. Ranitidine works by reducing the amount of acid produced in the stomach.

Indications and Clinical Use:
Ranitidine is administered for the treatment of gastro esophageal reflux disease (GERD), gastric ulcers, and hyperemesis (see CMBC's *Indications for Discussion, Consult and Transfer of Care*). Ranitidine can be administered during pregnancy or labour for the treatment of GERD.

Contraindications:
Hypersensitivity or known allergy to Ranitidine.

Warnings and Precautions:
Do not mix clindamycin in same syringe, due to physical incompatibility. Caution should be exercised when administering ranitidine to patients with hepatic dysfunction since ranitidine is metabolized in the liver. If breastfeeding and still experiencing severe GERD after one month post-delivery, consideration should be given to referral for further medical work-up.

Pregnancy:
Compatible

Lactation:
Category L2 - Limited Human Data – Probably Compatible

Ranitidine is excreted into human milk in concentrations exceeding those found in plasma. There have been no reported adverse effects in the newborn via milk. Although ranitidine is concentrated in milk, the overall dose is less than therapeutic[21]. Ranitidine is used therapeutically in pediatric patients including infants.

Adverse Reactions: (infrequent)
Headache, dizziness, nausea, stomach upset and diarrhea.

Dosage and Administration:
Adult Oral: 150 mg twice daily or 300 mg once daily at bedtime;
IV/IM: 50 mg, IV infused over 15-30 minutes, or give direct IV over a minimum of 5 minutes, or IM, every 8 hours. (Comes as premixed minibag of 50 mg/50 mL, or 25 mg/mL injection).

Onset of Action:
Oral: 1-3 hours to peak level; IM dose – Within 15 minutes; IV – onset 5-10 min.

Half-Life:
2-3 hours

Prochlorperazine *(added May 2018)*

(Buccastem®, Compazine®, Nu-Prochlor®, Prorazin®, Stemetil®) is a phenothiazine that acts as a powerful post-synaptic dopamine D2 receptor antagonist and has both anti-psychotic and antiemetic properties.

[21] Hale, T. W. (2010). *Medications in Mother's Milk (14th edition)*. Amarillo, TX: Hale Publishing.

Indications and Clinical Use:
Prochlorperazine is primarily used in adults for the management of psychotic conditions such as schizophrenia and mania. Prochlorperazine has also been approved by Health Canada to be used as a second line treatment for nausea, vomiting and hyperemesis in pregnancy (see CMBC's *Indications for Discussion, Consult and Transfer of Care*). Midwives may prescribe prochlorperazine as a second-line anti-emetic in an outpatient setting during pregnancy.

Contraindications:
Hypersensitivity or known allergy to prochlorperazine or any phenothiazines; severe depression; history of seizures.

Warnings and Precautions:
Prescribers must assess for potential medication interactions prior to prescribing this drug. This drug must not be prescribed at the same time as other phenothiazine-class medications. Use with caution in patients with cardiovascular disease: may cause hypotension, QTc prolongation and increase risk for venous thromboembolism and stroke. May cause photosensitivity; recommend use of sunscreen.

Pregnancy:
Compatible.
Pregnancy Category C, risk not ruled out: animal reproduction studies have shown an adverse effect on the fetus and there are no adequate and well-controlled studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks.

Lactation:
L3- No Data- Probably Compatible.

Adverse Reactions:
Drowsiness, sedation, agitation, seizure, hypotension, arrhythmia, dry mouth, increased appetite, leukopenia, changes in liver function, constipation, extrapyramidal symptoms (drug induced movement disorders). Sudden discontinuation may result in withdrawal symptoms including nausea, vomiting, sweating, confusion and insomnia; discontinue gradually when possible.

Dosage and Administration:
Oral: 5mg- 10 mg Q 6-8h PO; maximum dose 40mg/day
Take with food or milk; avoid taking within two hours of antacids

Rectal: 5mg- 10 mg Q 6-8h PR; maximum dose 40mg/day
OR
25mg PR q 12h PR

Onset of Action:
Oral: 30-40 minutes
Rectal: 60 minutes

Half-Life:
17 hours

Anti-virals

Acyclovir and Valacyclovir

Acyclovir and Valacyclovir are anti-viral agents which inhibit DNA synthesis and viral replication.

Indications and Clinical Use:
Valacyclovir or Acyclovir is recommended for the treatment of symptomatic recurrent herpes simplex virus (HSV) types 1 and 2 outbreaks. Valacyclovir has three to fivefold greater oral bioavailability than acyclovir, but is not recommended for treatment of severe or disseminated disease.

Dosing regimens differ based on the site and type of outbreak (genital vs. oral). For suspected primary infections, clients should be referred to a physician for physical examination and serological confirmation. For known recurrent oral or genital HSV infections, midwives may offer their clients treatment **when prodromal symptoms present** (tingling, pain and/or aura). **Once lesions appear**, treatment is no longer considered effective or recommended.

Clients with a history of recurrent genital HSV infections should be offered Acyclovir or Valacyclovir suppression therapy at 36 weeks gestation to decrease the risk of clinical lesions or viral shedding at the time of birth, therefore decreasing the need for a cesarean section (Money, D. et al, 2008). If an HSV lesion or prodrome is present at the time of delivery, an obstetrical consult is indicated, to assess for the need for cesarean section. When at risk of preterm birth, use of suppressive antivirals may be considered at an earlier gestational age.

Contraindications:
Hypersensitivity to acyclovir, valacyclovir, or any component of the formulation.

Warnings and Precautions:
Maintain adequate hydration and use with caution in patients with renal impairment, hepatic or electrolyte abnormalities.

Pregnancy:
Acyclovir & Valacyclovir - Compatible
Data exists for acyclovir use in all trimesters of human pregnancy; less information for valacyclovir. Combined data regarding use of acyclovir or valacyclovir (pro-drug of acyclovir) has not shown an association of any consistent pregnancy complications or fetal/neonatal adverse effects, however long term follow-up data is needed. Potential benefits of short term use for indications reducing risk of transmission to newborn as well as treatment of genital herpes to prevent prematurity likely outweigh potential risks of therapy.

Lactation:
Acyclovir – Category L2 - Limited Data – Probably Compatible

- Relative Infant Dose is 1.09-1.53%; acyclovir therapy in neonates is common and produces few toxicities which are usually minor.

- Infant monitoring: vomiting, diarrhea

Valacyclovir – Category L1- Limited Data – Compatible

- Valacyclovir is rapidly metabolized to acyclovir in maternal plasma, resulting in an acyclovir Relative Infant Dose of 4.7%, which is considerably less than that used in therapeutic dosing of neonates.
- Infant monitoring: vomiting, diarrhea.

Adverse Reactions:
The most common side effects include nausea, vomiting, diarrhoea, dehydration and headache. Less commonly, agitation, confusion, rash, anaemia and muscle pain have been reported. Rare hypersensitivity reactions include seizures and hepatitis. Thrombocytopenic purpura has been reported in immunocompromised patients.

Dosage and Administration (Genital HSV):
Symptomatic recurrent episode

Acyclovir: 400mg orally three times daily for 5 days OR 800mg orally three times daily for 2 days, initiate when first prodromal symptoms appear,

OR

Valacyclovir: 1000mg orally once daily OR 500 mg orally two times daily (bid) for three days, initiate when first prodromal symptoms appear.
May be taken with or without food.

Suppressive dosing at 36 weeks until delivery:

Acyclovir: 400 mg orally every 8 hours (tid), or
200 mg orally every 6 hours (qid), from 36 weeks gestation until birth,

OR

Valacyclovir: 500 mg orally every 12 hours (bid) from 36 weeks gestation until birth.
May be taken with or without food.

Dosage and Administration (Oral HSV):
Symptomatic recurrent episode:

Acyclovir: 400 mg orally five times a day for five days, initiate when first prodromal symptoms appear

OR:

Valacyclovir: 2 g orally every 12 hours (bid) for two doses, initiate when first prodromal symptoms appear.
May be taken with or without food.

OR

Acyclovir 5% cream: Apply topically to affected lesion(s) six times per day for 7 days, initiate when first prodromal symptoms appear

Benefit of treatment in Orolabial HSV:

- Valacyclovir: reduced duration of symptoms by 1 day
- Acyclovir: reduced duration of symptoms by ½ day
- Acylcovir topical: reduced duration of symptoms by ½ day

Pharmacokinetics: Time to peak, serum:

- Acyclovir: 1.5-2 hours
- Valacyclovir:1-3 hours

Half-Life:

- Acyclovir:3 hours
- Valacyclovir: (rapidly converted to acyclovir by first pass effect in liver) Acyclovir (active metabolite): 3 hours

Excretion:
Acyclovir: Urine (62% to 90% as unchanged drug and metabolite)
Valacyclovir: Urine (as acyclovir 89%)

Oseltamivir

(Tamiflu®) Neuraminidase inhibitors anti-viral agents' oseltamivir (Tamiflu®) and zanamivir (Relenza®) are moderately effective for the treatment of infections with susceptible viruses of influenza strains including H1N1[22]. More safety data is available on oseltamivir than zanamivir in pregnancy. Thus oseltamivir is the treatment of choice for the prevention and treatment of influenza. Oseltamivir reduces the spread of influenza by blocking the action of the enzyme neuraminidase and prevents the spread of virus from cell to cell reducing the duration and severity of symptoms particularly when treatment is initiated early after onset of symptoms. The neuraminidase inhibitors also reduce the duration of shedding and viral titer.

Indications and Clinical Use:
Oseltamivir is recommended during pregnancy when influenza-like illness (ILI) develops, especially those in their second and third trimesters or within 2-4 weeks post-partum[23]. There are significant increased risks for morbidity and mortality related to influenza infection during pregnancy. ILI is defined as the acute onset of respiratory illness with fever and cough and one or more of the following: sore throat, muscle pain, joint pain, exhaustion or prostration. Treatment is most effective if started early, within 48 hours of illness onset, however initiating treatment after 48 hours may still be worthwhile if the illness is progressive in severity. On average, oseltamivir may reduce the duration of symptoms by one and a half days[24].

[22] Public Health Agency of Canada. (n.d.). *Flu (Influenza).* Retrieved from http://www.phac-aspc.gc.ca/influenza
[23] Public Health Agency of Canada. (2009, July). *Interim guidance Ambulatory Care of influenza-like illness in the context of H1N1 influenza virus.* Retrieved from http://www.phac-aspc.gc.ca/alert-alerte/h1n1/guidance-orientation-07-09-eng.php
[24] Aoki, F., Allen, U.D., Stiver, H.G., Evans, G.A. (2010). *The use of antiviral drugs for influenza: Guidance for practitioners, 2010-11.* Retrieved from www.bccdc.ca

Prompt initiation is recommended in initiation of antiviral therapy for individuals with suspected or confirmed influenza infection and any of the following:

- Illness requiring hospitalization
- Progressive, severe, or complicated illness, regardless of previous health or vaccination status
- During pregnancy and up to two weeks postpartum

Treatment should not be delayed while awaiting the results of diagnostic testing, nor should it be withheld in patients with indications for therapy who present >48 hrs after the onset of symptoms, particularly among patients requiring hospitalization. Patients with a negative rapid antigen test for influenza whom present with symptoms that are progressive in severity should be treated with antivirals since the sensitivity of these tests is generally low[25].

In addition, instructions to remain hydrated and manage fever with acetaminophen should be provided.

Those who are pregnant or postpartum recovering from influenza generally do not require antiviral therapy. The decision to initiate antiviral therapy should be based on the clinician's judgment and on what is known about the potential benefits of therapy for seasonal influenza versus the potential risks.

Patients with mild uncomplicated influenza infections who do not have risk factors for severe or complicated illness are not likely to benefit from antiviral therapy if it is initiated more than 48 hours after symptom onset.

Given concerning trends of increasing resistance with neuraminidase inhibitors, the risk of promoting antiviral drug resistance should be considered. Overuse of neuraminidase inhibitors will promote further development of resistance and could lead to these agents becoming ineffective[26].

Contraindications:
Known allergy to any antiviral component; previous severe reactions and/or allergic reactions such as difficulty breathing; tightness in the chest; wheezing; hives; confusion; hallucinations. Zanamivir is administered by oral inhalation and is contraindicated in patients with underlying asthma or other chronic respiratory conditions.

Warnings and Precautions:
Information about the increased risk of complications with influenza illness during pregnancy should be provided, including H1N1 virus, and the need for a prompt assessment. This is especially important information for those who are pregnant and have young children with ILI.

Pregnancy:
Compatible – Limited reports during human pregnancy do not suggest a significant risk of developmental toxicity. Maternal benefit outweighs the unknown risk if any to the embryo or fetus.

[25] Drug Information Lexicomp. (n.d.). *Oseltamavir*. Retrieved from www.uptodate.com.
[26] Health Link BC August 2010

Lactation:
Category L2 - Limited Data – Probably Compatible

Due to breastmilk's anti-infective benefits and the low dosages of antiviral passed through breastfeeding, it is recommended that breastfeeding be continued when taking antiviral medications. Oseltamivir is not usually prescribed for administration to children under one year of age.

If a significant infection including H1N1 is confirmed or strongly suspected, consultation with a physician is required, even if antiviral therapy has been commenced unless otherwise indicated by a symptom-based protocol established between the midwives and physician consultants in a given community.

In a pandemic situation, how the consultation process takes place may be guided by this specific community-based protocol that take into account the severity of the signs and symptoms and available medical resources.

Based on such protocols, the midwife should do an assessment to determine if referral for a telephone assessment by a physician, or an in-person physician assessment or an immediate referral for hospital admission is required.

If a specific infection has not been confirmed by a positive swab, advise that if another ILI develops, a second course of antiviral therapy may be recommended because immunity to infection cannot be documented.

Adverse Reactions:
Nausea, vomiting, diarrhea, bronchitis, abdominal pain, headache and dizziness.

There are no known interactions between oseltamivir and other drugs. Oseltamivir does not interact with the flu vaccine so both vaccinated and unvaccinated individuals can use oseltamivir.

Tamiflu® may increase the risk for self-injury and confusion in people who have the flu.

Any odd behaviour should be reported.

Please refer to the website below for a list of Reportable Adverse Reactions to Antiviral Drugs[27].

Dosage and Administration:
Oseltamivir (Tamiflu®): One 75 mg capsule orally every 12 hours (bid) for 5 days or prescribe Zanamivir if nausea and vomiting.
Zanamivir (Relenza®): Two 5 mg inhalations (10 mg total) every 12 hours (bid) for 5 days.
More information can be located in the appropriate product monograph.
May be after meals to reduce nausea.

[27] Health Canada. (2011, March 2). ***Reporting adverse reactions to antiviral drugs during an influenza pandemic: Guidelines for health professionals and consumers.*** Retrieved from http://www.hc-sc.gc.ca/dhp-mps/pubs/medeff/_guide/2011-ar-ei_anti_guide-ldir/index-eng.php

Dose reduction is advised for pharmacokinetic reasons when creatinine clearance of <10 ml/min is present.

Benzodiazepine Receptor Antagonists

Flumazenil

(Anexate®, Romazicon®)**.** Flumazenil is a benzodiazepine receptor antagonist and acts as an antidote in reversing the CNS depressant effects of benzodiazepine compounds. Flumazenil has no effect on CNS depression from other causes such as opioids, alcohol, barbiturates or general anesthetics. Flumazenil, if required, should be readily available for administration.

Indications for Clinical Use:
For reversal of benzodiazepine use during procedure, or known isolated benzodiazepine overdose if not taking benzodiazepines chronically.

Contraindications:
Hypersensitivity to flumazenil or benzodiazepines or to any component of the formulation.

Warnings and Precautions:
Flumazenil may not reverse respiratory depression as well when longer acting benzodiazepines have been used. There is a need to monitor in the event that respiratory depression or sedation returns. Flumazenil may not reverse amnesia. Immediately after administration physician consultation is required.

Consult physician immediately if patient takes benzodiazepines chronically but has an acute overdose – risk of seizures may occur. The indications for flumazenil in clinical use are for benzodiazepine reversal during procedure, or known isolated benzodiazepine overdose in those who are not taking benzodiazepines chronically. The number of different types of benzodiazepines does not affect efficacy of flumazenil, however flumazenil's half-life may be shorter than the benzodiazepines used and repeated doses may be necessary.

Pregnancy:
Compatible
Although an assessment of the teratogenic risk in humans cannot be made, animal data suggests the risk is low. Human-placenta transfer to the fetus is unknown, and despite the moderate plasma protein binding capacity and inactive metabolites, the very short elimination half-life will limit exposure. The indications for flumazenil are such that the benefit should outweigh the unknown fetal risk.

Lactation:
No Data- Probably Compatible
Flumazenil may be considered suitable for use in lactation as this medication has a very short half-life, however when administering this medication to a breastfeeding client for a benzodiazepine overdose, breastfeeding may need to be withheld due to the amount of benzodiazepine in milk and the potential risk of adverse effects (respiratory depression, sedation).

Adverse Reactions:
Headache; fatigue; tremor; weakness; diaphoresis; agitation; nausea/vomiting; seizure although rare.

Dosage and Administration:
0.1 mg/ml injectable solution
IV: 0.2 mg over 30 seconds
If there is inadequate response 30 seconds after the first dose, give 0.3 mg IV over 30 seconds. If inadequate response continues, repeat doses of 0.5 mg IV over 30 seconds can be given at one (1) minute intervals to a maximum cumulative dose of 3 mg.

Onset of Action:
30-60 seconds

Half-Life:
Adult - 4-11 minutes
Neonate – unknown

Elimination:
Liver

Corticosteroids

Hydrocortisone compounds *(updated September 2018)*

Hydrocortisone compounds contain topical corticosteroids that decrease inflammation by suppressing leukocyte production and reducing capillary permeability. They are available in cream, lotion, ointment and suppository form.

Indications and Clinical Use:

Hemorrhoids:	Low to mid potency creams or ointments, In combination with pramoxine hydrochloride 1% and zinc sulfate, may be prescribed for adults for anorectal therapy for treatment of hemorrhoids (examples include Anusol HC®, Procotzone®, Proctodan®, Proctofoam®).
PEP:	Low to mid-potency creams, lotions and ointments may be prescribed to treat symptoms associated with polymorphic eruption of pregnancy (PEP), formerly known as pruritic urticarial papules and plaques of pregnancy (PUPP).
APNO:	Low-potency betamethasone ointment may be prescribed as a component of All-Purpose Nipple Ointment (APNO).

Contraindications:
Hypersensitivity to any component of the formulation.

Warnings and Precautions:
Use with caution in patients with GI disease, hepatic impairment, hypertension, osteoporosis, thyroid disease. Discontinue use if redness or irritation occurs.
Do not apply to nipples unless as a component of APNO.

Pregnancy:
Compatible

The lowest effective potency should be used over the smallest possible area for the shortest possible time.

Lactation:
Category L2 - No Data – Probably Compatible
Topical use to small area is not associated with problems

Adverse Reactions:
Burning, dryness, irritation, itching, skin maceration, dermatitis and secondary skin infection.

Dosage and Administration:

Hemorrhoids: **Topical**: 0.5%-1% hydrocortisone acetate (cream or ointment + pramoxine hydrochloride + zinc sulfate): Apply thin layer of to the affected area two to four times daily.
Suppository:1% hydrocortisone acetate (foam or cream + pramoxine hydrochloride 1% + zinc sulfate): One suppository twice daily for two weeks.

PEP/PUPP: **Topical**: 1% hydrocortisone butyrate (lotion, cream or ointment) OR 0.1% betamethasone (lotion, cream or ointment): Apply thin film to affected area twice daily for up to seven days.

APNO: **Topical**: 0.1% betamethasone ointment, in combination with mupirocin ointment and miconazole powder (refer to entry for APNO).

Galactagogues

Domperidone

(Motilium®) promotes the release of prolactin from the pituitary gland. It is a dopamine antagonist with anti-emetic properties.

Midwives can prescribe domperidone in the postpartum period only for the treatment of insufficient milk supply (I.M.S.). However, this treatment should not be used as the first approach to correcting IMS[28]. A comprehensive assessment and attention to other factors that can influence milk supply and milk transfer should be completely explored as a priority prior to prescribing domperidone

Regardless of treatment plan, failure of the newborn to regain birth weight by three weeks of age is an indication for a consultation with a physician (CMBC, 2015).

Amongst lactation specialists in Canada and based on individual clinical evaluations, Domperidone has historically been prescribed in doses ranging from 30-90 mg/day to a maximum dose of 80-160 mg/day. However, there have been numerous warnings by Health Canada regarding the risk of serious abnormal heart rhythms or cardiac arrest with the use of domperidone. Clients at greatest risk of this adverse effect include those:

- Taking more than 30 mg/day;
- With a history of cardiac disease or abnormal heart rhythm;

- Taking other medications that prolong QTc;
- With abnormal electrolytes (e.g. changes in potassium from diarrhea or vomiting);
- Who are more than 60 years of age.

Indications and Clinical Use:
Used to enhance breastmilk production where non-pharmacologic methods have proven ineffective and there is inadequate milk supply.

Contraindications:
Hypersensitivity to domperidone or its excipients, with gastrointestinal obstruction, perforation, or hemorrhage, with prolactinoma, and for those with a history of breast cancer.

Warnings and Precautions:
Due to the increased risk of QTc prolongation, domperidone should not be administered with other medications that may also prolong QTc (including but not limited to fluconazole, macrolide antibiotics [azithromycin, erythromycin], SSRIs, methadone). **Check the client's current medications to assess for drug interactions with domperidone.**

Domperidone should be used with caution in those with hepatic disease and with those taking anticholinergics, since these may antagonize the effect of the domperidone in the GI tract.

Pregnancy:
Category C

Lactation:
Category L1 – Limited Data - Compatible

Adverse Reactions:
Headache (1% - resolved with dose reduction), dry mouth (2%), abdominal cramps (less than 1%), rashes and urticaria and alteration of menstrual cycles.

Dosage and Administration:
Usual dose – Domperidone: 10 mg PO every 8 hours (tid) x 7-14 days

Onset of Action:
Time to peak serum concentration: 30 minutes

Half-Life:
7 hours

Therapeutic Notes:
Milk supply is usually increased within three to four days, although effects may be seen as soon as 24 hours. Domperidone dosage should be gradually reduced by one tablet every 2-3 days when milk supply is adequate

Compression Stockings

Compression stockings are designed to improve circulation, and relieve symptoms of edema and varicose veins of the lower extremities when circulation is impaired. Two types of compression stockings are available: 1) uniform compression stockings, which offer the same amount of compression to all parts of the leg and 2) graduated compression stockings, which are designed to provide support and are tightest at the ankle as pressure gradually decreases up the leg. The graduated compression helps move blood through veins towards the heart. Measurements of compression are in millimetres of mercury ranging from light support in 815 mmHg up to 30-40 mmHg and higher. Compression stockings are available in socks, stockings, knee-highs, thigh-highs or full length.

Contraindications:
Contraindicated in those with peripheral artery disease, cellulitis and acute deep vein thrombosis.

Indications and Clinical Use:
Compression stockings are used to reduce edema, prevent varicose veins, promote venous return and provide comfort.

Warnings and Precautions:
Compression pushes blood away from the leg and should be used with caution in smokers and those with a decreased blood supply to the legs, poorly controlled diabetes, neuropathy and skin infections.

Clients should be advised to report increased pain, swelling, redness or numbness when wearing compression stockings.

Prescribing:
Prescriptions require grade of compression, length and type of stocking. **All compression levels greater than 20 mmHg require a prescription.** See chart below.

Clients should be advised that compression stockings are sized by height and/or by leg measurements. Correct sizing will maximize benefits and comfort. Various styles and brands may have different sizing instructions. Clients should be informed to consider the following steps when they are being fitted and measured:

- Measure when swelling is at a minimum, usually first thing in the morning
- Measure ankle circumference at the narrowest part of the ankle, usually right above the anklebone
- Measure calf circumference at the fullest part of calf
- Measure calf length from where heel touches the floor to midline at the back of knee
- For full length stockings, measure thigh circumference at fullest part
- Measure length of thigh from where heel touches the floor to the gluteal fold
- For full-length stockings, measure hips at their widest part

Compression Strength[29]	Use
8-15 mmHg: **Minimal Graduated Compression**	• Lightest compression • Provides relief from tired or aching legs

[29] UpToDate – Compression Stockings. Literature review current through March 2016. Topic updated June 6, 2016.

15-20 mmHg: **Mild – Graduated Compression**	• Helpful for travel and for long periods of sitting or standing • May offer relief from minor varicose veins • Often recommended during pregnancy
20-30 mmHg: **Moderate – Graduated Compression**	• Most commonly used compression level • Provides relief from moderate to severe varicose veins • Relieves swelling and edema • Useful in preventing thrombosis
30-40 mmHg: **Firm – Graduated Compression**	• Provides relief from edema and severe varicose veins

Histamine Antagonists

Diphenhydramine Hydrochloride

(Benadryl®). Competes with histamine for H_1-receptor sites on effector cells in the gastrointestinal tract, blood vessels, and respiratory tract; sedative effects are also seen.

Indications and Clinical Use:
Adjunctive therapy in the treatment of anaphylactic reactions related to the administration of drugs, vaccines or sera.

Contraindications:
Hypersensitivity to diphenhydramine or any component of the formulation; acute asthma.

Warnings and Precautions:
This drug is for emergency purposes, and its use should be immediately followed by a physician consultation and if out-of-hospital, emergency transport to hospital. Further definitive treatment would be managed by a physician.

Patients should be cautioned about the possibility of CNS depression, which may impair physical or mental abilities.
Use with caution in patients with a history of asthma.
Use with caution in patients with cardiovascular disease (including hypertension and ischemic heart disease).
Use with caution in patients with thyroid dysfunction.

Pregnancy:
Compatible

Lactation:
Category L2 - Limited Human Data – Probably Compatible

Adverse Reactions:
Chest tightness, hypotension, palpitation, tachycardia, chills, confusion, convulsion, dizziness, fatigue, headache, insomnia, irritability, nervousness, restlessness, sedation, sleepiness, constipation, diarrhea, dry mucous membranes, nausea, throat tightness and vomiting.

Dosage and Administration:
Adult – 50 mg IM

Onset of Action:
Sedative effect – 1-3 hours

Half-Life:
2-10 hours

Elimination:
Urine (as unchanged drug)

Immune Globulins

Informed Consent and Documentation

Informed consent for Immune Globulin administration must be obtained and documented by the midwife. If informed consent is obtained in a facility (i.e. hospital) it should obtained and documented in accordance with facility policies and procedures. If informed consent is obtained in the community, the midwife should documented the process in client's medical record. The Transfusion Service issuing the product(s) is responsible for reporting final disposition to the BC Provincial Blood Coordinating Office, Central Transfusion Registry. Midwives must provide a record of administration of Immune Globulin(s) to the client's primary care provider (i.e. family physician or nurse practitioner) upon discharge from care.

Hepatitis B Immune Globulin (HBIg)

(HBIg, HepaGam B®, HyperHEP B® S/D) is a fractionated human blood product that provides immediate, short-term protection against hepatitis B infection.

Indications and Clinical Use:
HBIg should be given immediately after birth to any infant born to either an HBsAg positive woman or woman at high risk for hepatitis B infection (i.e. intravenous drug user or sex trade worker) whose infection status in unknown or negative.

Dosage and Administration:
Infant: 0.5 mL IM immediately after birth, along with first dose of hepatitis B vaccine series

Rh_o (D) Immune Globulin (Human) *(updated March 2018)*

Rh_o (D) Immune Globulin (Human) (WinRho® SDF) is a sterile lyophilized gamma globulin (IgG) fraction of human plasma containing antibodies to the Rh_o(D) antigen. It prevents the development of Rh antibodies in the Rh_o(D) negative patient carrying a Rh_o(D) positive fetus, thus preventing the occurrence of haemolytic disease in the fetus or newborn.

Indications and Clinical Use:
WinRho® SDF is indicated for the prevention of Rh immunization in Rh_o(D) negative patients during pregnancy, so long as they are not previously sensitized.

WinRho® SDF should be offered to known Rh_o(D) negative patients:

- At 28 weeks gestation;
- Within 72 hours of the birth of a Rh_o(D) positive (including weak D) baby;
- As soon as possible or within 72 hours of any complication or procedure that could result in a potential fetomaternal haemorrhage:
    - vaginal bleeding,
    - therapeutic or spontaneous abortion,
    - molar pregnancy,
    - ectopic pregnancy,
    - placental abruption,
    - abdominal trauma,
    - obstetrical procedures,
    - amniocentesis,
    - chorionic villi sampling (CVS),
    - percutaneous umbilical blood sampling,
    - external cephalic version (ECV); and
- Every 12 weeks until delivery with ongoing vaginal bleeding.

Contraindications:

- A history of anaphylactic or severe systemic reaction to the administration of human immune globulin products.
- IgA deficiency with antibodies to IgA and a history of hypersensitivity.
- Autoimmune hemolytic anemia, with pre-existing hemolysis or at high risk for hemolysis.
- Rh_o(D)-positive.
- Rh_o(D)-negative who are Rh_o(D) immunized by standard manual Rh antibody screening tests (after due allowance for previously administered anti-D immunoglobulin).

Dosage and Administration:

- WinRho® SDF is available in 600 units and 1500 units and can be administered IM or IV.
- Administer WinRho® SDF separately from other drugs.
- Administer IV WinRho® SDF slowly over 3-5 minutes.
- The dosage guideline is outlined in the table below.
- In the event of a massive fetal maternal hemorrhage:
    - consult with a transfusion medicine specialist;
    - WinRho® SDF dose depends on the presence of fetal cells in the maternal circulation;
    - a Kleihauer-Betke test should be used to quantify the fetomaternal hemorrhage and individualize the appropriate dose;
    - WinRho® SDF 90 units is recommended for each 1 mL of fetal blood in the maternal circulation;
    - where the volume of fetomaternal hemorrhage is not available, administer 1500 units (300 mcg) IM or IV as soon as possible and within 72 hours of birth.
    - each antepartum hemorrhage should be treated as a separate incident with appropriate dose of anti-D immunoglobulin;
    - dosages may vary according to blood bank directives.

Indication	Rh_o(D) IG Dosage* IM or IV	
	600 Units *(120 mcg)*	**1500 Units** *(300 mcg)*
Complications: pregnancy before 12 weeks	√	
Complications: pregnancy after 12 weeks		√
Prophylactic dose at 28 weeks		√
Obstetrical procedure: amniocentesis/ECV after 34 weeks	√	
Massive fetomaternal haemorrhage	90 units/1 mL fetal blood	
Every 12 weeks until delivery with ongoing vaginal bleeding		√
Within 72 hours after birth or as soon as possible of confirmed Rh(D) positive baby	√	

Pregnancy:
Compatible

Lactation:
Category L2 – Limited Data – Probably Compatible

Adverse Reactions:

- Side Effects are uncommon (<2%) Headache, chills, fever, asthenia, pallor, diarrhea, nausea, vomiting, arthralgia, myalgia, dizziness, malaise, hyperkinesia, abdominal or back pain, hypotension, hypertension, increase LDH, somnolence, vasodilation, pruritus, rash and sweating.
- An allergic response is possible: there should be observation for at least 20 minutes after administration. *Epinephrine* and *Diphenhydramine* should be immediately available.

Warnings and Precautions:

- WinRho® SDF is made from human plasma; it may carry a risk of transmitting infectious agents, e.g., viruses and theoretically, the Creutzfeldt-Jakob disease (CJD) agent.
- Risk of transmitting an infectious agent has been reduced by screening plasma donors, testing for the presence of certain current viral infections, and including virus inactivation/removal steps in the manufacturing process.
- The product has been screened or processed to remove the risk of HIV, hepatitis A, B, and C, West Nile viruses, and human parvovirus B19.
- The risk associated with administration of this blood product is very low, however, it is possible that screening may not detect all possible pathogens and this information should be provided.
- The liquid formulation of WinRho® SDF contains maltose. Maltose has been shown to give falsely high blood glucose levels in certain types of blood glucose testing systems.

For women eligible for MMR vaccines postpartum (identified as non-immune in pregnancy):

- WinRho® SDF may transiently impair the immune response to live attenuated virus vaccines such as MMR and varicella; delay immunization with live vaccines for three months after administration of WinRho® SDF .

Inhalants

Nitrous Oxide pre-mixed 50/50 with Oxygen

(Entonox® or Nitronox®) Premixed 50/50 concentration of nitrous oxide and oxygen.

Nitrous oxide increases cerebral blood flow and intracranial pressure and decreases hepatic and renal blood flow; analgesic action is similar to morphine.

Indications and Clinical Use:
For relief of moderate pain in normal labour. Commonly used in the transition period prior to full dilation. Its analgesic effect is strong and characterized by rapid onset and offset.

Contraindications:
Nitrous oxide should not be used in patients with bowel obstruction, pneumothorax, middle ear or sinus disease.

Hypersensitivity to nitrous oxide or any component of the formulation.
Nitrous oxide should not be used without oxygen.

Warnings and Precautions:
Must be self-administered in labour during contractions.
Oxygen use: Oxygen should be briefly administered during emergence from prolonged anesthesia with nitrous oxide to prevent diffusion hypoxia.

Pregnancy:
Human and Animal Data Suggest Risk

Lactation:
Category L3 – No Data – Probably Compatible

Adverse Reactions:
Hypotension, headache, dizziness, confusion; possibly nausea and vomiting.

Personnel exposed to unscavenged nitrous oxide are at increased risk of renal and hepatic diseases and peripheral neuropathy as seen in vitamin B_{12} deficiency. Dental personnel exposed to unscavenged nitrous oxide for more than 5 hours/week are significantly less fertile than those who are not exposed, or who are exposed to lower levels of scavenged or unscavenged nitrous oxide[30].

Dosage and Administration:
Face mask or mouth piece.
Self-administration should be at the beginning of a contraction.

[30] Drug Information Lexicomp (n.d.). *Nitrous oxide.* Retrieved from www.uptodate.com

Onset of Action:
Peak action: 30 seconds following administration.

Half-Life:
3 minutes approximately.

Oxygen

For administration by non-rebreathing mask in the course of normal labour as therapy for abnormal fetal status or in the labour or the postpartum period for maternal haemorrhage or shock. For a newborn, either free-flowing oxygen or oxygen by resuscitation bag and mask should be administered according to national neonatal resuscitation (NRP) guidelines.

Intravenous Fluids

Normal saline, Ringer's lactate, 5% dextrose in water

Intravenous access is indicated for the administration of medication and fluids (volume expansion, hydration and blood products). Prophylactic intravenous access with a saline lock can also be recommended in certain situations.

Normal Saline & Ringers Lactate

These isotonic crystalloid solutions can be used to provide volume and deliver medication and are the most likely solutions indicated for use during pregnancy, birth and postpartum.

- If an IV is established in third stage or the immediate postpartum during an out-of-hospital birth, the midwife must ensure that vital signs are normal and stable for one hour prior to removing the IV canula.
- In an out of hospital setting, initiating emergency transport to hospital should be considered early in the treatment of a postpartum haemorrhage[31]. Emergency transport to hospital and consultation with a physician is required if bleeding is unresponsive to therapy.
- Water intoxication is a potential side effect of oxytocin administration. Use electrolyte-containing solutions (i.e. normal saline or Ringer's lactate) with oxytocin reduces the risk of water intoxication.
- Intake and output records should be initiated when delivering IV fluids. Fluid overload and hyponatremia may be prevented by recording and use of balanced salt solutions.

In neonatal resuscitation Ringer's Lactate or 0.9% NaCl may be administered intravenously as a volume expander (10 mL/kg over 5 to 10 minutes) if there is evidence of acute bleeding with signs of hypovolemia as per NRP guidelines.

D5W

5% Dextrose in Water is packaged as an isotonic solution and can be indicate for hydration and provide calories, however, the glucose in the solution is quickly consumed

[31] It is beyond the scope of this document to outline the complete steps in the management of a postpartum hemorrhage. Midwives are expected to initiate the appropriate steps in the management of a postpartum hemorrhage according to their Emergency Skills protocol and are reminded that hemorrhage unresponsive to therapy is an indication for transfer of care to a physician.

leaving the solution hypotonic. Administration of hypotonic solutions via IV will leave the intravascular space quickly and reappear in the cells. The need for calories is not usually warranted as mild to moderate ketosis is a normal intrapartum state and hydration with 5% dextrose is associated with poorer outcomes. Use of dextrose containing solutions in the absence of saline is associated with maternal hyponatremia and hypoglycaemia in the newborn.

Narcotic antagonists

Naloxone Hydrochloride

Naloxone hydrocholoride (Narcan®) is a narcotic antagonist used to treat opioid toxicity and overdose.

Note: The American Academy of Pediatrics (AAP) no longer recommends the use of naloxone hydrochloride (naloxone) for neonatal resuscitation[32] at birth. There is insufficient data on the efficacy and short-term and long-term safety of naloxone to reverse respiratory depression in the neonate caused by maternal opiate exposure in labour close to the time of birth. There is also concern that naloxone is misused during resuscitation and could lead to seizures when administered to infants of opioid-dependent women. The Canadian Neonatal Resuscitation Program (NRP) Executive Committee is in agreement with this recommendation[33] . Refer to the most current NRP recommendations for first-line treatment of neonatal respiratory depression.

Indications and Clinical Use:
To reverse opioid toxicity.

Contraindications:
Previous hypersensitivity reaction to naloxone.

Warnings and Precautions:
Naloxone is not effective in reversing respiratory depression due to any other cause than opioid toxicity. Naloxone is not recommended for use during newborn resuscitation.

Compatibility- Pregnancy:
Compatible

No evidence of impaired fertility or fetal harm. Naloxone crosses the placenta quickly and appears in fetal blood within 2 minutes following adult dose.

Compatibility- Lactation:
Category L3 - No Human Data – Probably Compatible

Naloxone is considered suitable for use in lactation. This medication has a very short half-life (one hour), is poorly absorbed orally and plasma levels in adults are thought to be undetectable two hours after oral doses. When administering this medication to a breastfeeding client for a narcotic overdose, breastfeeding may need to be withheld due to

[32] http://circ.ahajournals.org/content/122/16_suppl_2/S516#sec-61

[33] http://www2.aap.org/nrp/docs/15535_NRP%20Guidelines%20Flyer_English_FINAL.pdf

the amount of narcotic in milk and potential risk of adverse effects including respiratory depression and sedation.

Adverse Reactions:
Adverse reactions are typically related to reversing dependency and precipitating withdrawal and include abdominal cramps, diarrhea, nausea, vomiting, muscle weakness, dyspnea, respiratory depression, restlessness, irritability, cardiac arrest, fever, hypertension, hypotension and/or tachycardia.

Dosage and Administration:
May be administered IV or IM routes. IM route not recommended due to slow onset of action and therapeutic effect.

Adult initial dose of naloxone for reversal of respiratory depression caused by a therapeutic dose of opioids:

- IV: 0.04-0.4 mg, may repeat until desired response is achieved
- IM: 0.04-0.4 mg, may repeat until desired response is achieved

Adult initial dose of naloxone cause by opioid overdose:

- IV: 0.4-2 mg, may repeat until desired response is achieved
- IM: 0.4-2 mg, may repeat until desired response is achieved

Additional considerations:
Consult physician following administration;
May need to repeat doses every two to three minutes and an IV infusion may be required (midwives are unable to prescribe a naloxone IV infusion);
Additional dose(s) may be required after reversal has occurred based on the opioids half-life.

Onset of Action:
IV: 2 minutes
IM: 2-5 minutes

Half-Life:
Adult - 0.5-1.5 hours

Excretion:
Urine as metabolites

Nitrates

Nitroglycerin

Nitroglycerin is a vasodilator which relaxes uterine smooth muscle, as well as vascular, bronchial, biliary, gastrointestinal and ureteral muscles.

Indications and Clinical Use:
For the treatment of hypertonic uterine contractions with non-reassuring fetal status as an adjunct to intrauterine resuscitation. This drug is for emergency purposes only, and its use should be immediately followed by a physician consultation and transfer of care. If used in an out-of-hospital setting, immediate emergency transport to hospital is required.

Contraindications:
Nitrates should not be administered to those with known hypersensitivity or idiosyncratic reaction to organic nitrates, severe anemia, hemorrhage, hypotension, uncorrected hypovolemia or severe liver disease. Although unlikely to be encountered in the provision of midwifery care, nitroglycerin is also contraindicated with conditions of head trauma, cerebral hemorrhage, increased intracranial pressure, restrictive cardiomyopathy, constrictive pericarditis and pericardial tamponade.

Warnings and Precautions:
To date, the evidence for safety and efficacy remains inconclusive. The use of nitroglycerin in pre-term labour is currently under evaluation. This application of nitroglycerin is NOT approved for use by registered midwives.

Pregnancy:
Human data suggest low risk-1st trimester data is limited, caution due to risk of hypotension.

Lactation:
No human data, probably compatible or limited data[34] - Category L4 - Possibly hazardous -There are currently no reports of nitroglycerin use in lactation, based on size of molecule it is expected to enter milk and could be a concern with prolonged use[35].

Adverse Reactions:
Include headache, which occurs in up to 50% of users at the beginning of therapy. Less than 1% of users may experience itching, wheezing, tracheobronchitis, hypotension, reflex tachycardia, palpitations or bradycardia. Syncope due to nitrate vasodilation, although rare, has been reported. Weakness, dizziness, apprehension, restlessness, nausea, vomiting, diarrhea, abdominal pain, arthralgia, muscle twitching, blurred vision, and upper and lower respiratory infections have also been reported. Overdose symptoms are primarily related to vasodilation: flushing, headache, nausea, dizziness, hypotension and tachychardia. Methemoglobinemia is also a rare adverse effect. Most of these can be obviated by discontinuing the drug. Treatment is symptomatic and supportive. The hemodynamic effect of nitrates is brief.

Dosage and Administration:
Nitroglycerin:
Nitroglycerin 50 mcg IV given over 2 to 3 minutes; may be repeated every 90 seconds to three minutes as needed to a maximum dose of 500 mcg over 15 minutes

- **Please note, preparations come in different strengths**
- Dilute 1 mL of 5 mg/mL nitroglycerin with 100 mL of normal saline to make a concentration of 50 mcg/mL. Should NOT be mixed with other medications;
    - Administer 50 mcg per dose into lowest port on IV tubing over 1-2 minutes.

[34] Briggs GG, Freeman RK. Drugs in Pregnancy and Lactation 10th Ed. Wolters Kluwer. Philapdelphia, PA. 2015.
[35] Hale TW, Rowe HE. Medications and Mothers' Milk 16th Ed. Hale Publishing. Amarillo, TX. 2015.

- Sublingual spray may be used however it is significantly less reliable: 0.4 mg, one to two metered doses can be administered sublingually[36]. The bioavailability of this route is variable and is reported to be no more than 38%[37].
- An IV should be established, regardless of the route of administration, to prevent hypotension[38].
- Nitroglycerin binds to plastic; therefore the solution must be used within 30 minutes of preparation.

Uterine relaxation is achieved within 40-90 seconds and lasts for about 1 minute.

Onset of Action:
Sublingual spray: 1-3 minutes; IV: Immediate

Peak effect:
Sublingual spray: 4-10 minutes; IV: immediate

Half-Life:
1-4 minutes

Elimination:
Excreted by the kidneys (as inactive metabolites)

Non-steroidal anti-inflammatories

Diclofenac

(Voltaren®) is a non-steroidal anti-inflammatory (NSAID) with analgesic and antipyretic properties. While the mechanism of action is not fully understood, it is known to inhibit COX-1 and COX-2 enzymes, which results in decreased formation of prostaglandin precursors. It is commonly used post-surgically for pain relief and inflammation.

Indications and Clinical Use:
For pain relief during the postpartum period especially for reducing perineal pain and swelling from operative delivery and episiotomy. Acetaminophen appears to be the best option for treatment of fever during pregnancy. Ibuprofen is the least potent of NSAIDs.

Contraindications:
Should not be given during pregnancy, especially during the last three months. Diclofenac should not be given with pre-existing cardiovascular or cerebrovascular, GI or kidney disease or any bleeding disorders. Suppositories should not be given if there is a recent history of rectal or anal bleeding or inflammatory lesions. NSAIDs should not be given to those who are asthmatic or allergic to ASA.

Warnings and Precautions:
All NSAIDs cross the human placenta in pregnancy and distribute to the fetus. NSAIDs increase the risk of premature closure or constriction of the ductus arteriosus. Avoid the

[36] Induction of labour at term: SOGC clinical practice guideline no. 296.September 2013. Retrieved from http://sogc.org/wp-content/updloads/2013/08/September2013-CPG296-ENG-Online_REV-D.pdf
[37] Chestnut, D et al. (2014). *Chestnuts Obstetric Anaesthesia Principle and Practice 5th Edition*. New York, NY: Elsevier.
[38] Lee, L., Sprague, A., Yee, J. & Ehman, W. (Eds.). (2009, January). *Fundamentals of Fetal Health Surveillance: Self-Learning Manual, 4th Edition*. Vancouver, BC: Canadian Perinatal Programs Coalition.

concurrent use of Diclofenac with other NSAIDs. It should be used with caution if under the age of 16, or when hypertensive disorders or renal disease is present.

Pregnancy:
Human Data Suggest Risk in 1st and 3rd Trimesters

Lactation:
Category L2 - No Human Data – Probably Compatible

Adverse Reactions:
Bleeding, hemorrhoid exacerbation, irritation and anal inflammation have been reported. A common side effect of NSAIDs is stomach upset. Additionally mild abdominal cramping, diarrhea, dizziness and/or headaches have been reported.

Dosage and Administration[39]:
Suppository: 50 mg, 100 mg – maximum dose 100 mg/day
Oral: 50 mg – maximum dose 100 mg/day
Oral enteric coated (delayed release): 50 mg, 75 mg

Usual dose following delivery with surgical procedures is 50 mg or 100 mg per rectum, not to exceed 100 mg/day.

Diclofenac suppositories tend to be used short-term (up to three days post-surgery), whereupon oral NSAIDs are preferred.

Onset of Action:
Suppository: Suppositories tend to have a more rapid onset of action and a slower rate of absorption compared to oral enteric coated (delayed release) tablet.
Time to peak, serum: 5 hours
Suppository: ≤1 hour; approximately two-thirds of that observed with oral tablet (equivalent 50 mg dose)
Tablet, delayed release (diclofenac sodium): 2 hours

Half-Life:
2 hours

Elimination:
Urine (65%); feces (35%)

Naproxen

(Anaprox®, Naprelan®, Naprosyn®) is an (NSAID) with analgesic and antipyretic properties. It works by blocking the enzyme that makes prostaglandins, thereby reducing levels of prostaglandins.

Indications and Clinical Use:
Commonly used post-surgically for pain relief and inflammation.

[39] Health Canada – Diclofenac – update to heart and stroke related safety information and decrease in the maximum recommended daily dose for tablets and suppositories. October 6, 2014

Contraindications:
Naproxen should not be given during pregnancy. Naproxen should not be given with a known sensitivity to NSAIDs, has heart, GI or kidney disease or any bleeding disorders. Avoid the concurrent use of Naproxen with other NSAIDs.

Warnings and Precautions:
All NSAIDs cross the human placenta in pregnancy and distribute to the fetus NSAIDs increase the risk of premature closure or constriction of the ductus arteriosus. Their use is not recommended in pregnancy, especially during the last three months. Naproxen should be used with caution if under the age of 16. Suppositories should not be given if there is a recent history of rectal or anal bleeding or inflammatory lesions. Naproxen when taken with some SSRIs may cause increased bruising or bleeding.

Pregnancy:
Human Data Suggest Risk in 1st and 3rd Trimesters

Lactation:
Category L3 - Limited Human Data – Probably Compatible

Adverse Reactions:
Abdominal pain or cramping, rash, ringing in the ears, headaches, dizziness, diarrhea or constipation, and/or headaches, bleeding, hemorrhoid exacerbation, irritation and anal inflammation especially with suppository administration.

Dosage and Administration:
Suppository: 500 mg every 12 hours (bid)
Oral tablet: 250 mg, 375 mg, or 500 mg every 12 hours (bid)

Maximum daily dose of 1500 mg for three days post-surgery. The suppository form of naproxen is usually used initially, followed by oral administration.

Onset of Action:
Onset of action: Analgesic: 1 hour; Anti-inflammatory: ~2 weeks
Peak effect: Anti-inflammatory: 2-4 weeks
Time to peak, serum: 1-4 hours

Half-Life:
Normal renal function: 12-17 hours; End-stage renal disease: No change

Elimination:
Urine (95%; primarily as metabolites); feces (≤3%)

Sympathomimetics

Epinephrine hydrochloride

Stimulates adrenergic receptors resulting in relaxation of smooth muscle, cardiac stimulation (increasing myocardial oxygen consumption), and dilation of skeletal muscle vasculature.

Indications and Clinical Use:

For the treatment of anaphylactic shock as a result of an allergic reaction following administration of a drug, vaccine or serum. For use during neonatal resuscitation according to Neonatal Resuscitation Program (NRP) guidelines, by umbilical vein catheter (UVC), intraosseous (IO) needle or endotracheal tube (ET). This drug is for emergency purposes, and its use should be immediately followed by a physician consultation and if out-of-hospital, emergency transport to hospital.

Contraindications:
No contraindications to the use of injectable in a life-threatening situation.

Warnings and Precautions:
Use in pregnancy if the benefits outweigh the potential risk to the fetus. Use with caution in patients with cardiovascular diseases, diabetes mellitus and in patients with thyroid disease.

Pregnancy:
Human Data Suggest Risk

Lactation:
Category L2 – Limited Data – Probably Compatible

Adverse Reactions:
Angina, cardiac arrhythmia, chest pain, flushing, hypertension, pallor, palpitation, sudden death, tachycardia (parenteral), vasoconstriction, transient anxiety, apprehensiveness, cerebral hemorrhage, dizziness, headache, restlessness, dry throat, nausea and vomiting.

Adult Dosage and Administration:
Adult: **IM** = 0.3 mg (0.3 mL) 1mg/mL of (formerly 1:1000 concentration) every 5 to 15 minutes in the absence of clinical improvement.

Midwives may choose to use an auto-injector (EpiPen®) for ease of administration. Each auto-injector contains 2 mL of 1mg/mL epinephrine and is designed to deliver a single 0.3 mg dose of epinephrine; 1.7 mL remains in the unit after use.

Neonatal Dosage and Administration:
Neonatal: **UVC/IO**: 0.1 mL/kg of 0.1 mg/mL (formerly 1:10,000 concentration) (do NOT flush or dilute in saline) followed by 0.1- 1 mL 0.9% saline flush.
ET = 1 mL/kg of 0.1 mg/mL (formerly 1:10,000 concentration) (do NOT flush or dilute with saline), to a maximum dose of 3mL per dose.

Epinephrine should be administered during neonatal resuscitation when the neonate's heart rate remains less than 60 beats per minute after 30 seconds of effective positive pressure ventilation (PPV), followed by 60 seconds of chest compressions with PPV using 100% oxygen. UVC continues to be the preferred route for emergency vascular access, but IO access can be used as an alternative if UVC access is not possible and the midwife has the required training and equipment. Additionally, an initial dose of epinephrine can be delivered by ETT while UVC/IO access is being obtained. May be repeated every 3-5 minutes as needed.

Onset of Action:

Rapid

Half-Life:
2 minutes

Elimination:
Urine (as inactive metabolites)

Uterotonic agents

Oxytocics and other uterotonics are to be administered for the management of postpartum bleeding on the registrant's own responsibility. The choice of agent and method of administration will be dependent upon the clinical scenario and availability of these medications.

In an out-of-hospital setting, initiating emergency transport to hospital should be considered early in the treatment of a postpartum hemorrhage[40].

Carboprost tromethamine

(Hemabate®) is a prostaglandin which stimulates uterine contractility. Hemostasis at the placentation site is achieved through the myometrial contractions produced.

Indications and Clinical Use:
For treatment of postpartum hemorrhage due to uterine atony that is unresponsive to conventional methods of management.

Used as a third-line agent only after oxytocin and ergonovine maleate or as a second-line agent after oxytocin when ergonovine maleate is not available or contraindicated[41].

Contraindications:
Carboprost should not be used if there is active cardiac, pulmonary or renal disease, hypersensitivity to prostaglandins or active pelvic inflammatory disease.

Warnings and Precautions:
Use with caution in patients with hypertension, hypotension, anemia, history of asthma, history of scarred uterus, diabetes mellitus or history of seizure disorders.

Must be refrigerated at 2° to 8°C. (Check specific manufacturer product monograph for most accurate storage conditions.)

Pregnancy:
Contraindicated (unless for Termination/Evacuation of Pregnancy)

Lactation:

[40] It is beyond the scope of this document to outline the complete steps in the management of a postpartum hemorrhage. Midwives are expected to initiate the appropriate steps in the management of a postpartum hemorrhage according to their Emergency Skills protocol and are reminded that hemorrhage unresponsive to therapy is an indication for transfer of care to a physician.

[41] Senikas, V. Leduc, D. & Lalonde, A. (2009, October). Active management of the third stage of labour: Prevention and treatment of postpartum hemorrhage. SOGC clinical practice guideline no.235. *J Obstet Gynaecol Can, 31*(10), 980-93.

Category L3 - No Human Data – Probably Compatible

Adverse Reactions:
Nausea, vomiting, diarrhea, chills, shivering, transient elevated temperature, transient bronchoconstriction, headache, flushing and moderate increase in blood pressure. Side effects are generally temporary and end when the therapy is discontinued.

Dosage and Administration:
250 mcg IM. This may be repeated at 15 to 90 minute intervals on the basis of response up to a cumulative dose of 2 mg.

Onset of Action:
Peak serum concentrations occur 15 to 60 minutes after injection.

Half-Life:
Less than 1 hour.

Ergonovine maleate

An alkaloid from ergot stimulates contractions and acts systemically on the upper and lower segments of the uterine smooth muscle to increase strength, duration, and frequency of uterine contractions.

Indications and Clinical Use:
Ergonovine maleate is an effective agent for the prevention and treatment of PPH. It is used as a second line medication for the treatment of postpartum uterine atony and/or for postpartum hemorrhage uncontrolled by the use of oxytocin.

Contraindications:
Ergonovine maleate is contraindicated in the presence of: hypertension, pre-eclampsia, hypersensitivity to ergonovine maleate or any ingredient in the formulation, as well as for those receiving treatment for HIV which includes protease inhibitors or non-nucleoside reverse transcriptase inhibitors.

Warnings and Precautions:
Use with caution in patients with cardiovascular disease, hepatic impairment, renal impairment. Ergonovine is considered as a second choice to oxytocin due to greater risk of adverse effects and of an increased risk of retained placenta[42].

Must be refrigerated (2 to 8˚C). Protect from light. (Check specific manufacturer product monograph for most accurate storage conditions.)

Pregnancy:
Contraindicated

Lactation:
Category L3 – Limited Data – Probably Compatible

[42] Senikas, V. Leduc, D. & Lalonde, A. (2009, October). Active management of the third stage of labour: Prevention and treatment of postpartum hemorrhage. SOGC clinical practice guideline no.235. *J Obstet Gynaecol Can, 31*(10), 980-93.

Adverse Reactions:
Hypertension, seizures, headache, hypotension, nausea and vomiting.

Dosage and Administration:
Supplied as 0.25 mg/mL. Second line medication for the treatment of postpartum uterine atony and/or for postpartum hemorrhage uncontrolled by the use of oxytocin:

0.25 mg IM or IV (slowly) once, if further doses are required, repeat every 2-4 hours. Maximum cumulative dose of 5 doses[43].

Onset of Action:
2-7 minutes IM
>1 minute IV

Half-Life:
0.52 hours

Misoprostol

Cytotec©, is a synthetic prostaglandin E_1 analog and induces uterine contractions. Misoprostol is a water soluble tablet.

Indications and Clinical Use:
1) Treatment of postpartum uterine atony or postpartum hemorrhage only when injectable uterotonics are not available. Where IM oxytocin can be repeated and there is no IV treatment with oxytocin or IM ergot alkaloids available, repeating IM oxytocin is preferred to misoprostol. Misoprostol is not as effective as oxytocin or ergot in management or prevention of postpartum hemorrhage[44] and carries a significant risk of pyrexia and GI symptoms. Misoprostol may be used when IV oxytocin is not available after a prophylactic IM oxytocin has been administered during the third stage of labor[45], although it is not preferred.

2) Treatment of retained placenta in the absence of bleeding: Misoprostol or oxytocin can be injected into the umbilical vein. Refer to instructions provided for Injection of the Intra-Umbilical Vein for Retained Placenta.

3) Cervical ripening for induction of labour: See section 2.1: *Drugs which a midwife may administer after consulting with and on the order of a medical practitioner.* As with any induction method where a physician has prescribed the inducing pharmacological agent, the midwife may continue to be involved in the care as the condition warrants. A midwife with specialized practice certification may on her own responsibility initiate induction of labour in hospital with a cervical ripening agent and/or initiate and manage an IV oxytocin induction/augmentation of labour[46].

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[43] SOGC. (2013). Postpartum Hemmorhage. In SOGC, *Advances in labour and risk management 19th edition 2012 – 2013* (p.7). Ottawa, ON.

[44] Tunçalp, Ö., Hofmeyr, G.J. & Gülmezoglu, A.M. (2012). Prostaglandins for preventing postpartum haemorrhage (Review). *Cochrane Database of Systematic Reviews, 2012*(8). CD000494. doi:10.1002/14651858.CD000494.pub4

[45] Tang J., Kapp, N., Dragoman, M. & de Souza, J.P. (2013, May). WHO recommendations for misoprostol use for obstetric and gynecologic indications. *Obstet Gynecol Int, 121*(2), 186-189. doi: http://dx.doi.org/10.1016/j.ijgo.2012.12.009

[46] Misoprostol use for induction of labour has not yet been included into the Framework for Midwife Certification for Induction and Augmentation of Labour in Hospital. It will come into effect when approved certification programs are in place. Please contact CMBC for more information.

Contraindications:
Misoprostol should not be used in those with a history of allergy to prostaglandins.

Warnings and Precautions:
Misoprostol should be used with caution in those with pre-existing cardiovascular disease.

Pregnancy:
Contraindicated (oral)
Human Data Suggest Low Risk (Term Cervical Ripening)

Lactation:
Category L2 – Limited Data – Probably Compatible

Adverse Reactions:
Most common (especially with oral administration): GI – diarrhea (14-40%), abdominal pain (13-20%), pyrexia and shivering (11%). Pyrexia is more common when the dose exceeds 600 mcg. Greater incidence than 1%: nausea (3.2%), flatulence (2.9%), headache (2.4%), dyspepsia (2 %), vomiting (1.3%) and constipation (1.1%).

Dosage and Administration:
1) Treatment of PPH
*Used only when no injectable uterotonic such as oxytocin or ergometrine is available.
Oral: Usual dose: 400 mcg sublingual SL[47, 48]
400 mcg-800 mcg sublingual SL can be administered[49]
Rectal administration (600 mcg-800 mcg) may be used if unable to take medications orally and injectable uterotonics are not available.

* Ergonovine, 0.2 mg IM, and misoprostol, 400 mcg to 800 mcg given by the oral, sublingual, vaginal or rectal route, may be offered as alternatives in vaginal deliveries when oxytocin is not available[50, 51].

Misoprostol is supplied as 100 and 200 mcg tablets.

Onset of Action:
Oral – 8 minutes
Sublingual – 11 minutes
Peak serum concentration – 18-34 minutes
Vaginal – 20 minutes
Rectal – 100 minutes

[47] Hofmeyr, G.J., Gülmezoglu, A.M., Novikova, N. & Lawrie, T.A. (2013). Postpartum misoprostol for preventing maternal mortality and morbidity (Review). *Cochrane Database Syst Rev, 2013*(7), CD008982. doi: 10.1002/14651858.CD008982.pub2

[48] Gizzo, S., Patrelli, T.S., Gangi, S.D., Carrozzini, M., Saccardi, C., Zambon, A., Bertocco, A., Fagherazzi, S., D'Antona, D. & Nardelli, G.B. (2013). Which uterotonic is better to prevent the postpartum hemorrhage? Latest news in terms of clinical efficacy, side effects, and contraindications: a systematic review. *Reproductive Sciences, 20*(9), 1011-9. doi: 10.1177/1933719112468951

[49] FIGO 2012 position for PPH recommends a dose of misoprostol 800 mcg SL only if oxytocin is not available.

[50] FIGO 2012 recommends a single dose of misoprostol Oral 600 mcg for active management or SL 800 mcg for pph only if oxytocin is not available.

[51] Senikas, V. Leduc, D. & Lalonde, A. (2009, October). Active management of the third stage of labour: Prevention and treatment of postpartum hemorrhage. SOGC clinical practice guideline no.235. *J Obstet Gynaecol Can, 31*(10), 980-93.

Half-Life:
20 to 40 minutes.

2) Injection of the Intra-Umbilical Vein for Retained Placenta
Misoprostol injected into the umbilical vein can be considered for retained placenta in the absence of maternal bleeding[52].
The technique for injection of the intraumbilical vein is described below[53,54]

1. Explain the procedure and obtain consent.
2. Prepare a syringe with the medication in 30 cc normal saline. Crush and dissolve 4x 200 mcg tablets misoprostol or oxytocin 20-50 IU in 30 mL normal saline. Identify the umbilical vein. Recut the cord if necessary.
3. Insert a size 10 nasogastric tube into the umbilical vein. If resistance is felt, retract the catheter by 1-2 cm and then advance further, if possible. If the catheter cannot be advanced further without force, inject the solution in this position.
4. The tube has reached the placenta when the majority of the catheter is inserted and resistance is felt. Retract by 3-4 cm to ensure that the tip is in the umbilical vein and not in a placental branch.
5. Attach the syringe to the catheter and inject the solution followed by clamping of the cord with the catheter.
6. Note the time of the injection.
7. Wait 10-30 minutes for the placenta to deliver.

3) Cervical ripening for induction of labour: See *Cervical Ripening and Induction Agents* in section *2.1: Drugs which a midwife may administer with specialized certification or after consulting with and on the order of a medical practitioner.*

Oxytocin

Oxytocin is a hormone that simulates uterine smooth muscle to contract by activating protein receptors which act on myofibrils. Oxytocin increases production of prostaglandin which further stimulates uterine contractions.

Indications and Clinical Use:
As a first line agent used intramuscularly or intravenously: 1) for active management to prevent postpartum hemorrhage 2) to treat postpartum hemorrhage due to uterine atony 3) for induction and augmentation of labour.

Contraindications:
Hypersensitivity to oxytocin or any component of the formulation. For induction and augmentation, any contraindication to labour including: placenta previa, vasa previa, cord presentation, fetal malpresentation such as transverse or footling breech, prior classical or inverted T cesarean section, previous uterine surgery such as myometrial incision, active genital herpes, pelvic structural deformities, cervical carcinoma, previous uterine rupture.

[52] Nardin, J.M., Weeks, A. & Carroli, G. (2011). Umbilical vein injection for management of retained placenta (Review). *Cochrane Database Syst Rev, 2011*(5), CD001337. doi: 10.1002/14651858.CD001337.pub2

[53] MORE^{OB} - Salus Global Corporation. (2014). *Postpartum Hemorrhage*. Retrieved from: https://secure.moreob.com/en?t=/contentManager/selectCatalog&i=1317992669064&l=0&e=UTF-8&displayMode=1&ParentID=1205698412125&intro=1&startRow=0&active=no

[54] Senikas, V. Leduc, D. & Lalonde, A. (2009, October). Active management of the third stage of labour: Prevention and treatment of postpartum hemorrhage. SOGC clinical practice guideline no.235. *J Obstet Gynaecol Can, 31*(10), 980-93.

Warnings and Precautions:
A midwife with specialized practice certification may, on her own responsibility, initiate induction of labour in hospital with a cervical ripening agent and/or initiate and manage an IV oxytocin induction/augmentation of labour.

Midwives without specialized practice certification may only administer oxytocin as an IV infusion for induction or augmentation of labour with a physician order.

Oxytocin is structurally and functionally related to vasopressin and its antidiuretic action can lead to water retention. For this reason electrolyte-containing solutions should be used when administering oxytocin. Water intoxication can lead to hyponatremia, confusion, convulsions, coma, congestive heart failure, and death. Fluid overload and hyponatremia with concurrent oxytocin administration may be prevented by strict intake and output recordings, use of balanced salt solutions such as Normal Saline or Lactated Ringers, and avoiding prolonged administration of an infusion of 20 to 40 units of oxytocin.

Oxytocin Vial STORAGE: Store between 15 and 30˚C. DO NOT FREEZE. (Check specific manufacturer product monograph for most accurate storage conditions.)

Oxytocin Ampoule STORAGE: (Check specific manufacturer product monograph for most accurate storage conditions.)

Pregnancy:
Compatible for induction or augmentation of labour

Lactation:
Category L2 – Limited Data – Probably Compatible

Adverse Reactions:
Arrhythmias, hypertensive episodes, nausea, vomiting, uterine hypertonicity, tetanic contraction of the uterus, uterine spasm, anaphylactic reaction, subarachnoid hemorrhage, severe water intoxication with convulsions, coma, and death is associated with a slow oxytocin infusion over 24 hours.

1) **Active Management of the Third Stage of Labour**:
   Dosage and Administration:
   10 Units IM or;
   20 Units to 40 Units added to 1000 mL normal saline or ringers lactate and administered IV at a rate of 100-150 mL/hr[55,56] or;
   5 Units IV given slowly over 1-2 minutes;

2) **Treatment of postpartum hemorrhage:**
   Dosage and Administration:
   10 units IM and/or;

[55] Nordstrom L., Fogelstam K., Fridman G., Larsson A. & Rydhstroem H. (1997). Routine oxytocin in the third stage of labour: A placebo controlled randomised trial. *Br J Obstet Gynaecol, 104*(7), 781-6.
[56] Leduc D., Senikas V. & Lalonde A. (2009, October). Active management of the third stage of labour: Prevention and treatment of postpartum hemorrhage. SOGC clinical practice guideline no.235. *J Obstet Gynaecol Can, 31*(10), 980-93.

20 to 40 Units added to 1000 mL of normal saline or ringers lactate and administered at a rate of 250 ml/hr

Onset of Action:
IM: 2-5 minutes
IV: 1-5 minutes

Duration of Action:
IM and IV: 30-50 minutes

Half-Life:
IM and IV: 6-15 minutes.

*Reference ranges for the onset and duration of action and half-life are varied in the literature[57,58,59,60].

Elimination:
Metabolised by the liver and oxytocinase and excreted by the kidneys.

3) **Induction and augmentation of labour: See section 2.1: *Drugs which a midwife may administer after consulting with and on the order of a medical practitioner*.**

As with any induction method where a physician has prescribed the inducing or augmenting pharmacological agent, the midwife may continue to be involved in care as the condition warrants. A midwife with specialized practice certification may on her own responsibility initiate induction of labour in hospital with a cervical ripening agent and/or initiate and manage an IV oxytocin induction/ augmentation of labour[61].

Vaccines *(updated March 2018)*

Pregnancy and related contact with a health care provider creates an opportunity to review a healthy individual's immunization status. The perinatal period is therefore an opportune time to assess for, offer and administer any indicated vaccines.

Registrants should refer to the BC Centre for Disease Control (BCCDC) Immunization Manual for the most up to date information, guidelines and protocols.

Special considerations:

- Live attenuated virus and live bacterial vaccines are generally contraindicated during pregnancy due to potential risks to the fetus.
- Serious adverse events following immunization must be reported to the local Public Health Unit. Refer to the BCCDC for a detailed overview of the definition/criteria and

[57] Simpson K. R. & Crechan, P. A. (2008). *AWHONN (Association of women's health obstetric and neonatal nurses) Perinatal nursing. Edition 3*. Philadelphia, PA: Lippincott, Williams and Wilkins.
[58] Hale, T.W. (2010). *Medications and mothers' milk. Fourteenth edition*. Amarillo, TX: Hale Publishing.
[59] Embrey, M.P. (1955, February). A New Multichannel External Tocograph. *J Obstet Gynaecol Br Emp*, *62*(1), 1-5.
[60] Embrey, M.P. (1961, June). Simultaneous intramuscular injection of oxytocin and ergometrine: A tocographic study. *British Medical Journal*, *1*(5241), 1737-1738.
[61] PLEASE NOTE: Certification programs are not yet in place. For more information, please contact CMBC.

forms for reporting. Adverse events following immunizations are generally mild; serious events including those resulting in permanent sequelae are extremely rare.
- Whenever vaccines are administered to an adult, the midwife must send a record of immunization to the primary care provider to whom care is transferred at six weeks postpartum. Whenever vaccines are administered to an infant, the midwife must send a record of immunization to the primary care provider to whom care transferred and to the local public health unit in a timely fashion.

Inactivated Influenza Vaccine

The inactivated influenza vaccines protect against seasonal influenza. These are reformulated annually because the circulating influenza viruses change. Included are standardized amounts of the Hemagglutinin (HA) protein from representative seed strains of the two human influenza A subtypes (H3N2 *and* H1N1) and one or two of the two influenza B lineages.

Indications and Clinical Use:
Inactivated influenza vaccine is recommended for all pregnant individuals, regardless of trimester, during the influenza season because of their increased risk of influenza-associated morbidity, evidence of adverse neonatal outcomes associated with maternal influenza, evidence that vaccination of pregnant women protects their newborns from influenza and influenza-related hospitalization, and evidence that infants born during the influenza season to vaccinated women are less likely to be premature, small for gestational age, and low birth weight. Immunization during pregnancy has the advantage of protecting the fetus through transplacental antibody passage or through breast milk.

Contraindications:
History of anaphylaxis to a previous dose of any type of influenza vaccine or any component of the vaccine; history of Guillain-Barré syndrome within eight weeks of receipt of a previous dose of influenza vaccine without another cause being identified.

Warnings and Precautions:
- Epinephrine (1:1000) and Diphenhydramine hydrochloride should be available for immediate use in the event of an anaphylactic reaction.

Pregnancy:
Compatible - inactivated influenza vaccines can be administered at any stage of pregnancy

Lactation:
Category L1 – Limited Data - Compatible

Adverse Reactions:
Possible reactions are usually mild and temporary and may include tenderness, redness, itching, bruising, and muscle ache at the injection site; and /or headache, fatigue, fever and myalgia.

Dosage and Administration:
IM: 0.5 mL of inactivated influenza vaccine. The deltoid muscle is the recommended site in adults.

Hepatitis B Vaccine

Hepatitis B vaccine is an inactivated vaccine administered to individuals at high risk of contracting hepatitis B. It can be administered any time during pregnancy and to infants within 24 hours of birth. Infants requiring hepatitis B vaccination at birth will receive a total of four doses of vaccine: subsequent doses of hepatitis B vaccine are given in combination with diphtheria, tetanus, acellular pertussis and *Haemophilus influenzae* type b as INFANRIX hexa® at the two, four and six month immunization visits.

Risk factors for hepatitis B include substance/drug misuse, HIV positive status, household contact with a chronic carrier including an internationally adopted child, unprotected sexual activity with multiple sexual partners, recent history of a sexually transmitted disease, anti-HCV positive status, or recipients of repeated infusions of blood or blood products.

Indications and Clinical Use:
Hepatitis B vaccine should be offered during pregnancy to seronegative adults with risk factor(s) for hepatitis B as listed above.

Hepatitis B vaccine should be given to the newborn at birth in the presence of the following factors:

1. The mother is known to be HBsAg positive or has specific risk factors (substance/drug misuse and/or sex worker) for recent acquisition of hepatitis B although seronegative (possible window period) or has unknown HBsAg status.
2. The mother is at high risk for hepatitis B (other than substance/drug misuse and/or sex worker) and status is unknown or negative.
3. The primary caregiver or other household contacts of infant have chronic hepatitis B virus infection.
4. The other primary caregiver is at high risk for hepatitis B and their status is unknown or negative.

Contraindications:
History of anaphylaxis to a prior hepatitis B vaccine or any component of the vaccine.

Warnings and Precautions:
- Epinephrine (1:1000) and Diphenhydramine hydrochloride should be available for immediate use in the event of an anaphylactic reaction.

Pregnancy:
Compatible

Lactation:
Category L1 – Limited Data - Compatible

Adverse Reactions:
Possible reactions are usually mild and temporary and may include tenderness, irritability, redness, itching, bruising, and muscle ache at injection site; and/or headaches, fatigue, fever and myalgia.

Dosage and Administration

Adult: Give 1 dose of hepatitis B vaccine IM (ENGERIX®-B 20 mcg/1 mL or RECOMBIVAX HB® 10 mcg/1 mL) during pregnancy or postpartum, and again at 1 and 6 months later.
Newborn: Give 1 dose hepatitis B vaccine IM (ENGERIX®-B 10 mcg/0.5 mL or RECOMBIVAX HB® 5 mcg/0.5 mL) immediately after birth, followed by 1 dose INFANRIX hexa® as part of the routine schedule at 2, 4 and 6 months of age. If HBIg indicated, ensure vaccine is given at the same time as HBIg but in a separate syringe and at a separate injection site.

Measles / Mumps / Rubella (MMR) Vaccine

The MMR vaccine is a live, attenuated vaccine indicated for active immunization against infection by measles, mumps and rubella. While this vaccine should not be given during pregnancy, for those identified as rubella-susceptible in pregnancy, counselling regarding exposure, reporting and postpartum MMR vaccination is indicated. Pregnant individuals without history of prior immunization or serological proof of immunity should be tested for serologic confirmation of rubella immunity status in early pregnancy.

Indications and Clinical Use:
If rubella-susceptible during pregnancy, the MMR vaccine should be offered in the postpartum period.

Contraindications:
Pregnancy; however, the risk of rubella vaccine teratogenicity is theoretical and has not been observed. Therefore, inadvertent immunization during pregnancy is not considered an indication for pregnancy termination and women should be reassured.
Immunocompromised as a result of disease or therapy.

Warnings and Precautions:

- Pregnancy should be avoided for one month following vaccination.
- Rubella-susceptible individuals who receive RhIg postpartum should wait three months before receiving MMR vaccine for rubella protection to ensure optimal anti-rubella antibody response. However, if there is a risk of non-compliance in vaccination at a later date, risk of pregnancy, or contracting rubella in the first three months postpartum, MMR may be given in the immediate postpartum period so long as serologic testing for rubella is done at one to three months postpartum to assess for immune status. Revaccinate if non-immune.
- Epinephrine (1:1000) and Diphenhydramine hydrochloride should be available for immediate use in the event of an anaphylactic reaction.

Pregnancy:
Contraindicated

Lactation:
Category L3 – No Data – Probably Compatible

Adverse Events:
Pain, redness, induration, wheal and flare reaction, urticaria and/or swelling at the injection site, rash, fever, malaise, headache, nausea, myalgia, paraesthesia.

Dosage and Administration*:

SC: 0.5 mL
*Reconstituted vaccine should be injected promptly, or within eight hours of reconstitution if it is stored refrigerated (2-8° C)

Varicella Vaccine

The varicella vaccine is a live, attenuated vaccine indicated for active immunization against varicella infection. While this vaccine should **not** be administered during pregnancy, those confirmed as varicella-susceptible in pregnancy should be counselled to report varicella exposure to a health care provider, and advised to receive postpartum varicella vaccination. All pregnant individuals should be evaluated for varicella immunity (prior history of varicella, prior receipt of 2 doses of varicella vaccine, or seroimmunity).

Indications and Clinical Use:
If identified as varicella-susceptible during pregnancy, the varicella vaccine should be offered in the postpartum period.

Contraindications:
Pregnancy; history of anaphylaxis to a prior varicella vaccine or any component of the vaccine; active untreated tuberculosis, immunocompromised as a result of disease or therapy; solid organ transplant recipient; history of chronic inflammatory disease.

Warnings and Precautions:

- Pregnancy should be avoided for one month following vaccination.
- Varicella-susceptible individuals who receive RhIg postpartum should wait three months before receiving the varicella vaccine to ensure optimal anti-varicella antibody response. However, if there is a risk of non-compliance in vaccination at a later date, risk of pregnancy, or contracting varicella in the first three months postpartum, the varicella vaccine may be given in the immediate postpartum period so long as serologic testing for varicella is done at one to three months postpartum to assess for immune status. Revaccinate if non-immune.
- Epinephrine (1:1000) and Diphenhydramine hydrochloride should be available for immediate use in the event of an anaphylactic reaction.

Pregnancy:
Contraindicated

Lactation:
Category L3 – No Data – Probably Compatible

Adverse Events:
Local: pain, redness, swelling. Rates of these events are slightly higher following 2nd dose. Systemic: varicella-like rash, fever. Rates of these events are lower following 2nd dose.

Dosage and Administration*:
SC: 0.5 mL
*Reconstituted vaccine should be injected within 90 minutes of reconstitution.

Tetanus Toxoid, Reduced Diphtheria Toxoid and Acellular Pertussis (Tdap) Vaccine

The Tdap vaccine is an inactivated vaccine that protects against tetanus, diphtheria and pertussis. Tetanus is a nervous system disorder caused by *Clostridium tetani* that can cause life-threatening muscle spasms. Diphtheria is a serious infection of the nose and throat that can result in severe breathing problems, heart failure and paralysis. Pertussis (whooping cough) is a respiratory illness caused by the bacterium *Bordetella pertussis*.

Rates of pertussis and associated morbidity are high in infants less than six months of age. Pertussis contracted during early infancy is associated with mortality rates as high as 1% in infants less than 6 months of age. About 75% of infants with pertussis contract it from a family member or caregiver. For these reasons a dose of pertussis-containing vaccine may be recommended during pregnancy. The vaccine provides passive protection to the infant by transfer of IgG transplacentally in the third trimester and by transfer of secretory IgA in breast milk. It also helps prevent infection in the mother, and thus potential transmission of pertussis from the mother to the infant after birth. In addition, to minimize the risk of transmission to the infant even further, all family members caring for the infant should also consider vaccination against pertussis.

Indications and Clinical Use:
Tdap vaccination is indicated for all pregnant individuals ideally between 27 and 32 weeks gestational age, irrespective of their immunization history. Tdap may also be administered as early as 13 weeks and up until delivery if Tdap administration during the ideal window of 27 to 32 weeks is missed. Tdap is not yet universally covered by the BC Medical Services Plan; despite being indicated, clients may be asked to pay for the vaccine.

Contraindications:
History of anaphylactic reaction to a previous dose of any tetanus, diphtheria, or pertussis-containing-vaccine or to any component of the formulation. History of Guillain-Barré Syndrome (GBS) within 8 weeks of receipt of a tetanus containing-vaccine with no other potential cause identified.

Warnings and Precautions:

- Use with caution in patients with a history of bleeding disorders, thrombocytopenia and/or patients on anticoagulant therapy.
- Epinephrine (1:1,000) and Diphenhydramine hydrochloride should be available for immediate use in the event of an anaphylactic reaction.

Pregnancy:
Compatible

Lactation:
Category L1 – No Data – Compatible

Adverse Events:
Pain, redness and/or swelling at the injection site, fatigue, headache, fever, chills, nausea, diarrhea, muscle or joint aches.

Dosage and Administration:
IM: 0.5 mL

Vitamin and mineral prophylaxis and therapy

Phytonadione *(updated December 2017)*

(Vitamin K_1) is a fat-soluble vitamin administered to the newborn shortly after birth to reduce the likelihood of vitamin K deficiency bleeding (VKDB), formerly known as haemorrhagic disease of the newborn (HDN). The intramuscular (IM) route is the most effective route compared to oral or parental routes in reducing the incidence of VKDB, and is currently considered to be the standard of care. Should parents refuse intramuscular administration, oral administration of the IM preparation as per the dosage regime below should be recommended as part of an informed choice discussion.

Dosage and Administration:

IM route:
1 mg IM within six (6) hours of birth if birth weight is greater 1500 grams
0.5 mg IM within six (6) hours of birth if birth weight is less than 1500 grams

Oral route:
2 mg orally within six (6) hours of birth, 2 mg orally at 2-4 weeks of age and 2 mg orally at 6-8 weeks of age.

If the infant regurgitates any of the oral doses within one hour of administration, the oral dose should be repeated.

Folic Acid

Folic Acid taken prior to conception and during early pregnancy has a role in preventing neural tube defects. Individuals at low risk and who are planning a pregnancy benefit from a good diet of folate-rich foods and a daily multivitamin with folic acid.

Dosage - low risk:
0.4-1.0 mg orally per day.

Individuals at high risk for neural tube defects require increased daily amounts of folic acid in the first trimester of pregnancy and ideally prior to conception. Risk factors include: Family history of neural tube defects, congenital anomaly; current health risks such as diabetes, BMI >35 kg/m^2, celiac disease, gluten-free diet[62], poor diet, or substance use; certain ethnic groups; currently taking a folic acid antagonist medication in early pregnancy[63].

Dosage - high risk:
5 mg orally per day, ideally beginning three months before conception and until 10 to 12 weeks post conception.
From 12 weeks post-conception and throughout pregnancy and the postpartum period (for as long as breastfeeding continues), supplementation should consist of a multivitamin with folic acid 0.4-1.0 mg.

Folic Acid greater than 1.1 mg requires a prescription

[62] Goh, I. & Koren, G. (2008, January). Folic acid in pregnancy and fetal outcomes. *J. Obs Gyn, 28*(1), 3-13.
[63] Wen, S.W., Zhou, J., Yang, Q., Fraser, W., Olantunbosun, O. & Walker, M. (2008, December). Maternal exposure to folic acid antagonists and placenta-mediated adverse pregnancy outcomes. *CMAJ, 179*(12), 1263-1268.

2.1 Drugs which may be independently prescribed, ordered and administered by a midwife with specialized practice certification or which may be administered after consulting with and on the order of a physician. *(updated March 2018)*

Cervical Ripening/ Induction Agents[64]

Midwives without specialized practice certification may administer a cervical ripening pharmacologic agent for induction of labour with a physician order. As with any induction method where a physician has prescribed the inducing pharmacological agent, the midwife shall continue to be involved in care as the condition warrants.

A midwife with specialized practice certification may, on her own responsibility, order and administer a cervical ripening pharmacologic agent for induction of labour in hospital as per the *CMBC Framework for Midwife Certification for Prescribing, Ordering, Administering and Managing Induction and Augmentation of Labour in Hospital* and in conjunction with local hospital protocols**.**

Prostaglandins E2/Dinoprostone (Cervidil®, Prepidil®, Prostin E2®)

In pregnancy, prostaglandins E2 (PGE2) are secreted by the fetal membranes and placenta. They are believed to play an important role in cervical ripening and the initiation of labour by stimulating the production of prostaglandin F2Alpha (PGF2α) which increases the sensitivity and number of oxytocin receptors on the myometrium.

Dinoprostone is a synthetic analogue of PGE2. Vaginal preparations of Dinoprostone (PGE2 gels and vaginal inserts, including sustained release preparations), appear to be effective in cervical ripening and induction of labour.

Indications and Clinical Use:
Dinoprostone is primarily used as an in-hospital method of ripening the cervix in preparation for labour or in the presence of a medical or obstetrical indication for the induction of labour.

Contraindications:
Known hypersensitivity to prostaglandins, any condition that preclude labour and vaginal birth, abnormal fetal status, non-vertex presentation, history of previous cesarean section or major uterine surgery, unexplained vaginal bleeding in pregnancy, ≥5 term pregnancies, history of epilepsy (Prepidil only) and concurrent use of oxytocic drugs.

Warnings and Precautions:
Dinoprostone may be used in the presence of rupture of membranes (ROM). However, there may be an increase in chorioamnionitis when vaginal prostaglandins are used for induction with ruptured membranes when compared with oxytocin induction.

[64] Several cervical ripening methods can be applied to increase the success of a vaginal delivery with an unfavourable cervix which includes both mechanical and pharmacologic options. Mechanical options such as a balloon device may be applied on the registrant's own responsibility.

Pregnancy:
First 28 weeks of pregnancy – Contraindicated unless for termination/evacuation.
Pregnancy near or at term – Compatible.

Lactation:
Category L3 - No Data – Probably Compatible (will be well-metabolized before lactogenesis)

Adverse Reactions:
Hypotension, syncope, tachycardia, dizziness, hyperthermia, nausea, vomiting, diarrhea, tachysystole, hypertonus, hyperstimulation, abnormal fetal heart rate.

Dosage and Administration:

Prostaglandins	Form	Route	Dose	Notes
Cervidil © Ferring PGE2 Dinoprostone	Time release polymer wafer	intravaginal	10mg with slow release of 0.3 mg / hr	Repeat in 12-24 hours; remove at the onset of active labour
Prepidil © Pfizer PGE2 Dinoprostone	Gel	endocervix	0.5 mg / 2.5 ml (3 gm)	Repeat every 6 hours max dose 3x in 24 hrs
Prostin E2 © Pfizer PGE2 Dinoprostone	Gel	intravaginal	1mg / 3 grams 2mg / 3 grams	Repeat in 6 hrs

Onset of Action:
Time to peak: 0.5-1 hour

Half-Life:
2.5-5 minutes

Prostaglandins E1/Misoprostol (Cytotec©)

Cytotec© is an orally active synthetic prostaglandin E_1 analog that induces uterine contractions. Misoprostol is available as a water soluble tablet.

Indications and Clinical Use:

Misoprostol is considered a safe and effective agent when used off-label for cervical ripening or labour induction on an inpatient basis.

Contraindications:
Known hypersensitivity to prostaglandins, any condition that preclude labour and vaginal birth, abnormal fetal status, non-vertex presentation, history of previous cesarean section or major uterine surgery, unexplained vaginal bleeding in pregnancy, ≥5 term pregnancies, and concurrent use of oxytocic drugs.

Warnings and Precautions:
Misoprostol should be used with caution in those with pre-existing cardiovascular disease. Oxytocin should be started no earlier than 4 hours after the last dose of misoprostol. Misoprostol is can be absorbed through skin and mucous membranes and should not be handled by anyone who is or could possibly be pregnant, lactating or trying to conceive.

Pregnancy:
Compatible for induction or augmentation of labour; otherwise contraindicated
Human Data Suggest Low Risk (Term Cervical Ripening)

Lactation:
Category L2 - Limited Data – Probably Compatible

Adverse Reactions:
Most common (especially with oral administration): GI – diarrhea (14 – 40%), abdominal pain (13 – 20%), pyrexia and shivering (11%). Pyrexia is more common when the dose exceeds 600 mcg. Greater incidence than 1%: nausea (3.2%), flatulence (2.9%), headache (2.4%), dyspepsia (2 %), vomiting (1.3%) and constipation (1.1%). Serious adverse events with the use of misoprostol are similar to those of other prostaglandins, and include uterine tachysystole with its potential fetal and maternal effects and meconium staining of liquor.

Dosage and Administration[65]
25-50mcg[66] orally with a drink of water (ensure that it is swallowed quickly to avoid sublingual absorption). Repeat every 2 hours as long as contractions are absent or non-painful.

Onset of Action:
Oral – 8 minutes
Sublingual – 11 minutes
Vaginal – 20 minutes
Rectal – 100 minutes

Half-Life:
20 to 40 minutes

Oxytocin Intravenous Infusion

[65] Providers should remain alert to changes in national standards and local hospital protocols as the evidence evolves.
[66] Dose recommendation is variable; the lower dose has been chosen for safety purposes because of the increasing sensitivity of uterine receptors to misoprostol with increasing gestational age.

Midwives without specialized practice certification may administer oxytocin via intravenous infusion for induction or augmentation of labour with a physician order. As with any induction or augmentation method where a physician has prescribed the pharmacological agent, the midwife shall continue to be involved in care as the condition warrants.

A midwife with specialized practice certification may, on her own responsibility, order and administer oxytocin via intravenous infusion for induction or augmentation of labour in hospital as per the *CMBC Framework for Midwife Certification for Prescribing, Ordering, Administering and Managing Induction and Augmentation of Labour in Hospital* and in conjunction with local hospital protocols**.**

Indications and Clinical Use:
Oxytocin is a hormone that simulates uterine smooth muscle to contract by activating protein receptors which act on myofibrils. Oxytocin increases production of prostaglandin which further stimulates uterine contractions. Oxytocin in indicated for the induction or augmentation of labour.

Contraindications:
Hypersensitivity to oxytocin or any component of the formulation, any contraindication to labour or vaginal birth, known cephalopelvic disproportion, abnormal fetal heart rate, circumstances that make it impossible for a primary care provider to be present, inability to apply appropriate fetal health surveillance (EFM).

Warnings and Precautions:
Oxytocin is structurally and functionally related to vasopressin and its antidiuretic action can lead to water retention. For this reason electrolyte-containing solutions should be used when administering oxytocin. Water intoxication can lead to hyponatremia, confusion, convulsions, coma, congestive heart failure, and death. Fluid overload and hyponatremia with concurrent oxytocin administration may be prevented by strict intake and output recordings and use of balanced salt solutions such as normal saline or lactated Ringer's. Oxytocin should also be used with caution in individuals with prior uterine surgery or caesarean delivery, history of difficult or traumatic delivery, a history of five or more term pregnancies, over distention of the uterus, uterine hypertonus and/or malpresentation.

Pregnancy:
Compatible for induction or augmentation of labour

Lactation:
Category L2 – Limited Data – Probably Compatible

Adverse Reactions:
Arrhythmias, hypertensive episodes, nausea, vomiting, uterine hypertonicity, tetanic contraction of the uterus, uterine spasm, anaphylactic reaction, subarachnoid hemorrhage, severe water intoxication with convulsions, coma, and death is associated with a slow oxytocin infusion over 24 hours.

Dosage and Administration:
Oxytocin must be delivered diluted in an isotonic solution through an IV infusion pump. Concurrent continuous electronic fetal monitoring is recommended due to the risk of tachysystole. Oxytocin can be used **after** the use of prostaglandins: 30 minutes after

dinoprostone insert (Cervidil) removal, four hours after oral misoprostol administration and/or six hours after vaginal prostaglandin E2 gel administration.

Low-dose oxytocin:

Initiate oxytocin infusion at 1-2 mU/min.
Increase oxytocin by 1-2 mU/min every 30 minutes until regular uterine activity is established.
Usual dose for labour = 8-10 mU/min.
Indications: All augmentations in 2nd stage, parous augmentation, grand multiparous induction, VBAC augmentation/induction[67] (increase by 1 mU/min).

High-dose oxytocin:

Initiate oxytocin infusion at 2-4 mU/min.
Increase oxytocin by 4 mU/min every 30 minutes until regular uterine activity is established.
Indications: Parous induction, nulliparous augmentation/induction in 1st stage.

Maximum dosage:
Low-dose- 20-30mu/min (20mu/min for VBACs)
High-dose: 30mu/min

Onset of Action*:
IM: 2-5 minutes
IV: 1-5 minutes

Half-Life*:
IM and IV: 3 minutes.

Elimination:
Excreted by the kidneys.

*Reference ranges for the onset and duration of action and half-life are varied in the literature

Controlled Substances for use in prodromal and active labour and for use in the early postpartum period can be found in the *CMBC Standards, Limits and Conditions for Prescribing, Ordering and Administering Controlled Substances*.

[67] A midwife may not administer or initiate an IV oxytocin induction/augmentation of labour if there is a history of previous cesarean section or uterine surgery without a physician consultation and order.