Episode 109 – Pregnancy and Oral Health: Part 2 May 24, 2024

Introduction

Pregnancy is accompanied by various physiologic, anatomical, and hormonal changes, including changes in the cardiovascular, respiratory and gastrointestinal systems, and the oral cavity. Maintaining good oral health during pregnancy is essential for the health of the pregnant person and their infant.

Most pregnant clients are generally healthy and can receive oral healthcare. However, the changes in organ systems often necessitate adjustments in treatment and medication use. [1] [2]

Pregnancy is associated with an altered immune response and, for some infectious diseases, an increased risk of infection, and an increased risk of severe outcomes if infected. The fetus, neonate, and infant can also be affected by infections that can result in congenital disorders, impaired fetal growth, or severe neonatal illness. [3]

Congenital disorders

Congenital[1] disorders (also known as congenital abnormalities, congenital malformations, or birth defects) are functional anomalies (e.g., endocrine disorders) or structural malformations (e.g., orofacial clefts[2]) that occur before birth. Congenital disorders may be identified prenatally, at birth, or sometimes may only be detected later in infancy (e.g., hearing defects). [4]

Risk factors for congenital disorders include:

- Genetic factors that are caused by either chromosomal abnormalities (e.g., Down syndrome or trisomy 21) or single gene defects (e.g., cystic fibrosis[3]).
- Environmental factors such as exposure to infections (e.g., syphilis, rubella, Zika[4]), radiation, certain pollutants, nutritional deficiencies (e.g., iodine, folate), or certain drugs (e.g., alcohol, phenytoin) during pregnancy.
- Socioeconomic factors such as low-income, which may be an indirect determinant of congenital disorders, with a higher frequency in resource-constrained families and countries. Approximately 94% of severe congenital disorders occur in low- and middle-income countries, possibly due to lack of sufficient nutritious foods, increased

[1] Congenital refers to the existence at or before birth.
[2] Refer to Episode 108 for additional information on orofacial clefts.
[3] Refer to Episode 83 for detailed discussion on cystic fibrosis.
[4] Zika virus infection during pregnancy can cause infants to be born with microcephaly and other congenital disorders. It can also cause preterm birth and spontaneous abortion. [86]

exposure to factors such as infection and alcohol, or poorer access to healthcare and screening.
- Demographic factors, such as advanced age of the pregnant person, increases risk of chromosomal abnormalities (e.g., trisomy 21).
- Unknown factors as most congenital disorders the etiology is unknown, including congenital heart defects, cleft lip or palate, and club foot. [4]

Medication use

During pregnancy, individuals may need to take medications to treat new or existing health conditions. About 59% to 66% of people use prescription medication during their pregnancy. Some of these medications are essential to maintain the health of the pregnant person or the fetus. [5]

Certain vitamins are recommended during pregnancy, such as a daily multivitamin containing:
- 0.4 mg folic acid to reduce risk of neural tube defects, and
- 16 to 20 mg of iron due to the expanding blood volume to prevent anemia and for healthy fetal growth. [5]

Before taking any medication (including over-the-counter, dietary supplements, medicinal herbs), the pregnant person should consult their primary health provider. Those currently taking medications and planning to become pregnant should consult their primary care provider to determine if those medications need to be changed or stopped. [5] [6] [7]

When deciding whether to continue, stop, start, or change a medication, its reproductive safety needs to be weighed against the benefit(s) of treating or controlling the condition and the risk(s) of an untreated condition. The dose, treatment duration, and the timing during pregnancy (i.e., critical window of exposure) also need to be considered. [5]

Medications or other substances may reach the fetus by crossing the placenta and may have a direct toxic effect or a teratogenic effect (e.g., causing fetal damage, congenital disorders, or death).

Drugs that do not cross the placenta may still harm the fetus by:
- Constricting placental blood vessels, reducing oxygen and nutrient supply to the fetus, which may result in the infant being underweight and underdeveloped.
- Causing forceful contraction of the uterine muscles, indirectly injuring the fetus by reducing fetal blood supply or triggering preterm labour and delivery.
- Affecting the fetus indirectly. For example, medications that lower blood pressure may reduce blood flow to the placenta, reducing fetal oxygen and nutrients. [6] [8]

How a medication affects a fetus depends on the:
- Stage of fetal development
- Medication strength and dose
- Permeability of the placenta (i.e., how easily substances pass through the placenta)

- Genetic factors in the pregnant person, which affects how much of the medication is active and available.
- General health (e.g., nausea and vomiting may decrease absorption of a medication taken orally). [6]

Therefore, when treating pregnant clients, special considerations are required when administering and prescribing drugs. For example, during the first trimester, internal organs are forming (i.e., organogenesis) and thus the fetus is most susceptible to teratogenic effects. Accordingly, avoiding medications during this time is desirable, although not always possible. Similarly, not prescribing any drugs carries risk. For instance, inadequately managed chronic pain may be harmful. Likewise, an untreated apical tooth abscess may lead to systemic infection. Consequently, not managing these conditions may harm the pregnant person and fetus. In general, medications may be prescribed during pregnancy when potential benefits outweigh known risks. [9]

Vaccination[5]

Vaccination during pregnancy protects the pregnant person from vaccine-preventable diseases they might transmit to the fetus or infant. These infections can result in congenital disorders, impaired fetal growth, or severe neonatal illness. Pregnant individuals respond adequately to vaccines even though pregnancy is associated with an altered immune response. In addition, protective concentrations of their antibodies are transferred to the fetus across the placenta, with the majority of transfer occurring during the third trimester.

Pregnant individuals can typically receive any of the non-live vaccines approved for use in Canada. Non-live vaccines use a killed (inactivated) version of a virus or bacteria, or pieces of the pathogen. Because non-live vaccines do not contain a live pathogen, it is impossible to become infected with the pathogen from these vaccines. Thus, they are considered safe to receive during pregnancy. [10]

Live attenuated vaccines are made from weakened viruses or bacteria. These vaccines are generally contraindicated during pregnancy because of the theoretical risk of fetal harm if pathogen transmission to the fetus occurs. However, these vaccines may be considered when the benefits of immunization outweigh the risks (e.g., yellow fever vaccine in a pregnant individual travelling to an endemic area).

Vaccines that are recommended during pregnancy include the tetanus, diphtheria, and pertussis (Tdap), annual influenza, and COVID-19 vaccines. Vaccination with the Tdap vaccine is recommended once in every pregnancy, ideally between 27 and 32 weeks of gestation. This vaccine protects infants against pertussis infection in their first two months of life when the disease can cause severe illness or death. In addition, a pregnant person who has no markers of hepatitis B infection but who is at high risk of acquiring the infection should be offered a complete hepatitis B vaccine series during the pregnancy and be tested for antibody response. [3] [5]

[5] Refer to Episodes 15 and 97 for additional information on the types of vaccines.

Influenza vaccination[6]
Influenza infection can lead to serious complications and adverse outcomes for pregnant individuals, the fetus, and infants younger than six months. The National Advisory Committee on Immunization (NACI) has identified pregnant individuals as a high-risk group. NACI strongly recommends immunizing pregnant individuals against influenza to protect them and their infants from severe disease.

Pregnant individuals are at higher risk for severe influenza disease and related complications (e.g., pneumonia, hospitalization, death) compared to nonpregnant individuals due to pregnancy-related changes in anatomy, and immune and cardiovascular systems. Influenza infection can also adversely affect the fetus and increase the risk of late-stage pregnancy loss, preterm birth, stillbirth, and low birth weight. Additionally, infants younger than six months are at high risk for severe influenza disease and complications but are too young for influenza vaccination. However, passive transfer of antibodies from influenza vaccination during pregnancy can protect newborns during their first months of life. [11]

COVID-19 vaccination
Vaccination against COVID-19 is particularly important in pregnancy. Compared to nonpregnant individuals, COVID-19 infection in pregnancy is associated with increased risk of hospitalization and intensive care unit (ICU) admission. Infection during pregnancy is also associated with an increased risk of complications in the newborn (e.g., preterm birth, low birth weight, neonatal ICU admissions). [3]

On May 3, 2024, the Public Health Agency of Canada (PHAC) released NACI's guidance on the use of COVID-19 vaccines during the fall of 2024. This guidance is based on current evidence and NACI expert opinion.[7]

Beginning in the fall of 2024, NACI strongly recommends the use of the most recently updated COVID-19 vaccines for previously vaccinated and unvaccinated individuals at increased risk of SARS-CoV-2 infection or severe COVID-19 disease, this includes individuals who are pregnant. [12] [13]

Preconception vaccination
In general, individuals planning a pregnancy should consider getting any vaccines they have never previously received or are not up to date on. Two fundamental vaccinations to receive preconception to prevent infection during pregnancy include:

- Varicella (chickenpox) vaccine, and
- Measles, mumps, and rubella (MMR) vaccine.

These vaccines are not recommended during pregnancy because they are live attenuated vaccines and pose a potential risk to the fetus.

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[6] Refer to Episode 97 for discussion on influenza and COVID-19 vaccination.
[7] Summary of NACI statement of May 3, 2024: Guidance on the use of COVID-19 vaccines during the fall of 2024 https://www.canada.ca/en/public-health/services/publications/vaccines-immunization/national-advisory-committee-immunization-summary-guidance-covid-19-vaccines-fall-2024.html

Chickenpox infection early in pregnancy increases the risk of congenital varicella syndrome, which can result in congenital disorders and intellectual disability. Rubella infection during pregnancy frequently gives rise to congenital rubella syndrome, which can result in spontaneous abortion (miscarriage), stillbirth, or congenital disorders. Measles during pregnancy results in a higher risk of premature labour, spontaneous abortion, and low infant birth weight. [3] [14]

Timing and effects of medications during pregnancy [6]

Time frame	Possible fetal effects*	Status of fetus
Within 20 days after fertilization	An all-or-nothing effect (fetus death or no effect at all).	Fetus is highly resistant to congenital disorders.
3-8 weeks after fertilization	Possibly no effect. Spontaneous abortion. Obvious congenital disorder. Permanent subtle congenital disorder noticed only later in life. Increased risk of childhood cancer (e.g., from exposure to radioactive iodine to treat thyroid cancer or using a radioactive substance in an imaging test, such as radionuclide scanning).	Fetus organs are developing, making fetus particularly vulnerable to congenital disorders.
Second and third trimesters	Changes in growth and function of normally formed organs and tissue. Unlikely to cause obvious congenital disorders. Unknown long-term effects.	Organ development is complete

* Only certain medications are likely to have adverse effects.

Safety of select medications in pregnancy* [6] [8] [9] [15] [16]

Medication*	Adverse effects*
Antibiotics	
Aminoglycosides (e.g., amikacin, gentamicin, neomycin, streptomycin, tobramycin)	Damage to the fetus ear (ototoxicity) resulting in deafness.
Fluoroquinolones (e.g., ciprofloxacin, ofloxacin, levofloxacin, norfloxacin)	Possibility of bone and joint abnormalities (seen only in animals).
Sulfonamides (e.g., sulfasalazine, trimethoprim-sulfamethoxazole)	When given late in pregnancy, jaundice and, without treatment, brain damage in the newborn. Sulfasalazine has minimal fetal risk.
Tetracycline	Slowed bone growth, enamel hypoplasia, permanent tooth discolouration, increased risk of dental caries in child. Occasionally, liver failure in pregnant person.
Penicillins Cephalosporins Macrolides (e.g., erythromycin)	Generally considered safe for use during pregnancy. However, there may be some concerns with prescribing erythromycin.
Anticoagulants	
Factor Xa inhibitors (e.g., rivaroxaban, apixaban, edoxaban)	Possible risk of bleeding in pregnant person or fetus. No antidote for reversal; to be avoided during pregnancy.
Heparin	Rarely causes thrombocytopenia in pregnant person, possibly resulting in bleeding.
Warfarin	Congenital disorders including malformed bones, intellectual disability, congenital cataracts, and other eye problems in fetus. Bleeding problems in fetus and pregnant person.
Antidepressants	
Bupropion	Possible risk of congenital disorders in first trimester; likely safe in pregnancy.
Citalopram	When taken during first trimester, increased risk of congenital disorders (particularly cardiac). When taken during third trimester, discontinuation syndrome[8] and persistent pulmonary hypertension in newborn.[9]

[8] Discontinuation syndrome occurs when antidepressants are stopped abruptly. Symptoms include dizziness, anxiety, irritability, fatigue, nausea, chills, and muscle aches in the newborn.

[9] Persistent pulmonary hypertension in the newborn results when arteries to the lungs remain narrowed after delivery, limiting blood flow to the lungs and the amount of oxygen in the blood.

Medication*	Adverse effects*
Escitalopram	When taken during third trimester, discontinuation syndrome and persistent pulmonary hypertension in newborn.
Fluoxetine	When taken during third trimester, discontinuation syndrome and persistent pulmonary hypertension in newborn.
Paroxetine	When taken during first trimester, increased risk of congenital disorders (particularly cardiac). When taken during third trimester, discontinuation syndrome and persistent pulmonary hypertension in newborn.
Sertraline	When taken during third trimester, discontinuation syndrome and persistent pulmonary hypertension in newborn.
Venlafaxine	When taken during third trimester, discontinuation syndrome.
Antifungals	
Fluconazole	No increased risk of congenital disorders after a single low dose. High doses taken for most or all of the first trimester increase risk of congenital disorders (e.g., cardiac, craniofacial, rib, and limb malformations).
Miconazole	No increased risk of congenital disorders when applied to the skin. When taken orally, adverse effects in animal studies. Intravaginal use, no increased risk of congenital disorders.
Terconazole	No increased risk of congenital disorders. Intravaginal use, no increased risk of congenital disorders.
Antihyperglycemics (oral)	
Chlorpropamide Glyburide Metformin Tolbutamide	Hypoglycemia in the newborn.
Insulin	Usually preferred during pregnancy.
Antihypertensives	
Aldosterone antagonists (e.g., spironolactone, eplerenone)	With spironolactone, possible feminization of male fetus. With eplerenone, no increased risk of congenital disorders in animals, but no well-designed studies done in pregnant people.
Angiotensin-converting enzyme (ACE) inhibitors	When taken late in pregnancy, possible kidney, craniofacial, limb, and lung malformations, and reduced amniotic fluid.
Beta-blockers	Labetalol is the preferred beta-blocker in pregnancy. Atenolol, propranolol, and other nonselective beta-blockers have been associated with fetal bradycardia, hypoglycemia, and possibly fetal growth restriction and preterm birth. Hypotension in pregnant person.
Calcium channel blockers	Nifedipine and nicardipine are the preferred calcium channel blockers during pregnancy

Medication*	Adverse effects*
Thiazide diuretics	Decrease in the levels of oxygen, sodium, and potassium and thrombocytopenia (reduced platelets) in the fetal blood. Growth restrictions (i.e., inadequate growth of fetus).
Antineoplastic drugs	
Busulfan	Congenital disorders such as underdevelopment of mandible, cleft palate, abnormal development of the skull bones, spinal malformations, ear malformations, and clubfoot. Growth restrictions (i.e., inadequate growth of fetus).
Chlorambucil	Congenital disorders such as underdevelopment of mandible, cleft palate, abnormal development of the skull bones, spinal malformations, ear malformations, and clubfoot. Growth restrictions (i.e., inadequate growth of fetus).
Cyclophosphamide	Congenital disorders such as underdevelopment of mandible, cleft palate, abnormal development of the skull bones, spinal malformations, ear malformations, and clubfoot. Growth restrictions (i.e., inadequate growth of fetus).
Mercaptopurine	Congenital disorders such as underdevelopment of mandible, cleft palate, abnormal development of the skull bones, spinal malformations, ear malformations, and clubfoot. Growth restrictions (i.e., inadequate growth of fetus).
Methotrexate	Congenital disorders such as underdevelopment of mandible, cleft palate, abnormal development of the skull bones, spinal malformations, ear malformations, and clubfoot. Growth restrictions (i.e., inadequate growth of fetus). Contraindicated during pregnancy. Effective contraception recommended for 8 weeks after last dose.
Antipsychotics and mood stabilizers	
Aripiprazole	When taken during the third trimester, increased risk of abnormal muscle movements and/or withdrawal symptoms in newborns.
Haloperidol	Adverse effects in animal studies. When taken during the first trimester, possible limb malformations. When taken during the third trimester, increased risk of repetitive, involuntary movements or withdrawal symptoms in newborn (e.g., restlessness, irritability, shaking, difficulty breathing, feeding problems).
Lithium	When taken during first trimester, increased risk of congenital disorders (mainly cardiac). When taken later in pregnancy, lethargy, reduced muscle tone, poor feeding, hypothyroidism, goiter, and nephrogenic diabetes insipidus in the newborn
Lurasidone	No evidence of adverse effects in animal studies.

Medication*	Adverse effects*
	When taken during the third trimester, increased risk of repetitive, involuntary movements or withdrawal symptoms in the newborn (e.g., restlessness, irritability, shaking, difficulty breathing, feeding problems).
Olanzapine	Adverse effects in animal studies. When taken during the third trimester, increased risk of repetitive, involuntary movements or withdrawal symptoms in the newborn (e.g., restlessness, irritability, shaking, difficulty breathing, feeding problems).
Risperidone	Adverse effects in animal studies. No evidence of increased risk of congenital disorders, but no well-designed studies done in pregnant people. When taken during the third trimester, increased risk of repetitive, involuntary movements or withdrawal symptoms in the newborn (e.g., restlessness, irritability, shaking, difficulty breathing, feeding problems).
Antiseizure drugs	
Carbamazepine	Increased risk of congenital disorders, including neural tube malformations (e.g., spina bifida) Bleeding problems in newborn, which can be prevented if pregnant person takes vitamin K by mouth every day for a month before delivery or if newborn is given an injection of vitamin K soon after birth
Phenobarbital	Increased risk of congenital disorders, including neural tube malformations (e.g., spina bifida) Bleeding problems in the newborn
Phenytoin	Increased risk of congenital disorders (e.g., cleft lip, cardiac malformations) Bleeding problems in the newborn
Trimethadione	High risk of congenital disorders (e.g., cleft palate, cardiac, craniofacial, hand, and abdominal malformations) Risk of a spontaneous abortion Almost always contraindicated during pregnancy.
Valproate	Increased risk of congenital disorders (e.g., cleft palate, neural tube, cardiac, limb, craniofacial malformations).
Anxiolytics	
Benzodiazepines	When given late in pregnancy, respiratory depression or withdrawal syndrome (causing irritability, tremors, and exaggerated reflexes) in the newborn.
Nonsteroidal anti-inflammatory drugs (NSAIDs)	
Aspirin and other salicylates Ibuprofen Naproxen	When taken in large doses, possibly spontaneous abortion during the first trimester, a delay in start of labour, premature closing of ductus arteriosus (connection between aorta and pulmonary artery), jaundice, necrotizing enterocolitis (damage to the lining of the intestine), and (occasionally) brain damage in fetus and bleeding problems in pregnant person during and after delivery and/or in the newborn. When taken late in pregnancy, a reduction in amniotic fluid. With low doses of aspirin, no significant risk of congenital disorders.

Medication*	Adverse effects*
Opioids and partial agonists	
Buprenorphine	No evidence of increased risk of congenital disorders. Risk of opioid withdrawal syndrome in newborns (e.g., restlessness, irritability, shaking, difficulty breathing, feeding problems). Improved fetal outcomes compared with those when pregnant person has an opioid use disorder.
Codeine Hydrocodone Hydromorphone Meperidine Morphine	Opioid withdrawal symptoms (e.g., restlessness, irritability, shaking, difficulty breathing, feeding problems) in the newborn, possibly occurring 6 hours to 8 days after birth. If high doses are given in the hour before delivery, possibly drowsiness and slowed heart rate in the newborn.
Methadone	Risk of opioid withdrawal syndrome (e.g., restlessness, irritability, shaking, difficulty breathing, feeding problems) in the newborn. Improved fetal outcomes compared with those when pregnant person has an opioid use disorder. Specific effects of methadone in pregnant people possibly difficult to differentiate from effects of concomitant opioid substance use.
Retinoids	
Isotretinoin	High teratogenic risk (e.g., cardiac malformations, orofacial clefts, small ears, hydrocephalus), spontaneous abortion, intellectual disability. Contraindicated during pregnancy and in those who may become pregnant.
Sex hormones	
Hormonal contraceptives (birth control pills, patches, or rings; contraceptive injections or implants; hormonal intrauterine devices [IUDs])	Exposure to estrogen-progestin contraceptives prior to conception or during pregnancy does not appear to increase risk of major congenital disorders Exposure to medroxyprogesterone acetate does not appear to increase risk of major congenital disorders, although some data suggest an increased risk of congenital disorders when progestogens are taken during first four months of pregnancy. No indication for use during pregnancy; should be discontinued.
Progesterone (oral or vaginal)	Exposure during pregnancy not associated with increased risk of major congenital disorders.
Thyroid medications	
Levothyroxine	Preferred treatment of hypothyroidism during pregnancy; safe in pregnancy.
Methimazole	Enlarged or underactive thyroid gland in the fetus. Facial and scalp malformations in the newborn. Other potential abnormalities.

Medication*	Adverse effects*
	Contraindicated during first trimester of pregnancy.
Radioactive iodine	Destruction of fetal thyroid gland When given near the end of first trimester, severe fetal hyperthyroidism. Increased risk of childhood cancer Absolutely contraindicated during pregnancy
Vaccines	
COVID-19 vaccines	No safety concerns for pregnant people, fetuses, or newborns.
Inactivated influenza vaccine	No safety concerns for pregnant people, fetuses, or newborns.
Tetanus, reduced diphtheria toxoid, acellular pertussis (Tdap) vaccine	No safety concerns for pregnant people, fetuses, or newborns.
Live attenuated vaccines (e.g., measles, mumps, and rubella vaccine; polio vaccine; varicella vaccine; yellow fever vaccine)	Contraindicated in people who are or may be pregnant.
Other medications	
Chlorhexidine gluconate (oral rinse)	Can be safely used during pregnancy
Corticosteroids	Possibly cleft lip when taken during the first trimester.
Hydroxychloroquine	No increased risks at usual doses.
Nirmatrelvir-ritonavir	Use considered for pregnant people with early mild to moderate COVID-19, particularly for those with at least one additional risk factor for severe disease.
Pseudoephedrine	Narrowing of blood vessels in placenta, possibly reducing oxygen and nutrients to the fetus resulting in growth restrictions (i.e., inadequate growth of fetus). Possible risk of gastroschisis (defect in abdomen wall that allows intestines to protrude outside the body).

* Nonexhaustive list

Substance use[10]
Certain substances, including caffeine, tobacco (nicotine), alcohol, and cannabis, may have harmful effects on the fetus and pregnant person. Unregulated (illegal) drug use during pregnancy can cause pregnancy complications and seriously harm the fetus and neonate. Unregulated drugs include amphetamines, stimulants, cocaine, hallucinogens, and opioids (e.g., heroin). These drugs may result in congenital disorders, poor fetal growth, or preterm birth. Injecting unregulated drugs increases the risk of infections (e.g., hepatitis, HIV) affecting or being transmitted to the fetus. [17]

Research on substance use in pregnancy found:

- 11% of pregnant individuals smoke cigarettes daily or occasionally,
- 11% drink alcohol, and
- 1%-5% use unregulated drugs. However, the rates are probably higher because people tend to underreport unregulated drug use or inappropriate use of prescription medications. [5]

Research suggests substance use disorders in pregnancy are significantly underestimated. Studies have also found polysubstance use during pregnancy is common, especially with alcohol, cannabis, and/or tobacco (nicotine). [18] [19]

A study by Crosland et al. (2024) evaluated hospital discharge data and vital statistics from more than 3.1 million pregnant patients with documented cannabis and nicotine use. Compared with people who did not use any substances, those using cannabis or nicotine alone had increased rates of infant and newborn death, small gestational size, and preterm delivery. However, the risk was even higher when cannabis and nicotine were used together. Most notable was the rate of infant death, which was four times higher in users of both cannabis and nicotine compared with nonusers. The rate was nearly two times higher compared with users of just cannabis or nicotine alone.

With the growing legalization of cannabis, there is often a perception that cannabis is safe in pregnancy. Also, many people who use cannabis often use tobacco or nicotine products. Given the increasing prevalence of combined cannabis and nicotine use in pregnancy, these findings demonstrate the need for more effective clinical counselling during the preconception and prenatal periods about the risks of cannabis and nicotine use and the benefits of cessation of at least one of the two substances. [20]

Caffeine
Caffeine is a widely consumed psychoactive substance found in coffee, tea, numerous soft drinks, energy drinks, chocolate, and some medications. Caffeine consumption is associated with increased bruxism. Its diuretic properties can reduce salivary flow contributing to dry mouth and increasing the risk of periodontal disease, dental caries,[11] dental erosion,[12] oral candidiasis, traumatic oral lesions, salivary gland stones, dysgeusia (altered taste), and halitosis.[13] Diminished saliva can also cause trouble

[10] Refer to Episodes 104 and 105 additional information on substance use.
[11] Refer to Episodes 86 and 87 for detailed discussion on dental caries.
[12] Refer to Episode 82 for additional information on dental erosion.
[13] Refer to Episode 67 for discussion on halitosis.

chewing, swallowing (dysphagia), speaking, and wearing dentures or other oral appliances, which may lead to decreased food intake and poor nutrition. [21] [22] Caffeine is typically in low pH, high sugar beverages, increasing the risk of dental caries, dental erosion, and tooth sensitivity. Certain caffeinated beverages (e.g., coffee, tea) contain chromogens contributing to tooth staining. [21]

Caffeine is a stimulant that readily crosses the placenta to the fetus. It is unclear whether consuming caffeine during pregnancy harms the fetus. Research suggests small amounts of caffeine (e.g., one cup of coffee per day) during pregnancy pose little or no risk to the fetus. Some research suggests drinking more than seven cups of coffee a day may increase the risk of stillbirth, preterm birth, low-birth-weight infant, or spontaneous abortion. [17]

Health Canada recommends limiting caffeine consumption to 300 mg/day (equivalent to two 8-ounce [237 mL] cups of coffee). Some pregnant individuals drink herbal teas to help avoid caffeine. Herbal teas such as citrus peel, ginger, orange peel, and rose hip are considered safe in moderation (i.e., two to three cups/day). Certain herbal teas should be avoided during pregnancy as they have been associated with a higher risk of spontaneous abortion, congenital disorders, or preterm birth. [5] [7] [23]

Herbal teas to avoid during pregnancy* [5] [7] [23]		
Camomile	Buckthorn bark	Lobelia
Aloe	Comfrey	Stinging nettle
Coltsfoot	Labrador tea	Senna leaves
Juniper berries	Sassafras	Fennel
Pennyroyal	Duck root	Fenugreek
Sage	Lovage	Thyme
Borage	Motherwort	Kombucha

* Nonexhaustive list

Tobacco (nicotine)

Tobacco use[14] can adversely impact oral health by causing various conditions, such as xerostomia, halitosis, tooth and restoration staining, periodontal disease, dental implant failure, tooth loss, oral potentially malignant disorders,[15] and oral cancer.[16] [24] [25]

Smoking tobacco also poses risks to the fetus and pregnant person. Carbon monoxide and nicotine in tobacco cause hypoxia and vasoconstriction, increasing risk of:

- Low birth weight
- Congenital malformations of the heart, brain, and face (orofacial clefts)
- Sudden infant death syndrome (SIDS)
- Placenta previa
- Placental abruption (premature detachment of the placenta)
- Prelabour rupture of the membranes causing amniotic fluid leakage

[14] Refer to Episode 101 for additional information on tobacco use and cessation.
[15] Refer to Episode 76 for additional information on oral potentially malignant disorders.
[16] Refer to Episode 76, 77, and 78 for detailed discussion on oral cancer.

- Preterm labour
- Uterine infection
- Spontaneous abortion
- Stillbirth
- Preterm birth [5] [17]

Exposure to secondhand smoke may similarly harm the fetus. [17]

Vaping products (e-cigarettes)[17] can deliver nicotine and other substances that are potentially harmful to the fetus and pregnant person. The safest option is to avoid the use of vaping products when pregnant.

Vaping is associated with an increased risk of periodontal diseases, dental caries, and adversely impacts saliva's antibacterial and antioxidant properties. It can also increase mouth irritation, ulceration, and xerostomia. E-cigarette explosions have resulted in oral lacerations, teeth and jaw fractures, and tooth avulsions. [26] [27] [28] [29]

Stopping nicotine use before or during pregnancy has numerous positive effects for the fetus, pregnant person, and their infant. Oral health professionals should screen for tobacco and e-cigarette use and offer cessation counselling and provide cessation resources to those who use nicotine. [5] [17] [30]

Alcohol

Alcohol consumption is linked to a range of adverse oral health effects, including oral cancer, salivary gland dysfunction, dental caries, periodontal disease, halitosis, dental trauma, tooth wear,[18] and staining. [31]

Alcohol use during pregnancy is the leading known cause of congenital disorders. There is no known safe amount of alcohol during pregnancy or when trying to conceive. Alcohol should be avoided if the person might be pregnant because they could be pregnant and not know for up to four to six weeks. There is also no safe time to drink during pregnancy. All types of alcohol are equally harmful, including all wines and beer. Alcohol consumption in any form almost doubles the risk of spontaneous abortion. Risk is probably related to the amount of alcohol consumed, but no amount is risk-free.

Fetal alcohol spectrum disorder is one of the most severe consequences of drinking during pregnancy. Pregnant individuals should abstain from drinking any alcohol because the amount or pattern of drinking alcohol required to cause fetal alcohol spectrum disorder (FASD) is unknown.

FASD is a group of conditions that can occur in a person exposed to alcohol before birth. These effects can include physical, behavioural, and learning problems. FASD remains the leading known cause of preventable developmental disability in Canada.

[17] Refer to Episode 19 for additional information on e-cigarettes and vaping.
[18] Refer to Episode 82 for additional information on tooth wear.

Signs and symptoms of FASD may include:

- Inadequate growth before or after birth
- Distinctive facial features (e.g., small eyes, thin vermillion of the upper lip, flat elongated philtrum, small or flat midface, widely spaced eyes, short upturned nose, small chin).
- Microcephaly (small head and brain size)
- Intellectual disability
- Abnormal behavioural development
- Joint, limb, finger, and cardiac malformations

Fetal alcohol syndrome (FAS) represents the most involved end of the spectrum. People with FAS have central nervous system (CNS) disorders, minor facial features, and growth problems. They can have problems with learning, memory, attention span, communication, vision, or hearing. They often have challenges in school and difficulties getting along with others. [5] [17] [32] [33] [34] [35]

Oral care considerations

Other oral manifestations of FASD may include:

- Microdontia with defective enamel, cleft lip, cleft palate, malocclusions, and poor tongue thrusting.
- Mouth breathing is a common condition that can contribute to dry mouth and malocclusions, increasing the risk of dental caries and periodontal diseases.
- Dry mouth as a side effect of medications for systemic conditions (e.g., hyperactivity, attention deficit).
- High rate of non-nutritive sucking (thumb, tongue) may contribute to malocclusions.
- Dental eruption may be delayed.
- Temporomandibular joint disorders occur at increased rates.
- Sleep apnea may be related to retraction of the midface.
- Poor oral hygiene related to behavioural and emotional issues may manifest as plaque, dental caries, and gingivitis.
- Atypical eating patterns due to intense responsiveness to smell, texture, taste, temperature or appearance of food. This may include behaviours related to pica[19] (e.g., eating nonfood items such as dirt and clay).
- Oral aversion may impede brushing, flossing, and the ability to undergo oral healthcare appointments.
- Oral self-care[20] may be impacted by limited manual dexterity, as difficulties with handwriting have been reported in individuals with FASD. [35] [36]

There is no cure for FASD, but research shows early intervention treatment can improve a child's development. Treatment options may include medication (e.g., stimulants, antidepressants, neuroleptics, antianxiety drugs) to help with some symptoms, behaviour and education therapy, parent training, and other alternative approaches (e.g., relaxation therapy, yoga, exercise, creative art therapy, etc.).

[19] Refer to Episode 95 for additional information on pica.
[20] Refer to Episode 8 for additional information on oral self-care.

Certain protective factors help reduce the effects of FASD and help those with this condition reach their full potential. Protective factors include:

- Early diagnosis before age six.
- Loving, nurturing, and stable home environment during the school years
- Absence of violence
- Involvement in special education and social services [17] [32] [33] [34] [35]

Oral health professionals can play a valuable role in identifying FASD because of their comprehensive knowledge of head and neck anatomy. If FASD is suspected, oral health professionals can refer and collaborate with the client's primary care provider and other health team members to provide the best possible care and treatment. [35] [36]

Cannabis[21]

Cannabis use, especially cannabis smoking, has been associated with poor oral health. Cannabis is usually smoked longer and has a higher combustion temperature compared to tobacco, which can impact oral health. However, identifying the oral effects of cannabis alone is complicated by the concurrent use of cannabis with tobacco, alcohol, and other drugs; poor oral selfcare; and infrequent oral healthcare visits associated with cannabis use. [37] [38]

Cannabis use is associated with:

- Xerostomia
- Increased cariogenic food consumption as THC is an appetite stimulant
- Increased dental caries, especially in cleansable smooth surfaces
- Higher DMFT (decayed, missing, and filled teeth) scores
- Periodontal disease (e.g., due to xerostomic effect, poor home care, heat from cannabis combustion)
- Alveolar bone loss
- Erythematous gingivitis
- Gingival hyperplasia
- Leukoedema[22]
- Leukoplakia, erythroplakia, keratosis, stomatitis
- Candidiasis
- Nicotinic-like tooth staining
- Uvulitis [37] [39]

Cannabis is the substance most commonly used during pregnancy. Research suggests pregnant people are using cannabis to treat nausea and vomiting. Using cannabis to help with nausea or vomiting during pregnancy is not recommended. Consultation with the primary care provider is advised to determine safer alternatives.

[21] Refer to Episode 58 for additional information on cannabis.

[22] Leukoedema is the bilateral, diffuse, translucent greyish thickening, particularly of the buccal mucosa. However, it is not clear whether associated irritants, such as orally inhaled smoke, rather than cannabis itself, may be contributing causes

The main component of cannabis, tetrahydrocannabinol (THC), can cross the placenta and thus may affect the fetus. Although findings are conflicting, prenatal exposure to cannabis has been shown to affect fetal growth and development and lead to behavioural and learning difficulties later in life.

Cannabis use during pregnancy has been associated with:

- Lower infant birth weight
- Development effects in children and adolescents, such as:
    - Problems understanding, learning, remembering, or succeeding at school
    - Hyperactivity, inattentiveness, or impulsive behaviour
    - Increased risk of depression or anxiety
    - Increased risk of future substance use

However, further research is needed on the immediate and long-term effects of cannabis use during pregnancy. The safest option is to avoid all cannabis use (smoking, vaping, edibles, topically) when pregnant. Cannabis should also not be used by those wishing to start a family since long-term use may affect fertility in females and males (e.g., decrease in sperm count, concentration, mobility; increase in abnormal sperm morphology). Medical and oral health providers should discuss cannabis use with pregnant clients and counsel abstaining or reducing use during pregnancy. [5] [17] [40] [41] [42]

Stimulants

Stimulants such as cocaine, crack (a form of cocaine), or amphetamines (e.g., methamphetamine) can cause stroke or death of a pregnant person. Stimulant use probably results in fetal vasoconstriction and hypoxia. Chronic use increases the risk of:

- Spontaneous abortion
- Fetal growth restriction
- Low birth weight
- Placental abruption
- Preterm labour and delivery
- Stillbirth
- Congenital disorders (e.g., CNS, genitourinary, and skeletal malformations; intestinal atresia or necrosis) [30]

Oral effects of cocaine and crack use may include gingival or mucosal erosion, chemical burns (from cocaine applied to the gingiva), recession, bony dehiscence, periodontitis, bruxism, TMJ pain, dry mouth, palatal perforation, cervical abrasions, and enamel erosion. Cervical abrasions are from aggressive brushing activity. Enamel erosion occurs from reduced pH when cocaine is dissolved in saliva. [43]

Oral effects of methamphetamine use may include dry mouth, caries, periodontal disease, tooth loss, permanent bad taste in the mouth, clenching, bruxism, increased cravings for sweets, osteonecrosis of the mandible, and reduced oral self-care. [44] [45]

Dry mouth leads to the loss of saliva's protective function, resulting in high caries and periodontal disease rates. This condition is often referred to as 'meth mouth'. [44]

Hallucinogens
Hallucinogens include methylenedioxymethamphetamine (MDMA or Ecstasy), ketamine, and lysergic acid diethylamide (LSD).

Hallucinogen use is associated with several oral complications including dry mouth and bruxism. Topical use of ecstasy may result in oral tissue necrosis and mucosal fenestration. [46]

Depending on the drug used, hallucinogens may increase risk of:
- Spontaneous abortion
- Preterm labour and delivery
- Withdrawal syndrome in the fetus or newborn

Hallucinogen use is associated with congenital disorders, including cardiovascular and kidney malformations. [5] [17]

Opioids
Opioid dependence is a serious public health crisis and can stem from prescription or nonprescription opioid use. U.S. data demonstrate opioid use in pregnant individuals has increased significantly.

Oral health effects of opioid dependence include increased risk of xerostomia, periodontal disease, dental caries, candidiasis, mucosal dysplasia, and bruxism. [47]

Opioid use (e.g., heroin, methadone, morphine) during pregnancy increases the risk of pregnancy complications, such as:
- Spontaneous abortion
- Abnormal fetal presentation
- Preterm delivery

Heroin increases the risk of having a small-for-gestational-age infant.

Opioids readily cross the placenta and thus may result in fetal opioid dependence. The newborn may have withdrawal symptoms (i.e., neonatal abstinence syndrome) six hours to eight days after birth.

Characteristic signs of withdrawal include:
- Irritability
- Jitters
- High-pitched crying
- Vomiting and/or diarrhea
- Sweating
- Seizures
- Hyperventilation

Mild withdrawal symptoms in the neonate are treated by a few days of swaddling and soothing care to alleviate the physical overarousal and frequent feedings to reduce restlessness. Some problems resolve in no more than a week. However, a significant number of infants with neonatal abstinence syndrome require medical treatment, typically using an opioid (e.g., morphine, methadone).

Opioid use rarely results in congenital disorders. Opioid partial agonist therapy, such as buprenorphine, may be associated with a lower risk for newborn withdrawal versus methadone and is being increasingly used for individuals with opioid dependence during pregnancy. Opioids should not be stopped suddenly during pregnancy as this poses a risk to the fetus, such as spontaneous abortion and preterm labour. [5] [30] [48] [49]

Medication use

Special considerations and changes may be required when administering or prescribing medications to pregnant clients. Medications should only be used when the benefits outweigh the risks. To determine the risks associated with medication use in pregnancy, the United States Food and Drug Administration (FDA) has classified drugs based on the level of risks they pose to the fetus. [9]

Drugs in categories A and B are considered safe as no adverse effects have been shown in humans. Drugs in category C have shown adverse effects on the fetus in some animal studies, but there are no adequate and well-controlled studies in humans. However, category C drugs may be used if the benefits outweigh the risks. Drugs in category D should be avoided as some studies demonstrated clear teratogenic effects in humans. Nevertheless, in rare circumstances, drugs in this category may be used. Drugs in category X clearly should be avoided as studies in humans or animals have demonstrated fetal abnormalities and evidence of human fetal risk. [9]

FDA pregnancy categories [9] [50]

Category	Risk factor
A	Adequate and well-controlled studies have failed to demonstrate a risk to the fetus in the first trimester and there is no evidence of risk in later trimesters.
B	Animal reproduction studies have failed to demonstrate a risk to the fetus and there are no adequate and well-controlled studies in pregnant individuals. Or, animal reproduction studies have shown an adverse effect (other than decrease in fertility), but adequate and well-controlled studies have failed to demonstrate a risk to the fetus during the first trimester and there is no evidence of a risk in later trimesters.
C	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 during pregnancy despite potential risk to the fetus.
D	There is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience or studies in humans, but potential benefits may warrant use of the drug during pregnancy despite potential risk to the fetus.

Category	Risk factor
X	Studies in animals or humans have demonstrated fetal abnormalities, or there is evidence of human fetal risk based on adverse reaction data from investigational or marketing experience, and risks in use of the drug during pregnancy clearly outweigh potential benefits.

Medication use in oral healthcare
Medications commonly used in oral healthcare include, local and topical anesthetics, sedatives (e.g., nitrous oxide, benzodiazepines), analgesics, and antimicrobials.

Local anesthetics
Local anesthetics are the most frequently used medications in oral healthcare. Local anesthetics and vasoconstrictors are generally safe for pregnant clients. Local anesthetic allows for definitive treatment, reducing the need for prolonged use of systemic antibiotics and analgesics. However, it is important to aspirate carefully to avoid intravascular injection. [51]

Lidocaine and prilocaine are considered the safest local anesthetics for pregnant clients, as they have an FDA category B ranking. Lidocaine is particularly preferred due to its lower concentration (2%) compared to prilocaine (4%), meaning less drug is administered per injection. Mepivacaine, articaine, and bupivacaine are FDA category C, making them less favourable for use during pregnancy. [9]

High-dose vasoconstrictors used to manage significant hypotension may be a concern for pregnant individuals. However, the doses of epinephrine in dental local anesthetic are so low that they are unlikely to affect uterine blood flow. Additionally, epinephrine increases the duration of local anesthesia and decreases bleeding at the administration site, justifying its use. If there are concerns about epinephrine use, the dose can be reduced by using it at a concentration of 1:200,000. [9] [51] [52]

Topical anesthetics
Topical anesthesia before injection can eliminate or minimize pain caused by the needle, adding to the safety of local anesthetic in pregnant clients. Lidocaine has the safest rating for topical use with FDA category B ranking as opposed to benzocaine and tetracaine, which are FDA category C. [51]

If topical anesthetic use is a concern, precooling the injection site may be an option. Precooling the injection site utilizing ice packs, popsicle sticks, or frozen cotton swabs is a simple, reliable, low-cost, and practical clinical method to reduce pain from local anesthetic injection. The analgesic effect is similar to 5% lidocaine gel, without the unpleasant taste of the gel. [53]

Nitrous oxide
Pregnant clients may have fear and anxiety of dentistry, requiring the use of sedation for oral care. If this fear is significant, sedation can be justified to minimize the risks of undue stress. Common sedatives used in dentistry are nitrous oxide (N_2O) and benzodiazepines.

N_2O use during pregnancy is controversial. Many recommend avoiding its use since it is in FDA category C. However, research has shown it can be used for short-term therapeutic reasons. Studies examining N_2O safety found that adverse consequences of N_2O were associated with large doses (concentration higher than 50%) and long duration exposures. Because N_2O administration is short-term in oral healthcare, no adverse consequences have been found and therefore its administration is considered safe. Nonetheless, as with any drug, pregnant clients should not be unnecessarily exposed to N_2O. If possible, it is best to avoid N_2O in the first trimester when organogenesis is occurring, and if given at all, it should be administered for less than 30 minutes and with at least 50% oxygen.

Chronic exposure to N_2O by female oral health clinicians has been linked to infertility, congenital disorders, and spontaneous abortions when scavenging was not used. Therefore, it is essential for clinics that use N_2O to have appropriate scavenging equipment, and all equipment should be regularly checked for leaks and ventilation. [1] [9] [52] [54] [55] [56]

Benzodiazepines

Benzodiazepines are commonly administered for clients with anxiety requiring sedation. These drugs were linked to congenital disorders and spontaneous abortion when taken during pregnancy. When prescribed chronically in the third trimester, these drugs were shown to cause fetal CNS depression, fetal dependence and withdrawal, a situation that is avoided by the single use administration as occurs in dental sedation. Thus, benzodiazepines may be used with caution when dental sedation is required. [9] [52]

Analgesics

Pregnant clients should not have to endure dental-related pain. If a pregnant client presents with pain, its origin should be identified and subsequently eliminated. An analgesic can then be given if symptomatic relief is required. The analgesic of choice in pregnancy is acetaminophen (FDA category B) as it is not associated with teratogenicity.

Another group of commonly used analgesics in dentistry are the nonsteroidal anti-inflammatory drugs (NSAIDs), which include ibuprofen, naproxen, and aspirin. Although their anti-inflammatory and analgesic properties are useful in oral healthcare, their use in pregnancy is less favourable. For example, ibuprofen is FDA category B in first and second trimesters. However, it is category D in the third trimester because of reported adverse effects, including premature closure of the fetal ductus arteriosus, prolonged labour, increased bleeding during labour, and spontaneous abortion when taken in the third trimester. If needed, ibuprofen can be prescribed in the first and second trimesters but should be avoided during the third trimester.

Opioid analgesics can be cautiously prescribed to pregnant clients. Oxycodone is the safest since it is FDA category B, whereas codeine is category C as its use has been reported to increase risk of congenital disorders, including cleft lip and palate. Nonetheless, codeine may be prescribed (preferably in the second or third trimesters) if necessary but only for a short duration. Consultation with the client's primary care

provider is required if there is severe long-term pain because chronic opioid use has been associated with fetal dependence, premature delivery, neonatal respiratory depression, and delayed growth. [1] [9] [52] [57]

Antibiotics
Generally, most antibiotics used in oral healthcare are safe during pregnancy. However, removing the source of infection should always be the first line of treatment, for example through extraction, pulpectomy, or incision and drainage of the infected site. Nonetheless, if the infection is associated with fever or extensive swelling, an antibiotic should be prescribed. Penicillin, amoxicillin, and cephalosporins (FDA category B) are safe to use during all trimesters without risk of teratogenicity. Erythromycin, clindamycin, and azithromycin (FDA category B) can also be prescribed. However, there is some concerns with prescribing erythromycin. Metronidazole,[23] even though it is FDA category B, should be used cautiously as it has been associated with a few reports of teratogenicity. Tetracycline and doxycycline (FDA category D) are contraindicated during pregnancy and should not be administered orally or applied subgingivally. Tetracycline has been associated with slowed bone growth, enamel hypoplasia, permanent tooth discolouration, and increased risk of dental caries in the child. [6] [9] [52] [56] [57] [58]

Antifungals
Nystatin is the safest with FDA category B ranking. Ketoconazole and fluconazole are less favourable with FDA category C ranking. However, then can be used with caution when necessary. [9] [52]

Chlorhexidine mouthrinse[24]
Chlorhexidine gluconate mouthrinse can be safely used during pregnancy as it has an FDA category B ranking. [9]

Merchant et al. (2022) conducted a systematic review and meta-analysis to determine if treating pregnant individuals with periodontitis with chlorhexidine mouthrinse plus scaling and root planing was associated with positive birth outcomes. The study consisted of 12 randomized controlled trials (RCTs) with 5,735 participants.

The study found chlorhexidine mouthrinse plus scaling and root planing, but not scaling and root planing alone, was associated with reduced risks of preterm birth and low birth weight. The results suggest treating periodontal disease with a combination of chlorhexidine mouthrinse and conventional periodontal treatment was associated with reduced negative birth outcomes. However, well-conducted RCTs are needed to test this association. [59]

[23] Refer to Episode 72 for research on metronidazole and oral innate immunity.
[24] Refer to Episode 103 for additional information on mouthrinses, including chlorhexidine.

Providing oral care
Most pregnant clients are generally healthy and can receive oral healthcare, including preventive, diagnostic, and restorative treatment. Clients should schedule an appointment in the first trimester to have their oral health assessed. [1] [60]

Studies have shown an association between periodontal disease and unfavourable pregnancy outcomes, such as preterm birth, low birthweight infants, and preeclampsia, emphasizing the importance of oral care throughout pregnancy. [61]
Also, pregnant individuals are at increased risk of developing periodontal disease, dental caries, tooth erosion, tooth mobility, pyogenic granuloma, and salivary changes. Despite the high prevalence of oral diseases, only 23% to 42% visit an oral health provider during pregnancy.

Access to oral care during pregnancy is essential to help avoid possible adverse oral effects and complications associated with periodontal disease. Treating oral disease is vital to attain and maintain the pregnant person's oral and systemic health and the health of their offspring. For example, treating dental caries reduces the risk of cariogenic bacteria transmission to the infant. [62] [63]

Many barriers are associated with low access to oral care among pregnant individuals, including
- Low oral health knowledge
- Low socioeconomic status
- Distant geographic location
- Negative dental experience and dental anxiety
- Oral health providers' knowledge of providing treatment during pregnancy
- Prenatal health providers' awareness of oral care during pregnancy [62] [64] [65] [66]

Studies continue to show many pregnant individuals are unaware of the importance of oral health for both themselves and their infant. A survey by Radwan-Oczko et al. (2023) of 200 pregnant participants, with more than half reporting advanced education levels, found 20% considered oral healthcare unimportant because they did not have any current oral health problems, while 16.5% noted they did not believe oral hygiene was important during pregnancy. Those with higher education levels were more likely to adhere to a daily oral hygiene regimen. The results emphasize the importance of increasing the public's and medical providers' (e.g., obstetricians, etc.) knowledge of the impact of oral health on pregnancy and the importance of regular oral care. [67]

Medical consultation is usually not required before initiating dental or dental hygiene treatment unless the client is at risk for pregnancy complications, such as
- Pregnancy-induced hypertension,
- Blood pressure exceeding 140/90 mmHg,
- Gestational diabetes,
- Threat of spontaneous abortion (e.g., vaginal bleeding/spotting),
- History of premature labour, or

- Prenatal care has not yet been accessed.

High-risk pregnant clients can usually be identified by taking a thorough medical history, including questions about the pregnancy (e.g., expected delivery date, any complications, etc.), and measuring and recording baseline blood pressure, pulse, and respiratory rate. [1] [54] [56] [60]

Oral care procedures can be safely performed during all three trimesters. Early in the second trimester is considered the safest period to provide routine care since organogenesis is complete and there is a lower pregnancy loss compared to the first trimester. Also, pregnant clients are generally more comfortable physically earlier than later in the pregnancy. [54] [63] [68]

During the third trimester, it is best to keep the dental chair in a semi-reclined position to avoid supine hypotension syndrome from pressure of the enlarged uterus on the inferior vena cava. Symptoms of supine hypotension syndrome include low blood pressure, syncope, bradycardia, lightheadedness, pallor, sweating, nausea, and weakness. If this problem arises, have the client turn onto their left side, supported by rolled towels or a pillow to elevate the right hip by about 15 degrees. This lifts the uterus off the vena cava. Also, scheduling shorter appointments and frequent changes of position will minimize problems. [54] [64] [69]

Morning appointments may need to be avoided for those experiencing morning sickness. Otherwise, the best time of day for scheduling appointments is when the client feels most comfortable. [64]

Radiographs

Radiographs are an integral part of a comprehensive examination and an essential tool to assess and diagnose oral diseases, develop a treatment plan, and evaluate treatment outcomes. The decision to obtain radiographic imaging is based on the client's history and clinical examination. However, the oral health provider must weigh the risks and benefits of taking radiographs in all clients as the effects of ionizing radiation accumulate over time. [70] [71]

During dental radiographic examination for all clients, including pregnant clients, optimizing techniques, choosing the fastest available image receptor (e.g., digital radiography), collimation of beam to size of receptor, and avoiding retakes help minimize radiation exposure. When a radiographic examination is conducted properly, the amount of radiation to a client's abdomen is negligible. During dental radiography the amount of radiation to the fetus is very low and, when standard precautions are taken, it does not pose a significant risk to the fetus. Following the as low as reasonably achievable (ALARA) principle helps to minimize the client's exposure. [70]

The ALARA principle can be applied during various phases of dental radiography, including:

- Determining the need for and type of radiographs to take.
- All radiographs are justified in relation to their benefits.

- Best practices are followed, including quality control measures.
- Radiation exposures are kept well below the allowable limits.
- Images are completely and accurately interpreted to obtain all diagnostic information, including pathology and variations of normal. [72] [73]

The American College of Obstetricians and Gynecologists reaffirmed in 2022 that dental radiographs are safe during pregnancy with shielding of the abdomen and thyroid. [74]

Currently, Health Canada's Safety Code 30 (2022), which provides guidance on radiation protection in dentistry, advises when any radiographic examination is prescribed for pregnant or possibly pregnant clients, full consideration of the consequence of fetal irradiation must be taken into account. It is generally accepted that the level of radiation to the fetus from dental radiography is extremely low when the abdomen is not directly exposed. [75]

The Canadian Dental Association 2005 position on control of x-radiation in dentistry states:

> *Elective procedures may be deferred until after the pregnancy. Pregnant patients requiring essential and/or emergency treatment should receive the minimum number of radiographs needed for diagnostic purposes.* [76]

As per the CDHO factsheet on pregnancy (updated on April 18, 2024):

> *X-ray exposure should be minimized during pregnancy (especially during the first trimester), with lead apron and thyroid collar being used if X-rays must be taken of the mouth. Digital radiography, which uses less radiation than traditional film, may decrease risk even further.* [54]

Even though radiographs are considered safe during any stage of pregnancy, there is often anxiety among pregnant individuals about dental radiography. This may prevent some people from seeking oral care during pregnancy and consequently may negatively affect their oral health and the health of their fetus.

Bahanan et al. (2021) assessed the awareness of dental radiography during pregnancy. In total, 410 female participants completed questionnaires. More than half of the participants were 30-49 years of age and more than two-thirds had a college degree. The majority of the participants (91%) demonstrated poor knowledge concerning dental radiography. Only 4% reported that pregnant individuals can have dental radiographs during any trimester. The majority believed there is a high risk of congenital malformation due to dental radiography and were unsure about the oncogenic risks.

The study demonstrates there is insufficient knowledge about dental radiography safety during pregnancy. This misperception could lead to anxiety and a delay of necessary treatment. Therefore, community awareness initiatives to inform the public about radiation doses, safety, and required protection measures are critical. Oral health

professionals must reassure pregnant clients about dental radiography safety during pregnancy and explain its benefits and risks. [71]

On August 1, 2023, the American Academy of Oral and Maxillofacial Radiology (AAOMR) published a position statement recommending discontinuing the use of protective shielding (i.e., lead aprons and thyroid collars) during dental imaging procedures. [77]

The AAOMR recommendations state:

> *Considering the absence of radiation-induced heritable effects in humans and the negligible dose to the gonads and fetus from dentomaxillofacial imaging, the committee recommends discontinuing shielding of the gonads, pelvic structures, and fetuses during all dentomaxillofacial radiographic imaging procedures. On the basis of radiation doses from contemporaneous maxillofacial imaging, the committee considered that the risks from thyroid cancer are negligible and recommends that thyroid shielding not be used during intraoral, panoramic, cephalometric, and cone-beam computed tomographic imaging.* [77]

In other words, dental radiographic procedures induce no heritable effects in humans and deliver only a negligible radiation dose to the gonads and the fetus. Accordingly, the dose of radiation exposure to a developing fetus from dental radiographs would have to be 10,000 to 30,000 times higher than it is currently to pose risk of causing fetal microcephaly, growth retardation, intellectual disability, or mortality. [77] [78]

According to the AAOMR position statement, dental radiography has greatly evolved, and the newest technology poses no threat to clients' health. Also, since most radiation exposure results from internal scattered radiation, shielding does not actually protect organs positioned outside of the imaged field. Furthermore, protective shielding for dental radiology can potentially increase the radiation dose to the client when anatomy is obscured by incorrectly placed shielding, necessitating a retake. Additionally, lead aprons may become contaminated with saliva and thus carry infection control risks if not properly disinfected. [77]

Although the AAOMR no longer recommends protective client shielding, the article highlighted the importance of following other radiation safety principles, including appropriate client selection and procedure optimization. Safety precautions include minimizing the radiation dose to the client to a level as low as reasonably achievable. [77]

Even though the position statement emphasizes client risk as negligible, oral health clinicians still need to exercise caution when taking radiographs to limit their occupational exposure. [77]

On February 1, 2024, the American Dental Association (ADA) released updated recommendations to enhance radiography safety. These recommendations include the

appropriate and justified use of dental radiographs and discontinuing the use of lead aprons and thyroid collars. [79] [80]

After reviewing published studies on radiography, the expert panel established by the ADA Council on Scientific Affairs determined lead aprons and thyroid collars are not necessary to shield clients from radiation exposure. These recommendations apply to all clients, regardless of age or health status, including pregnancy. Evidence indicates that modern digital radiographic equipment and restricting the beam size to the area being imaged better protect clients against radiation exposure to other parts of their body. In addition, lead aprons and thyroid collars can block the primary X-ray beam, obscuring the radiographic image necessitating retakes. [79] [80]

The ADA recommendations also advise safeguarding clients against unnecessary radiation exposure by:

- Ordering radiographs to optimize diagnostic information and enhance client care outcomes and making every effort to use images acquired at previous dental exams;
- Using digital instead of conventional X-ray film for imaging;
- Restricting the beam size through rectangular collimation;
- Properly positioning clients so the best image can be taken;
- Incorporating CBCT only when lower-exposure options will not provide the necessary diagnostic information; and
- Adhering to all applicable federal, state, and local regulations on radiation safety. [79] [80]

Lead shielding has been in practice for many years but this is not the first time that discontinuing client protective shielding has been recommended. In 2019, the American Association of Physicists in Medicine published a position paper recommending the discontinuation of client lead shielding. Among other things, the position paper indicated client lead shielding was ineffective in reducing internal scatter radiation, rendering it useless in reducing radiation dose. [81]

Additionally, Health Canada's Safety Code 30 (2022) states:

> *The patient must be provided with a thyroid shield when it will not interfere with the required diagnostic information of the examination (See Section A3.2.3, item 1). The use of a thyroid shield is especially important in children, as the thyroid gland in children is particularly sensitive to radiation.*
>
> *With the exception of CBCT procedures, the use of a lead apron is not required for the patient during routine dental X-ray procedures, if all other recommendations for limiting patient radiation exposure are respected (See Section A.3.0), as the dose to the patient will not be significantly affected by abdominal shielding; however, a lead apron may be used to aid in patient comfort regarding fears of radiation. For CBCT procedures, the patient should be provided with a lead apron when it will not interfere with the required diagnostic information of the procedure, as there is uncertainty and a lack of consensus regarding use of lead aprons for patients with CBCT.* [75]

However, the *Healing Arts Radiation Protection Act* (HARPA) states the radiation protection officer (which is a dentist under HARPA) must ensure lead aprons (protective accessories) are available for use. The HARPA does not state when lead aprons should be used. Also, Health Canada's Safety Code 30 (2022) recommendations are not enforced under HARPA. [82] [83]

Nonetheless, oral health practitioners should not eliminate lead aprons just yet because the province of Ontario will need to update its legislation and the public will need to be informed that evidence indicates lead aprons are not necessary.

Moreover, for some clients, the lead apron provides a level of comfort, whether physical similar to a weighted blanket, or psychological as it makes them feel protected. Furthermore, some pregnant clients are going to feel more comfortable and protected when they have the lead apron.

Dental amalgam

There is no evidence that a pregnant client's preexisting mercury-containing amalgam restorations cause any adverse effect on the fetus. [54]
As per the Royal College of Dental Surgeons of Ontario (RCDSO) 2003 policy statement on dental amalgams:

> *Dental amalgam continues to be a safe, extremely useful and necessary part of the restorative materials available to Ontario dentists and their patients of all ages. The placement and removal of dental amalgams should be avoided, if possible, during pregnancy.* [84]

In 1996, Health Canada published a report on the safety of dental amalgam along with a position statement. The position statement drew no clear link between mercury in dental amalgam and negative health effects, but advised minimizing the use of dental amalgam in children, pregnant persons, and people with kidney disease, as a precaution. A follow-up safety review was conducted in 2020 to consider recent information and determine if the recommendations in the 1996 report were still valid.

The 2020 safety review did not find new evidence to suggest a change in the overall safety profile for dental amalgam. Therefore, the 1996 Health Canada position statement on dental amalgam remains valid. As a precaution, use of dental amalgam in children, pregnant persons, and people with kidney disease should be minimized, as recommended in the 1996 Health Canada position statement. [85]

Whitening

Dental whitening is known to have side effects (e.g., tooth sensitivity, tissue irritation) in the general population. However, whitening has not been studied in pregnant individuals. Due to the lack of safety evidence, it is recommended whitening be avoided during pregnancy. In general, elective dental treatment should be postponed until after delivery to help minimize risk to the client and fetus. [70]

Take home messages

- Medications should be kept to a minimum during pregnancy and the benefits of any medication used should outweigh the risks.
- Oral health practitioners should be aware of the various medications that can adversely affect pregnant clients and their developing fetuses.
- Clients should be referred to their primary care provider if they have not had a prenatal assessment.
- Pregnant clients should be encouraged to avoid tobacco and vaping products, exposure to smoke, and use of alcohol and other substances. Oral health practitioners should counsel pregnant clients on the risk of negative consequences to the developing fetus if exposed to these substances.
- Oral healthcare is safe and recommended for pregnant clients and is essential for their health and the health of their fetus.
- Primary care providers should be consulted if there are any concerns with administering medications or providing care to pregnant clients.

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Refer your clients for proactive phone support
https://smokershelpline.ca/healthcare/make-a-referral

Quit with Confidence: Guide to a smoke-free life
https://www.canada.ca/en/health-canada/services/smoking-tobacco/quit-smoking/introduction.html

Tools for a smoke-free life
https://www.canada.ca/en/health-canada/campaigns/quit-smoking.html

World Health Organization has created a digital health worker to help people quit smoking. https://www.who.int/news-room/spotlight/using-ai-to-quit-tobacco

Get help with substance use – This webpage provides resources and information for individuals who need help with substance use, including overdose prevention resources and tobacco cessation services.
https://www.canada.ca/en/health-canada/services/substance-use/get-help-with-substance-use.html

Find mental health and addiction services in your community
https://www.ontario.ca/page/mental-health-services

How to talk to a family member or friend about their drug or alcohol use
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