

# Oral Health Care for the Pregnant Patient

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## ABSTRACT

Pregnancy is a unique time in a woman's life, accompanied by a variety of physiologic, anatomic and hormonal changes that can affect how oral health care is provided. However, these patients are not medically compromised and should not be denied dental treatment simply because they are pregnant. This article discusses the normal changes associated with pregnancy, general considerations in the care of pregnant patients, and possible dental complications of pregnancy and their management.

For citation purposes, the electronic version is the definitive version of this article: [www.cda-adc.ca/jcda/vol-75/issue-1/43.html](http://www.cda-adc.ca/jcda/vol-75/issue-1/43.html)

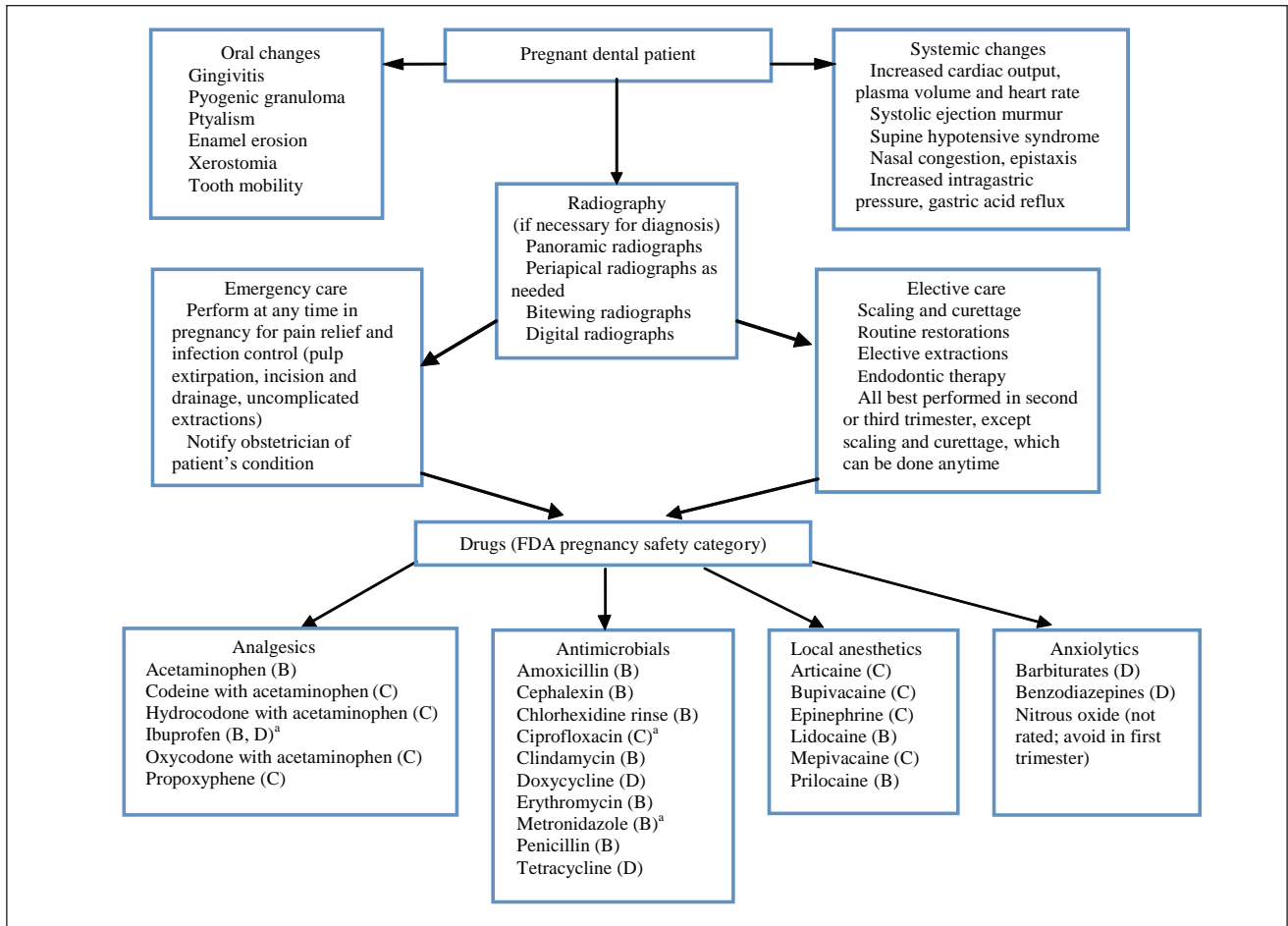
Most pregnant patients are generally healthy and need not be denied dental treatment solely because they are pregnant. However, even a healthy pregnancy causes major changes in maternal anatomy, physiology and metabolism. These can include changes in the cardiovascular, respiratory and gastrointestinal systems, as well as changes in the oral cavity and increased susceptibility to oral infection. Although these adaptations of maternal organ systems are normal, they do necessitate consideration and adjustments in treatment by any dentist who is providing oral health care and prescribing medications for the patient. This article discusses the various changes that occur during normal pregnancy and suggests modifications in dental management that should be considered.

### Systemic Changes

#### Cardiovascular System

Cardiovascular changes in pregnancy include increases in cardiac output, plasma volume and heart rate. A benign systolic ejection murmur, caused by increased blood flow across the pulmonic and aortic valves, occurs

in 96% of pregnant women,<sup>1</sup> but no treatment is required. In addition, as a result of vasomotor instability, pregnant patients are susceptible to postural hypotension. Consequently, changes in dental chair position from reclining to upright should be performed very slowly. As the uterus increases in size, it causes pressure on the vena cava and aorta, which can result in decreases in cardiac output, venous return and uteroplacental blood flow. Aortocaval compression, which occurs specifically in the supine position, leads to supine hypotensive syndrome, which is characterized by symptoms and signs such as lightheadedness, weakness, sweating, restlessness, tinnitus, pallor, decrease in blood pressure, syncope and, in severe cases, unconsciousness and convulsions. Patients who experience this syndrome are usually aware of its occurrence and can alert their caregivers if they begin to notice symptoms developing. The condition can be corrected by having the patient roll on her left side and placing a pillow or rolled towels to elevate her right hip and buttock by about 15°. This manoeuvre lifts the uterus off the vena cava and re-establishes aortocaval patency.<sup>2</sup>



**Figure 1:** Summary of somatic changes associated with pregnancy and diagnostic and treatment options in dental management of pregnant women. See **Table 1** for definitions of U.S. Food and Drug Administration (FDA) drug risk categories. <sup>a</sup>See text for further explanation.

### Respiratory System

Increased estrogen production during pregnancy causes the capillaries in the mucosa of the nasopharynx to become engorged, which results in edema, nasal congestion and predisposition to epistaxis.<sup>1</sup> Nasal breathing becomes more difficult, and there is a tendency to breathe with the mouth open, especially at night. If xerostomia subsequently develops, patients lose the protection against dental decay afforded by saliva.<sup>3</sup> Patients who are experiencing these problems, especially those with a high caries index, should undergo early caries control to minimize deleterious effects on the dentition.

### Gastrointestinal System

The increase in progesterone levels during pregnancy causes a decrease in lower esophageal tone and gastric and intestinal motility. The combined effects of hormonal and mechanical changes in the gastrointestinal system and greater sensitivity of the gag reflex also increases the risk of gastric acid reflux. In addition, the stomach is displaced superiorly as the uterus increases in size, which

increases intragastric pressure. Consequently, the chair should be kept as upright as possible during dental treatment to relieve abdominal pressure and keep the patient comfortable.

Ptyalism (excessive secretion of saliva) is a complication of pregnancy that occurs most often in women suffering from nausea. The presence of excessive saliva in the mouth may also reflect the inability of nauseated women to swallow normal amounts of saliva rather than a true increase in production. In some cases as much as 2 L of saliva per day is lost through drooling. Reducing the consumption of complex carbohydrates may improve this condition.<sup>1</sup>

### High-Risk Patients

Obstetric consultation is usually not required before initiating dental treatment for normal, healthy pregnant patients. However, consultation should be sought before caring for patients who have been identified by the obstetrician as being at risk for pregnancy complications, such as those with pregnancy-induced hypertension,

**Table 1** Pregnancy drug risk categories, as defined by the U.S. Food and Drug Administration<sup>4</sup>

Category	Evidence
A	Adequate, well-controlled studies in pregnant women have not shown an increased risk of fetal abnormalities.
B	Animal studies have revealed no evidence of harm to the fetus, however, there are no adequate and well-controlled studies in pregnant women. or Animal studies have shown an adverse effect, but adequate and well-controlled studies in pregnant women have failed to demonstrate a risk to the fetus
C	Animal studies have shown an adverse effect and there are no adequate and well-controlled studies in pregnant women. or No animal studies have been conducted and there are no adequate and well-controlled studies in pregnant women.
D	Studies, adequate well-controlled or observational, in pregnant women have demonstrated a risk to the fetus. However, the benefits of therapy may outweigh the potential risk.
X	Studies, adequate well-controlled or observational, in animals or pregnant women have demonstrated positive evidence of fetal abnormalities. The use of the product is contraindicated in women who are or may become pregnant.

gestational diabetes, threat of spontaneous abortion or history of premature labour. High-risk pregnant patients can usually be identified by taking a good medical history and asking questions about the course and nature of the pregnancy. Careful measurement and recording of baseline blood pressure, pulse and respiratory rate are required before any invasive procedure, including administration of a local anesthetic. Blood pressure is often at or below the range expected for healthy women of child-bearing age. If blood pressure is repeatedly elevated, especially above 140/90 mmHg, and fear and pain can be ruled out as causes, the obstetrician should be notified.

### Dental Treatment

Figure 1 summarizes physiologic and other changes associated with pregnancy, and outlines the various diagnostic and treatment options for dental concerns. These patients have a heightened awareness of and sensitivity to taste, smell and environmental temperature. Unpleasant tastes and odours can cause severe nausea or even gagging and vomiting, and overheating can lead to fainting. Acknowledged awareness and concern on the part of the dental staff and control of the office environment to the extent possible will contribute to patients' comfort and sense of well-being. Hypoglycemia may cause fainting; it can be prevented by recommending that the patient eat a snack containing protein and complex carbohydrates before the appointment. Patients should be well hydrated, and the duration of chair treatment time should be as short as possible.

### Timing of Treatment

Coronal scaling, polishing and root planing may be performed at any time as required to maintain oral health. However, routine general dentistry should usually only be done in the second and third trimester of pregnancy. Organogenesis is completed by the end of the first trimester, and uterine size has not increased to the extent that sitting in the dental chair is uncomfortable. Moreover, nausea has generally ceased by the end of the first trimester. Extensive elective procedures should be postponed until after delivery. Any treatment should be directed toward controlling disease, maintaining a healthy oral environment and preventing potential problems that could occur later in the pregnancy or during the postpartum period.<sup>3</sup>

### Radiography

Oral radiography is safe for pregnant patients, provided protective measures such as high-speed film, a lead apron and a thyroid collar are used. No increase in congenital anomalies or intrauterine growth retardation has been reported for x-ray radiation exposure during pregnancy totalling less than 5–10 cGy,<sup>5,6</sup> and a full-mouth series of dental radiographs results in only  $8 \times 10^{-4}$  cGy.<sup>5</sup> A bitewing and panoramic radiographic study generates about one-third the radiation exposure associated with a full-mouth series with E-speed film and a rectangular collimated beam.<sup>7</sup>

Patients who are concerned about radiography during pregnancy should be reassured that in all cases requiring



Figure 2: Pregnancy gingivitis.



Figure 3: Pyogenic granuloma.

such imaging, the dental staff will practise the ALARA (As Low As Reasonably Achievable) principle and that only radiographs necessary for diagnosis will be obtained.<sup>8</sup>

### Periodontal Disease

Pregnancy gingivitis (Fig. 2) usually appears in the first trimester of pregnancy. This form of gingivitis results from increased levels of progesterone and estrogen causing an exaggerated gingival inflammatory reaction to local irritants. The interproximal papillae become red, edematous and tender to palpation, and they bleed easily if subjected to trauma. In some patients, the condition will progress locally to become a pyogenic granuloma or “pregnancy tumour,” which is most commonly seen on the labial surface of the papilla (Fig. 3). Small lesions respond well to local debridement, chlorhexidine rinses and improved oral hygiene measures, but large lesions require deep excision. Because intraoperative bleeding can be difficult to control, such surgery should be performed by clinicians with requisite training and experience.

Tooth mobility is a sign of periodontal disease caused by mineral changes in the lamina dura and disturbances in the periodontal ligament attachments. Vitamin C deficiency contributes to this problem, so the patient should be advised accordingly.<sup>3</sup> Removal of local gingival irritants, therapeutic doses of vitamin C and delivery typically result in reversal of the tooth mobility.<sup>3</sup>

Some observational and interventional studies have shown an association between periodontal disease and adverse pregnancy outcomes such as preterm labour and low birth weight,<sup>9,10</sup> but other studies have shown no relation between periodontal disease and pregnancy outcomes.<sup>11</sup> While research continues into the pathophysiology of a cause-and-effect relation between oral health and pregnancy outcomes, it is prudent to keep the pregnant patient’s periodontal system as free of disease as possible.

### Infection

Odontogenic infection should be treated promptly at any time during pregnancy. Although pregnant patients are usually not immunocompromised, the maternal immune system does become suppressed in response to the fetus.<sup>1</sup> As such, there is a decrease in cell-mediated immunity and natural killer cell activity. Consequently, odontogenic infections have the potential to develop rapidly into deep-space infections and to compromise the oral-pharyngeal airway. Abscesses should be drained

and the offending pulp extirpated or the tooth removed to control the infection. The obstetrician should be informed of the patient’s status and the planned course of and rationale for treatment discussed. Patients who are in acute dental pain should be cared for in a similar manner. Long-term use of analgesics instead of definitive treatment is inappropriate. The patient should not have to wait until after delivery before treatment is provided.

### Medications

Another concern is the prescribing and administration of drugs. The most obvious concern is that the drug will cross the placental barrier and cause teratogenic effects to the fetus. The U.S. Food and Drug Administration (FDA) has defined categories of pregnancy risk associated with various drugs (Table 1), and guidelines for safely prescribing drugs during pregnancy have been published.<sup>4</sup>

### Analgesics

Analgesic drug categories are based on short-term use (over 2 or 3 days) to treat a specific disease process. Acetaminophen, which is in pregnancy risk category B, is the safest analgesic for use during pregnancy. However, because various strengths and preparations are available and because there is a potential for liver toxicity, patients should be instructed on how to take the drug and the maximum recommended daily dose (no more than 4 g/day for adults).

The majority of the other commonly prescribed analgesics are in pregnancy risk category C. It should be remembered that although category C drugs are generally safe, information from well-controlled human studies is not available. Therefore, prescriptions for these drugs should specify the most effective therapeutic dose for the shortest time. Ibuprofen is a category B analgesic in the first and second trimesters, but it is a category D drug during the third trimester because it has been associated with lower levels of amniotic fluid, premature closure of the fetal ductus arteriosus and inhibition of labour when taken during this time.<sup>12</sup> It should be

prescribed only after consultation with and advice from the obstetrician. Obstetricians often prescribe a combination of acetaminophen and codeine or oxycodone in place of nonsteroidal anti-inflammatory drugs. Prolonged use of narcotic analgesics in the third trimester can lead to neonatal respiratory depression.<sup>3</sup> In general, this does not appear to be a concern for the dose regimens typically prescribed in association with dental treatment. Recently, however, concern has been raised about the use of codeine by nursing mothers. In some women, codeine is more rapidly metabolized into morphine, and the morphine can be passed along by a mother who is breast-feeding an infant. Genetic testing is the only way to determine whether someone is a “rapid metabolizer,” so nursing mothers who are taking codeine should be made aware of the signs of morphine overdose in their infants. A mother should contact her doctor if her baby shows signs of increased sleepiness (more than 4 hours at a time), limpness or difficulty nursing or breathing.<sup>13</sup>

#### *Antibiotics and Antimicrobials*

Most antibiotics that are commonly prescribed by dentists are category B drugs, with the exception of tetracycline and its derivatives (e.g., doxycycline), which are in category D because of their effects on developing teeth and bone. Ciprofloxacin, a broad-spectrum fluoroquinolone antibiotic used to treat periodontal disease associated with *Actinobacillus actinomycetemcomitans*, is in category C. Its use in pregnancy has been restricted because of arthropathy and adverse effects on cartilage development observed in immature animals. There are not enough data to definitively determine its safety in humans.<sup>14</sup> Metronidazole is in category B. Some authors caution against its use in the first trimester because of potential harm to the fetus; however, recent studies showed no definitive teratogenic effects.<sup>15–17</sup> The risk–benefit ratio for the patient should be determined and the obstetrician consulted before prescribing this drug. The estolate form of erythromycin should be avoided because of deleterious effects on the mother’s liver. Chlorhexidine gluconate is a category B antimicrobial mouth rinse.

#### *Local Anesthetics*

Local anesthetics are relatively safe when administered properly and in the correct amounts. Lidocaine and prilocaine are category B drugs, whereas mepivacaine, articaine and bupivacaine are in category C. Epinephrine is also a category C drug. This drug has been studied in amounts of up to 0.1 mg added to local anesthetics used for epidural anesthesia (administered for pain relief during labour); no unusual side effects or complications have been reported in this context.<sup>18</sup> During administration of a local anesthetic with epinephrine, an intravascular injection may, at least theoretically, cause insufficiency of uteroplacental blood flow. However, for

a healthy pregnant patient, the 1:100,000 epinephrine concentration used in dentistry, administered by proper aspiration technique and limited to the minimal dose required, is safe.<sup>3</sup>

#### *Fluoride*

Fluoride is a category C drug. Fluoride treatment may be needed for patients with severe gastric reflux caused by nausea and vomiting during early pregnancy, which can cause erosion of tooth enamel. In these cases, fluoride treatment and restorations to cover the exposed dentin can diminish the sensitivity of and injury to the dentition. Topical fluoride gel may cause nausea, so application of a fluoride varnish may be better tolerated. The application of topical fluoride should follow evidence-based guidelines.<sup>19</sup>

#### *Sedatives and Anxiolytics*

Barbiturates and benzodiazepines are category D drugs and should be avoided during pregnancy. Benzodiazepines have been implicated in the development of cleft lip and palate. Nitrous oxide is not rated in the FDA classification system, and its use during dental treatment is still controversial. The results of a survey of more than 50,000 dentists and dental hygienists, which suggested that *long-term* exposure to nitrous oxide may be associated with reproductive problems such as spontaneous abortion and birth defects, have been called into question because of perceived inherent biases of the study design. However, nitrous oxide is known to affect vitamin B<sub>12</sub> metabolism, rendering the enzyme methionine synthase inactive in the folate metabolic pathway. Because methionine synthase is vital for the production of DNA, it is best to avoid the use of nitrous oxide in the first trimester of pregnancy, when organogenesis is occurring.<sup>20</sup>

The greatest concern for patient safety during the administration of nitrous oxide analgesia is the potential for hypoxia. The use of modern anesthetic machines, which are equipped with fail-safe and flow-safe systems, greatly diminishes the potential for hypoxia. If nitrous oxide is necessary for patient comfort, the analgesia technique should be discussed with the patient and obstetrician to be sure the pregnancy is progressing normally. After the first trimester of pregnancy, short-term administration of nitrous oxide (to ease apprehension during administration of a local anesthetic), with a minimal concentration of 50% oxygen, should be safe.<sup>3,20</sup>

#### **Conclusions**

Optimal oral health is very important for the pregnant patient and can be provided safely and effectively. Paying attention to the physiologic changes associated with pregnancy, practising careful radiation hygiene measures, prescribing medications on the basis of drug safety

categories and timing appointments and aggressive management of oral infection appropriately are important considerations. Given the possibility that periodontal disease may affect pregnancy outcomes, dentists need to play a proactive role in the maintenance of the oral health of pregnant women. ➤

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The authors have no declared financial interests.

This article has been peer reviewed.

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