

# Oral Health Issues During Pregnancy

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## Faculty Disclosure

Contributing faculty, Mark J. Szarejko, DDS, FAGD, has disclosed no relevant financial relationship with any product manufacturer or service provider mentioned.

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## Division Planner/Director Disclosure

The division planner and director have disclosed no relevant financial relationship with any product manufacturer or service provider mentioned.

## Audience

This course is designed for all nurses and nurse midwives involved in the care of pregnant patients.

## Accreditations & Approvals



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### Disclosure Statement

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### Course Objective

The purpose of this course is to provide healthcare professionals with the information necessary to appropriately intervene to promote good oral health in pregnant patients, with lasting positive effects to the patient and fetus.

### Learning Objectives

Upon completion of this course, you should be able to:

1. Identify the most common systemic changes that occur during pregnancy.
2. Describe common oral health issues that arise during pregnancy.
3. Analyze which dental medications are considered the safest to use during pregnancy.
4. Review precautions for dental procedures that are performed during pregnancy.



EVIDENCE-BASED  
PRACTICE  
RECOMMENDATION

Sections marked with this symbol include evidence-based practice recommendations. The level of evidence and/or strength of recommendation, as provided by the evidence-based source, are also included so you may determine the validity or relevance of the information. These sections may be used in conjunction with the course material for better application to your daily practice.

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## INTRODUCTION

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Pregnancy is a time of profound physiologic, anatomical, emotional, and hormonal changes. While a patient may have co-existing chronic systemic illnesses, pregnancy alone is not a medically compromised condition. Each woman has unique circumstances during this time that influence her oral health, her ability to undergo dental treatment, and the appropriateness of medications adjunctive to dental treatment. The goals for dental treatment during pregnancy and postpartum focus on the maintenance of optimal oral health in a manner that is safe for both the mother and the developing fetus.

This course will highlight the direct and the indirect effects in the oral and maxillofacial complex that manifest due to the hormonal changes experienced during pregnancy. Systemic changes that modify or preclude the ability to provide dental treatment and influence oral health will be reviewed. Guidelines established by the U.S. Food and Drug Administration (FDA) for medication use during pregnancy will be outlined as they relate to the relative safety of medications commonly used before, during, or after dental treatment [1; 2; 3; 4]. However, the uniqueness of each patient's pregnancy and medical history are the ultimate factors to consider when determining whether to progress with dental treatment, to defer treatment until after delivery, or to refer the patient to an appropriate specialist.

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## SYSTEMIC CHANGES DURING PREGNANCY

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### CARDIOVASCULAR CHANGES

During pregnancy, the increased metabolic demands of both the mother and the fetus are accompanied by a 40% increase in blood volume, a 30% to 40% increase in cardiac output, and a 15% to 20% increase in erythrocytes [5]. The production of erythrocytes, with their oxygen-binding hemoglobin complex, is not proportionate to the increased blood volume. Therefore, the hematocrit, defined as the proportion by volume of blood comprised of erythrocytes, decreases. A proportionate decrease in the iron-containing hemoglobin complex can lead to anemia.

The increased blood flow across the aortic and pulmonary valves causes the development of a benign systolic murmur in approximately 90% of pregnant women; this generally resolves after the pregnancy [6]. An increase in clotting factors (such as fibrinogen) and a decrease in anticlotting factors can place the pregnant patient at an increased risk of a thromboembolic event [7]. There is also a risk for hypotension during pregnancy, particularly in the last trimester.

As the pregnancy advances, patients in a supine position during dental treatment can be susceptible to supine postural hypotension. The increased fetal and uterine weight can compromise the venous return to the heart from the inferior vena cava. Nausea, weakness, sweating, and syncope may result. If this occurs, the patient should be instructed to roll on her left side and place support to raise the hips and buttocks 15 degrees [6]. This will lift the uterus from the inferior vena cava and permit the resumption of appropriate blood flow. Clinicians should avoid placing pregnant patients in a supine position when possible and must return them to an upright position slowly to prevent orthostatic hypotension.

## RESPIRATORY CHANGES

The increased production of estrogen during pregnancy causes the capillaries within the mucosa of the nasopharynx to become dilated [8]. The subsequent edema can lead to nasal congestion and difficulty breathing through the nose. This can cause nocturnal mouth breathing, with desiccation of the gingival tissues and xerostomia (dry mouth) as untoward results. Patients may also have difficulty during dental procedures if nasal congestion forces the majority of breathing to be accomplished via the mouth. Handpieces used for restorative dentistry and scaler/polisher units used for hygiene procedures generate aerosols that can further challenge the patient's ability to breathe orally. Procedures of this nature may need to be deferred until the nasal congestion subsides.

When nasal congestion is sustained and the desiccation is both significant and chronic, the gingival tissues may exhibit an increased inflammatory response and the teeth are subject to an increased risk of caries. Patients who develop this problem should be advised to maintain meticulous oral hygiene. The teeth should be brushed before bed and upon arising, and patients should be advised to floss daily. Alcoholic beverages and mouth rinses that contain alcohol should be avoided, as alcohol is a desiccant and can exacerbate this problem. Instead, lubricating mouth rinses may help alleviate any discomfort. Humidifiers placed in the patient's room overnight may offer some relief.

The increased metabolic demand for oxygen as the pregnancy progresses causes the rate of respiration to increase (tachypnea). The increasing size of the uterus can encroach upon the thoracic cavity, limiting lung expansion and causing dyspnea (shortness of breath). Dyspnea can be exacerbated with the assumption of a supine position during dental treatment. The patient should be positioned in the dental chair in a fashion that addresses this issue, if present, or treatment should be deferred until respiratory distress is not an issue.

## GASTROINTESTINAL CHANGES

The sustained increase in progesterone levels during pregnancy decreases the tone of the lower esophageal region and affects gastric and intestinal motility [9]. The gag reflex can be exacerbated during pregnancy, which is problematic during dental procedures in which aerosols are generated. The progressive increase in fetal size causes an increase in intragastric pressure and can lead to the development of acid reflux. Protracted acid reflux can be deleterious to the enamel of the lingual surfaces of the teeth and result in its progressive erosion. Patients who experience excessive vomiting (hyperemesis gravidarum) and/or acid reflux during pregnancy may be instructed to rinse with a solution of one teaspoon of baking soda to one cup of water to neutralize the highly acidic gastric contents [10]. Tooth brushing should be deferred until all of the acidic residue can be removed from the teeth (i.e., wait 60 minutes after rinsing before brushing) [27].

The abrasiveness of toothpaste coupled with acid-laden enamel can accelerate the demineralization process and loss of enamel. Acidic residue that remains on the teeth after repeated incidents of acid reflux can lead to enamel demineralization, exposure of the underlying dentin, increased tooth sensitivity to thermal stimuli and sweets, and an increased risk of caries. Sensitive teeth are usually avoided during brushing and flossing, which can further increase the risk of caries and periodontal problems. Some patients will develop cravings for foods that are sugar-laden and deleterious to oral health and overall health. These patients should be counseled to monitor their diet and to maintain meticulous oral hygiene throughout their pregnancy, with a reminder that tooth brushing should be avoided for 60 minutes after eating highly acidic or sugary foods [27].

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## ORAL HEALTH ISSUES DURING PREGNANCY

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### PREGNANCY GINGIVITIS

The most frequent oral complication to develop in pregnant women is pregnancy gingivitis [9]. During pregnancy, the gingival tissues may exhibit an increased inflammatory response to local irritants, such as plaque and calculus, due to the altered levels of estrogen and progesterone. Research indicates that there are significant changes in the oral flora during pregnancy, with a shift to more anaerobic flora as the pregnancy progresses and an increase in the presence of *Prevotella intermedia* [11]. Pregnancy gingivitis begins at the marginal gingiva and extends into the interdental papilla and may involve a few teeth or the entire dentition. In general, the condition has an onset during the first trimester of pregnancy and may increase significantly throughout pregnancy [12].

In patients with pregnancy gingivitis, the involved tissue has an edematous and erythematous appearance and is generally tender to palpation. This can discourage appropriate brushing and flossing, exacerbating the condition and increasing the risk of caries in the affected teeth. Pregnancy will generally intensify the clinical presentation of pre-existing gingivitis or periodontal disease and decrease its response to conventional periodontal treatment and daily oral hygiene methods.

Patients should be advised during the early stages of their pregnancy about the potential development of gingivitis and the need to maintain excellent oral hygiene to diminish its severity. Scaling can minimize the course of gingivitis and is usually safe

during pregnancy. Patients with pregnancy gingivitis have a tendency for increased bleeding during these procedures, and the affected tissues may be more sensitive to minimal instrumentation. The conservative use of topical or local anesthetics may be necessary to complete procedures. In cases in which the gingival tissues are extremely inflamed and patient comfort and procedural bleeding are a concern, it may take two appointments to complete the appropriate periodontal treatment.

Some pregnant women still believe the widely circulated myth that pregnancy and tooth loss have a direct relationship. The adage of “a tooth loss for every pregnancy,” attributed to calcium being withdrawn from the teeth to supply the calcium needs of the developing fetus, is false. Dental calcium is in a stable crystalline configuration and is not subject to withdrawal to meet the calcium demands of the mother or the fetus. Calcium metabolism is controlled by parathyroid hormone (PTH) and calcitonin. When a calcium deficit exists, PTH triggers the release of calcium stored in bones, not teeth, to obtain the required amount of calcium. Calcitonin hastens the uptake of calcium into bones when a surplus of calcium exists.

Prenatal nutrition should focus on achieving adequate intake of vitamin C and vitamin D, as both are important in the maintenance of periodontal health. Vitamin C is involved in the synthesis of collagen, an important component in the gingival tissue matrix, which is critical in the attachment of the tissues to the tooth. Vitamin D plays a role in immunity and bone metabolism [13]. These and other vitamins and minerals are derived from a combination of diet and prenatal vitamins, and they are essential elements for proper periodontal health.



The need to maintain optimal oral health during pregnancy may have benefits beyond that of the periodontal health of the mother. Several studies have found possible links between periodontal disease and adverse pregnancy outcomes, such as preterm birth and low birth weight (i.e. less than 2,500 grams) [14]. Two hypotheses have been advanced to support this correlation. First, the direct extension of oral periodontal pathogens into the womb might initiate a direct intrauterine inflammatory response. An alternate theory is that the mediators of inflammation associated with periodontal disease have systemic access and can alter the immune response of the mother and the developing fetus, which may lead to premature labor [15]. It should be emphasized that research into this issue continues and a direct causal relationship between periodontal disease and adverse pregnancy outcomes has yet to be established.

### PYOGENIC GRANULOMAS (PREGNANCY TUMORS)

Pyogenic granulomas are a pathologic entity that can occur in many patients. However, when they occur during pregnancy, they are referred to as “pregnancy tumors” [16]. These benign granulomas are a locally progressive manifestation of pregnancy gingivitis that occur in up to 5% of all pregnancies, most often during the second or third trimester [17]. The lesions have a highly developed vascular network secondary to the hormonal changes in pregnancy. They are typically painless but can bleed easily during brushing, flossing, or eating. Pyogenic granulomas in pregnancy usually develop from the interdental papillae on the buccal or labial surfaces of the teeth. Smaller lesions will usually regress after childbirth, but larger lesions may require surgical excision for their elimination. The rich vascular network associated with these lesions can cause profuse bleeding upon their removal. Clinicians should only undertake the surgical excision of these lesions if they are capable of achieving hemostasis after the procedure.

### XEROSTOMIA

As discussed, there may be an increased reliance upon mouth breathing during pregnancy due to chronic nasal congestion. This can cause problems in the oral cavity, including xerostomia. Acid reflux or frequent bouts of vomiting associated with morning sickness may exacerbate xerostomia, as dehydration can cause an adverse change in the systemic electrolyte composition. Many medications also cause xerostomia, and this should be considered, particularly for women with chronic illnesses.

Aside from adversely affecting the quality of life, xerostomia can compromise oral health. Decreased salivary flow results in less self-cleansing action for the teeth and a decrease in immunoglobulins. An increased retention of plaque can lead to an increased risk of caries and periodontal problems. The decreased lubricating medium of saliva can lead to increased oral discomfort for women who use partial or complete dentures. Eating can become difficult for these patients at a time when appropriate maternal and fetal nutrition are essential. Fungal organisms such as *Candida albicans* can flourish in a xerostomic environment and cause candidiasis.

If symptoms are severe, treatment is necessary. However, over-the-counter saliva substitutes or prescription-strength salivary stimulants should only be used if they are compatible with the mother’s medical history and are considered safe for the fetus.



EVIDENCE-BASED  
PRACTICE  
RECOMMENDATION

The American Academy of Pediatric Dentistry recommends health care providers counsel patients on the safety and benefits of prenatal medical and dental care.

([https://www.aapd.org/globalassets/media/policies\\_guidelines/bp\\_pregnancy.pdf](https://www.aapd.org/globalassets/media/policies_guidelines/bp_pregnancy.pdf).  
Last accessed July 20, 2021.)

**Level of Evidence:** Expert Opinion/Consensus Statement

## MEDICATION USE DURING PREGNANCY

Prescribing and administering medications for pregnant patients should be done with concern for both maternal and fetal safety. The FDA previously established pregnancy drug risk categories according to drugs' effects on reproduction and pregnancy; however, these product letter drug risk categories only remain in use for over-the-counter (OTC) medications [1; 3; 18]. The safest medications that have been tested in pregnant women are category A drugs. However, due to possible risks to maternal and fetal health, drug trials rarely included pregnant women, and there are only a few medications that fall into this category. Category B medications have been found to have no fetal risk in animal studies, or more rarely, have been proven safe in women despite evidence of increased risks in animal studies. Medications for which increased risk of harm to mother or fetus cannot be ruled out are referred to as category C, while medications with evidence of negative effects are category D. Any medications that are contraindicated during pregnancy are considered category X.

The drug risk categories, in effect since 1979, were substantially updated in 2006 under the FDA's Physician Labeling Rule (PLR). Effective June 2015, the Pregnancy and Lactation Labeling Rule (PLLR) has replaced the product letter categories for prescription medications and biologics with three detailed labeling subsections [1; 2; 3; 4]:

- The pregnancy subsection must provide information relevant to use of the drug in pregnant women (e.g., dosing, potential risk to fetus); it must also provide information about whether a registry exists that collects/maintains data on the drug's effect on pregnant women.

- The lactation subsection must provide information about use of the drug during breastfeeding (e.g., amount of drug in breast milk, potential effect/s on the child).
- The females/males of reproductive potential subsection must include information about pregnancy testing, contraception, and infertility as it relates to the drug.

The PLLR is intended to provide a more consistent way to include relevant information about the risks and benefits for the mother, the fetus, and the breastfeeding child. As noted, it applies to all drug and biologic product applications submitted on or after June 30, 2015. The labeling of previously approved products that contained the product letter categories will be phased in gradually [4].

When prescribing medications to pregnant women before, during, and after dental treatment, these guidelines should be taken into consideration. In addition, the patient's unique medical history, medication use, and current condition should be considered. If there is any doubt as to which medication, dose, or frequency of administration to use, consultation with the patient's obstetrician is advisable. The following discussion will highlight some of the most common medications used in conjunction with dental treatment and will be described using the former drug risk categories for reference. Clinicians and prescribers should be familiar with the current PLLR labeling for these common medications. In all cases, the minimal dose to produce the desired clinical effect should be utilized.

## LOCAL ANESTHETICS

Among the local anesthetics, prescription lidocaine and prilocaine were previously category B drugs, while articaine, bupivacaine, and mepivacaine were previously category C drugs, as was the vasoconstrictor epinephrine [19]. An intravascular injection of epinephrine may decrease the uteroplacental blood flow and potentially endanger the fetus. When the occurrence of an intravascular injection is minimized by the appropriate aspiration technique, a minimal dose of a local anesthetic with 1:100,000 epinephrine is generally safe to use [20].

## ANALGESICS

Acetaminophen is a category B or C drug [19]. As with other medications, the lowest dose and duration should be used. Ibuprofen and naproxen are considered category B for the first and second trimesters, but both are considered category D in the third trimester [19]. This change is due to an increased risk for closure of the fetal ductus arteriosus, fetal renal damage, inhibited clotting, and delayed labor and birth [19]. Opioid narcotic use in the third trimester should be avoided as it can cause neonatal respiratory depression [21].

## ANTIBIOTICS

Oral and maxillofacial infections can occur at any time during pregnancy and should be treated immediately to prevent the morbidity and even the potential mortality associated with regionally and systemically disseminated infections. Most of the commonly used antibiotics, such as penicillin, amoxicillin, cephalexin, clindamycin, and azithromycin, were category B drugs and are considered safe to use for the mother and fetus [19]. A few antibiotics (e.g., ciprofloxacin) were classified as category C [19].

Conventional doses of antibiotics will have less intense effects in pregnant patients given the larger maternal blood volume in which they are distributed [22]. If an oral infection does not respond to a conventional dose, consult an obstetrician to determine if a higher dose or an increased frequency of administration can be used. Patients with oral or maxillofacial infections that do not resolve despite adjustments to the dose or frequency of administration should be referred to an oral surgeon immediately.

Tetracycline and its derivatives were considered pregnancy category D and should not be used during pregnancy [19]. These medications bind to hydroxyapatite within the developing tooth and cause brown discoloration of the teeth, poorly formed enamel, and problems with bone growth [19; 23].

## ANXIOLYTICS/SEDATIVES

Oral anxiolytic medications from the benzodiazepine and barbiturate categories were category D drugs and cannot be used during pregnancy. Nitrous oxide inhalation analgesia may be considered after the first trimester [19]. If used, the minimum effective duration should be utilized with 50% concentration of oxygen and approval by the patient's obstetrician [24].



According to the American Academy of Pediatric Dentistry, nitrous oxide/oxygen analgesia/anxiolysis may facilitate the delivery of dental care for a pregnant patient when topical and local anesthetics alone are inadequate. Consultation with the prenatal medical provider is indicated prior to its use, and precautions are needed during treatment to prevent hypoxia, hypotension, and aspiration. Due to the increased risk of pregnancy loss, use of nitrous oxide may be contraindicated in the first trimester of pregnancy.

([https://www.aapd.org/globalassets/media/policies\\_guidelines/bp\\_pregnancy.pdf](https://www.aapd.org/globalassets/media/policies_guidelines/bp_pregnancy.pdf). Last accessed July 20, 2021.)

**Level of Evidence:** Expert Opinion/Consensus Statement



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## DENTAL TREATMENT CONSIDERATIONS

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Before any treatment for a pregnant patient is undertaken, a complete review of the medical history should be completed. Co-existing chronic illnesses that could influence the course of dental treatment or the metabolism of medications should be considered in addition to the concerns of the pregnancy. Problems such as gestational diabetes, pre-eclampsia, or a history of premature labor can classify a patient as high risk, which may require deferral of dental treatment until after the pregnancy. It would be wise to consult with the patient's obstetrician before any dental treatment is contemplated, especially procedures of an invasive nature.

If dental treatment is performed during pregnancy, the second trimester is generally the safest in terms of both maternal and fetal concerns. Fetal organ development is completed by the end of the first trimester, and morning sickness symptoms often begin to subside. During the third trimester, increasing uterine weight can cause discomfort when the patient is placed in a supine position typical for most dental procedures. Emergency situations such as acute infections, fractured teeth, endodontic problems, or traumatic injuries may require a diversion from this ideal timing.

Dental radiographs should only be taken if they are required for a dental problem that cannot be deferred until the completion of the pregnancy. Shielding the patient with a lead apron and a thyroid collar and using high-speed conventional film or digital radiography minimize maternal and fetal radiation exposure. Clinicians should ascribe to the "as low as reasonably achievable" (ALARA) principles of radiography techniques [25]. This is not the time to take a complete series of radiographs

for a comprehensive dental treatment plan. Caution should also be exercised when placing the films in the patient's mouth, as a heightened gag reflex during pregnancy can induce nausea and vomiting. Keeping the patient in an upright position during the placement of dental films may also decrease problems associated with the gag reflex.

Periodontal treatment during pregnancy should be limited to basic procedures such as coronal scaling and polishing and root planing. As noted, there is some speculation that treatment of periodontal disease during pregnancy might reduce the risk for preterm birth, but this has not yet been substantiated [26]. If pregnancy gingivitis exists, bleeding from the affected periodontal pockets of even minimal depth may be more profuse and prolonged compared to areas unaffected by this problem. Oral hygiene instructions should be provided as a continued effort to maintain optimal oral health throughout the pregnancy. Hand instrumentation may be needed rather than ultrasonic instrumentation, as the aerosol created by the latter can agitate an already heightened gag reflex. More invasive periodontal treatment, such as curettage and periodontal surgery, should be deferred unless required to eliminate an acute infection of periodontal origin. Infected teeth with a poor periodontal prognosis may be extracted to prevent recurring infections.

Restorative dental treatment should be limited to conservative treatment that can be accomplished in short appointments, preferably during the second trimester of pregnancy. If patients have nasal congestion secondary to the engorged capillary network of the mucosa of the nasopharynx, isolation of teeth to be restored with a rubber dam can make breathing very difficult and treatment should be deferred. Lengthy appointments and higher doses of local anesthesia should be avoided.

Fixed prosthetics, such as individual or multiple units of crowns, should be deferred, if possible, until after the pregnancy has been completed. The longer appointments required for impressions, the preparation of the teeth, and the fabrication of temporary crowns may be beyond the patient's tolerance for treatment. Impressions for fixed or removable prosthetics can stimulate the gag reflex in any patient, but particularly in pregnant patients. A plethora of impression materials exist, each with an interval during which the material must undergo a polymerization reaction to set completely and the impression tray cannot be removed from the mouth. Even this short duration of time can seem like an eternity to a patient with a heightened gag reflex and can lead to panic attacks, nausea, vomiting, and aspiration pneumonia. If there is any doubt about the patient's ability to tolerate any type of impression because of an exacerbated gag reflex, defer this treatment until another time.

Oral surgery should be limited to basic extractions of teeth that have become the source of an acute dental emergency. Each clinician should make an honest assessment of his or her surgical skills as they relate to the ability to extract a tooth as quickly and atraumatically as possible. Consider referral of the pregnant patient to an oral surgeon if it is in the best interest of maternal or fetal safety.

Emergencies of dental origin can occur at any time during the patient's pregnancy. Teeth with pre-existing caries, fractured restorations, necrotic pulps, and periodontal pathology may be asymptomatic for lengthy intervals. However, pain, swelling, and infections can develop rapidly amidst previously unrecognized and asymptomatic dental pathology. Treatment should be designed to eliminate pain and infection as quickly as possible. If there is any concern about the patient's safety or ability to tolerate dental treatment or prescribed medication, the patient's obstetrician should be contacted. The nature and extent of the dental problem, the proposed treatment, and medication use should be discussed. Unfortunately, many pregnant women (and many people in general) do not receive routine periodic preventive dental care during which dental problems could be treated at an early stage to minimize the development of dental emergencies.

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## CONCLUSION

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Oral health is essential to overall health and general well-being and should be maintained during pregnancy. The patient and healthcare professionals should have a unified goal of optimal oral health during the patient's pregnancy and beyond. Unique aspects of the patient's medical history and pregnancy must be considered before any dental treatment is begun. Consultation with the patient's obstetrician should be sought if there is any concern regarding maternal/fetal health, the dental treatment or lack thereof, or the use of any medication. Patient tolerance for dental treatment during pregnancy can vary considerably among pregnant patients, and clinicians should proceed in a manner and pace with which the patient feels comfortable. Medication selection should be appropriate for the patient's medical history and reflect the FDA guidelines for maternal and fetal safety. Patient education regarding appropriate oral hygiene at home should be a component of all dental recall visits. On a larger and more encompassing scale, information about dental treatment during pregnancy should be disbursed among patients and medical and dental professionals. Many women are convinced that all dental treatment is unsafe during pregnancy and should be assured that this is not true. Dentists and healthcare providers should maintain a dialogue regarding the benefits of dental treatment during pregnancy and the safe boundaries under which treatment will be rendered so the benefits of optimal oral health can be experienced by the mother and the fetus.

### Implicit Bias in Health Care

The role of implicit biases on healthcare outcomes has become a concern, as there is some evidence that implicit biases contribute to health disparities, professionals' attitudes toward and interactions with patients, quality of care, diagnoses, and treatment decisions. This may produce differences in help-seeking, diagnoses, and ultimately treatments and interventions. Implicit biases may also unwittingly produce professional behaviors, attitudes, and interactions that reduce patients' trust and comfort with their provider, leading to earlier termination of visits and/or reduced adherence and follow-up. Disadvantaged groups are marginalized in the healthcare system and vulnerable on multiple levels; health professionals' implicit biases can further exacerbate these existing disadvantages.

Interventions or strategies designed to reduce implicit bias may be categorized as change-based or control-based. Change-based interventions focus on reducing or changing cognitive associations underlying implicit biases. These interventions might include challenging stereotypes. Conversely, control-based interventions involve reducing the effects of the implicit bias on the individual's behaviors. These strategies include increasing awareness of biased thoughts and responses. The two types of interventions are not mutually exclusive and may be used synergistically.

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