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## 10-Minute EBD: Stimulant Medications, Rampant Caries, and Prevention

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# Stimulant Medications, Rampant Caries, and Prevention

By Madison Thomas, BS, Nancy Poznick, DDS, and  
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The term “meth mouth” has been used by both the layperson and the dental professional to describe extreme dental decay, often with associated discoloration and loss of teeth. The difference is, the practitioner may understand better the mechanism behind this rampant decay. In the minds of the general public, the drug itself may seem to be the enemy — destroying the teeth from the inside out, making them brittle and rotten. To dental professionals, it is understood to be a more complex issue stemming from the drug-induced xerostomia and long periods of poor oral hygiene.

Xerostomia, dry mouth, is a common occurrence and frequent sequela of stimulant medications. It is understood that lack of saliva increases the acidity of the mouth while decreasing the clearance of bacteria and food particles, leading to higher rates of tooth demineralization.<sup>1</sup> Therefore, patients with xerostomia have a higher risk of developing caries.

Methamphetamine is a dangerous stimulant. It is classified as a Schedule II drug and was implicated in nearly 16,000 overdose deaths in 2019 alone.<sup>2</sup> So what about this addictive drug’s close cousin, amphetamine? This psychostimulant is the drug of choice for the treatment of attention deficit hyperactivity disorder, of which there are 6.1 million people currently diagnosed in the United States.<sup>3</sup> If both the illicit drug and the therapeutic drug of choice

In patients with attention deficit hyperactivity disorders, do non-stimulant medications as compared with stimulant medications lead to dry mouth?

## Clinical Scenario



Patient presents with long term use of Adderall for ADHD, xerostomia, and rampant decay. The question arose by the student dentist if there is a non-stimulant medication that could be used instead that would not have the common cariogenic effect of xerostomia.

## Literature Search Strategies



Google search engine  
PubMed  
Search terms: non-stimulants and ADHD

## Evidence Summary



Non-stimulant therapy also has the common cariogenic side effect of dry mouth and is less effective in managing ADHD.

for ADHD use a similar mechanism to create a stimulating result, are similar side effects to be expected as well?

## Clinical case

A 29-year-old male patient presents for full mouth extraction in preparation for complete dentures. His medical history is significant for long-term Adderall (amphetamine and dextroamphetamine) use for ADHD as well as occasional use of an albuterol inhaler for asthma. Clinical examination reveals that all 28 remaining teeth are extensively decayed and fractured. The patient states his teeth began to break down over the last 10 years, often fracturing during mastication. He reports frequent sugared gum use, as well as candy, sports drink, and soda consumption.

The question arose: Is there a drug for patients diagnosed with ADHD that has fewer oral side effects, specifically xerostomia? While the answer to that question can no longer help this patient, it could prevent a similar irreversible dental outcome for other patients using this type of drug therapy.

## Developing the PICO

The PICO system is used to develop a question that can be answered using an evidence-based approach. The acronym stands for Population, Intervention, Comparison, and Outcome. We want to explore the population of patients with ADHD and compare medication types on the outcome of dry mouth, a cariogenic risk factor. Putting that all together, our PICO question reads as follows:

In patients with attention deficit hyperactivity disorders, do non-stimulant medications as compared with stimulant medications, lead to dry mouth?

- P** = Patients with ADHD
- I** = Non-Stimulant medications
- C** = Stimulant medications
- O** = Xerostomia

### Gathering background and literature search

As with most internet searches, Google was the first stop. The goal was to explore what types of ADHD medications were currently being prescribed and how they differed. The majority of medications noted were stimulant-based and were ruled out as possible alternative therapy, based on the likelihood of similar dry mouth side effects.

This led to the few non-stimulant options listed: guanfacine, clonidine, and atomoxetine. To explore these medications, a literature search using PubMed was initiated. The search terms entered, “non-stimulants” and “ADHD,” yielded results for both the medications of interest and also options for non-pharmacological treatment. The findings were evaluated for topic, level of evidence, date published, and overall relevance to the initial question.

### Evidence summary

A PubMed search resulted in articles categorized under the following MeSH terms:

- Attention deficit disorder with hyperactivity/therapy.
- Dental caries/prevention and control.
- Saliva/physiology.
- Central nervous system stimulants/adverse effects.
- Drug-related side effects and adverse reactions.
- Xerostomia/therapy.

**Figure 1**



**Rampant decay** — Photo shows decay and tooth loss as a result of xerostomia, poor eating habits, and abuse of amphetamines.

■ Amphetamine-related disorders/epidemiology.

■ Amphetamine-related disorders/mortality.

A 2017 meta-analysis by Luan, et al., on the efficacy and tolerability of ADHD medications listed non-stimulant options such as atomoxetine and guanfacine as “moderate” treatment options behind traditional stimulants such as methylphenidate.<sup>4</sup> Published by the Public Library of Science, the systematic review by Catalá-López, et al., discusses pharmacologic options for ADHD therapy. They similarly concluded the traditional stimulant medications exceeded the non-stimulant comparisons in effectiveness.<sup>5</sup> It was also found that the most efficacious medications resulted in the most harmful side effects. Finally, *Expert Opinion on Pharmacotherapy* published a drug comparison in 2020 regarding the use of guanfacine for attention disorder treatment. The authors highlighted less symptom re-

duction when using guanfacine and higher adverse effects when using the stimulant competitors.<sup>6</sup>

A pattern was noticed in the research of wanting to find an ADHD medication as effective as stimulant medications but with fewer of the side effects. While this is exactly what the search was meant to yield, it appeared the consensus was that effectiveness and side effects had a positive correlation. This led to a question of what lesser side effects the non-stimulants could provide and at what tradeoff to the clinical effectiveness of the drug. Unfortunately, the answer was that even the non-stimulants had the common cariogenic side effect of dry mouth, due to their action on the alpha-adrenergic receptors and serotonin reuptake.<sup>6</sup>

Research is dynamic. The initial goal was to find an alternative ADHD treatment that would lessen the risk of xerostomia inducing cariogenic  
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side effects, therefore preventing the outcome shown in our clinical case for future patients. Reflecting on the research, it appears the best prevention option is actively treating the dry mouth symptom experienced while taking these drugs.

As seen and reported by the patient in this case, the dry mouth experienced when taking these drugs can lead to an increased desire to self-medicate. Many patients turn to sugary drinks and candies to quench their thirst. The constant desire to have a carbohydrate-based cure can exacerbate the issue from xerostomia-induced tooth demineralization to rampant decay as seen in this patient. Perhaps substituting sugar intake with sugar-free or anti-cariogenic options, such as xylitol, would have decreased the risk of caries.

## Conclusion

Implementing the PICO strategy is useful to answer a clinical question in an evidence-based manner. However, sometimes the information obtained may not directly provide the treatment modality to use. Based on the evidence retrieved in this case, pharmacologic changes in the medication used to manage ADHD may not prevent the cariogenic risk factor of xerostomia. Therefore, alternative treatment options in the management of the symptoms of the medication should be considered instead. Patient education, nutritional counseling, frequent recalls, and the use of xylitol mints or gum may provide the most predictable reduction in carious activity while not compromising the effective pharmacologic management of ADHD.

While we could not save the pa-

tient's dentition in this scenario, researching best practices in the management of cariogenic side effects of xerostomia in patients taking stimulant and non-stimulant medications for ADHD may prevent similar outcomes for other patients.

## Key words

ADHD, ADHD medication, Adderall, dry mouth, caries, caries risk, xerostomia, xylitol, non-stimulant, CNS stimulants, methamphetamine, caries prevention, dental decay, gum, amphetamine salts, attention deficit disorders. ●

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