


# Management of patients with neurodevelopmental disorders in the dental office. A literature review

*Manejo de pacientes con trastornos del neurodesarrollo en la consulta odontológica. Una revisión de la literatura*

*Manejo de pacientes com transtornos do neurodesenvolvimento na consulta odontológica. Uma revisão da literatura*

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## Abstract

This article aims to describe the characteristics of patients with neurodevelopmental disorders, specifically autism spectrum disorder and attention-deficit/hyperactivity disorder, and relate it to the type of dental approach that this patient requires, in addition to describing the educational strategies that can be offered to the patient and parents to promote oral health care as part of general health. A bibliographic review was carried out where articles located in the databases PubMed, SciELO, Scopus, LILACS and Google Scholar were analyzed. It was concluded that neurodevelopmental disorders can increase the risk of dental caries and other oral diseases in pediatric patients, so preventive measures should be increased and improved, in addition to monitoring parents regarding the care they take of the oral health of these patients. Knowledge and application of the correct behavior management techniques can allow the dentist to provide more effective and appropriate care for these patients.

**Keywords:** Autism spectrum disorder, attention déficit disorder with hyperactivity, dental care.

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## Resumen

Este artículo tiene como objetivo describir las características de los pacientes con trastornos del neurodesarrollo, específicamente el trastorno del espectro autista y el trastorno de déficit de atención e hiperactividad, y relacionarlo con el tipo de abordaje odontológico que requiere este paciente, además de describir las estrategias de educación que se pueden ofrecer al paciente y a los padres para promover el cuidado de la salud bucal como parte de la salud general. Se realizó una revisión bibliográfica donde se analizaron artículos ubicados en las bases de datos PubMed, SciELO, Scopus, LILACS y Google Académico. Se concluye que los trastornos del neurodesarrollo pueden aumentar el riesgo de padecer de la enfermedad caries dental y otras enfermedades bucales en el paciente pediátrico, por lo que se debería aumentar y mejorar las medidas preventivas, además de realizar un monitoreo a los padres respecto al cuidado que tienen en la salud bucal de estos pacientes. El conocimiento y la aplicación de las correctas técnicas de manejo de la conducta puede permitir al odontólogo una atención más efectiva y adecuada de estos pacientes.

**Palabras clave:** Trastorno del espectro autista, trastorno por déficit de atención con hiperactividad, atención odontológica.

## Resumo

Este artigo tem como objetivo descrever as características de pacientes com transtornos do neurodesenvolvimento, especificamente transtorno do espectro autista e transtorno de déficit de atenção e hiperatividade, e relacioná-los com o tipo de abordagem odontológica que esse paciente necessita, além de descrever as estratégias educativas que podem ser oferecidas ao paciente e aos pais para promover os cuidados de saúde bucal como parte da saúde geral. Foi realizada uma revisão bibliográfica onde foram analisados artigos nas bases de dados: PubMed, SciELO, Scopus, LILACS e Google Acadêmico. Conclui-se que os transtornos do neurodesenvolvimento podem aumentar o risco de cárie dentária e outras doenças bucais em pacientes pediátricos, portanto medidas preventivas devem ser aumentadas e aprimoradas, além do acompanhamento dos pais quanto aos cuidados que têm na saúde bucal desses pacientes. O conhecimento e a aplicação das técnicas corretas de manejo do comportamento podem permitir que o cirurgião-dentista preste um atendimento mais eficaz e adequado a esses pacientes.

**Palavras-chave:** Transtorno do Espectro Autista, Transtorno do Deficit de Atenção com Hiperatividade, Assistência Odontológica.

## Introduction

Neurodevelopmental disorders appear in certain population groups and are characterized by delayed or impaired language, motor, social and/or cognitive skills.<sup>(1,2)</sup> The most common neurodevelopmental disorders are autism spectrum disorder (ASD) or autism, including its variants, and attention deficit hyperactivity disorder (ADHD).<sup>(3)</sup> Parents are often unaware of these disorders and tend to associate their re-

lated behaviors or attitudes with other factors or characteristics of their children. This means that they are never detected until adulthood, leading to complications in daily life. The lack of awareness about these disorders results in inadequate dental care, causing dental fear or anxiety in children, which impacts their long-term oral health. These disorders have differential characteristics that require special treatment during dental visits regarding treatment, behav-

ioral management, and patient education. The recommendation is to provide individualized attention and implement behavioral management techniques.<sup>(4-6)</sup> Therefore, this article aims to describe the characteristics of patients with neurodevelopmental disorders, specifically ASD and ADHD, and to relate this to the type of dental approach they need according to the literature consulted. We also describe the educational strategies that can be shared with patients to help them promote oral health care as part of general health.

## Methodology

A literature search on neurodevelopmental disorders (especially ASD and ADHD) and their relation to dental care was conducted in the following databases: PubMed, SciELO, Scopus, LILACS, and Google Scholar. The following keywords were used: autism, ADHD, neurodevelopmental disorders, dentistry, pediatric dentistry, behavioral management techniques, and dental care. We considered including original articles, review articles, and clinical cases in Spanish and English published in 2005–2021. Articles whose titles or abstracts included the term “special patients” were excluded because this is not the appropriate terminology to name these patients. The selection process yielded 38 articles (22 original articles, 13 reviews, two systematic reviews, and one case report), 7 books, and 2 theses, which were used to conduct this review.

### Most common neurodevelopmental disorders

Neurodevelopmental disorders are a group of conditions that affect the functioning and maturation of different areas of an individual. These affect the intellectual, social, learning, motor, and communication areas. Some areas are more affected than others depending on the type of disorder.

These conditions exist from birth and most frequently in early childhood. These impairments involve functional brain problems and motor, learning, language, behavioral, and social deficits.<sup>(3,7)</sup> ADHD—one of these disorders—is associated with impulsivity, hyperactivity, and inattention. This group also includes ASD, which involves social and language limitations, intellectual disability, sensory hypersensitivity, aggressiveness, anxiety, and attention deficit.<sup>(5)</sup> It is difficult to determine the prevalence of these disorders due to the different criteria professionals consider when diagnosing autism or ADHD. This leads to a lack of coherence in the data obtained from each assessing professional. The WHO estimates that approximately 1 in every 160 children has an ASD globally.<sup>(8)</sup> Regarding ADHD, the prevalence is between 3 and 10%.<sup>(9)</sup> These figures remain imprecise because the prevalence of these disorders is unknown or unreliable in low- and middle-income countries.

### Identifying a patient’s neurodevelopmental disorder

ASD is a behavioral disorder with characteristics easily recognized through observation. These are the characteristics that can help identify a patient with ASD in the dental practice: limited interaction between the child and the dentist, no response when the dentist tries to interact or call the patient by their name, avoidance of eye contact, nonparticipation in attempts to interact with the dentist, no spoken language, repetition of previously heard words for no apparent reason, and also hypersensitivity to touch when the dentist attempts an intraoral inspection.<sup>(10,11)</sup> Specific diagnostic criteria, such as noticeable impairments in social communication skills and repetitive patterns in behavior, interests, or activities, must be considered. These symptoms may appear at early stages of life but sometimes are masked until clinical deterioration occurs due to the high stress levels and the depressive and anxiety dis-

orders that ensue.<sup>(5)</sup> ASD variants are classified according to the patient's specific characteristics. The first variant is Rett syndrome, which mainly affects girls, who lose the manual abilities already gained. Asperger's syndrome is usually the most difficult to identify because the patient has a typical appearance but may have difficulty relating to others or display age-inappropriate behavior in stressful situations. Childhood disintegrative disorder (CDD), also known as Heller's syndrome, is characterized by the loss of acquired manual abilities, language and social function delay, and even hallucinations.<sup>(12-15)</sup>

Patients with ADHD pay little attention to the dentist's indications; they are easily distracted by external elements and show impulsivity in reacting to annoying or uncomfortable stimuli during the appointment. They display extreme restlessness when moving, inability to remain still or in the dental unit, and constant interruption during conversations with the dentist.<sup>(16)</sup> The diagnostic criteria for ADHD are consistent patterns of attention loss, hyperactivity, and impulsivity. These signs appear from childhood onwards, which implies difficulties at school.<sup>(5)</sup> In many cases, patients suffer from both or even more disorders, making it difficult to identify them because they display characteristics of both disorders with a predominance of one or the other. These disorders, however, can be identified through specialized assessment with professionals from other areas.

### **Oral health care limitations of patients with neurodevelopmental disorders**

Patients with neurodevelopmental disorders are at high risk for health problems. Oral health is no exception. Dental care is consistently reported as one of the primary medical needs of these patients. Several studies have reported a higher prevalence of caries in children with neurodevelopmental disorders than in the general population<sup>(17,18)</sup> They usually present poor oral hygiene, which is associated with a lack of

manual and lingual motor skills for removing dental biofilm, as well as frequent resistance to daily oral hygiene.<sup>(19,21)</sup> This depends on the support of the adults in charge since they do not have the necessary skills to take care of themselves, making them highly vulnerable to oral diseases that affect their overall health.<sup>(20,21)</sup> This situation can severely increase exposure to caries lesions and periodontal disease, as these patients present high levels of dental biofilm, gingivitis, calculus, halitosis, and constant remnants of cariogenic food in the oral cavity.<sup>(22,23)</sup> Poor attention, hyperactivity, poor eating habits, and oral hygiene might cause these conditions. In addition, drugs such as anxiolytics and anticonvulsants may also have an impact. These drugs cause xerostomia, stomatitis, glossitis, erythema multiforme, sialorrhea, dysgeusia, gingivitis, parotid gland inflammation, periodontal abscesses, sinusitis, dysphagia, among others.<sup>(11,17,24)</sup> These patients also have lesions caused by bad habits and oral parafunctions, such as bruxism, lip, and nail biting. Patients sometimes present geographic tongue, tongue fissures, enamel defects, and ogival palate.<sup>(25)</sup> Conversely, socioeconomic status can negatively influence good oral health maintenance by hindering access to dental care.<sup>(26)</sup>

### **Techniques used for behavioral management in children with ASD in the dental office**

Patients with ASD need health professionals who are trained in treating these patients to provide comprehensive care. The techniques are selected according to the type of behavior. They include modeling, reinforcement, tell-show-do (TSD), visual and auditory learning, individualized attention, and having other health professionals in attendance (network of colleagues).<sup>(27)</sup> Patients with ASD must be provided with a comfortable environment. Also, a systematic desensitization program is recommended before the dental visit to help the child adapt to the dental office environment through simulations that provide preliminary informa-

tion. This can be done by telling them which instruments will be used in the appointment, the step-by-step procedure, and even introducing the professionals that will provide the care. This helps foster the patient's trust. Drugs can also be used, and in case the techniques above do not work, patients can be treated under general anesthesia. The role of parents, guardians, and dentists is relevant since they will help the patients apply these techniques. Therefore, they should be familiar with these issues to help provide better care to these patients.<sup>(28)</sup>

### **Barriers limiting the access of patients with ASD to dental care**

Accessibility of dental care for patients with ASD can be difficult because there are few dental professionals trained to treat these patients. Most children with ASD display uncooperative behavior due to their high sensitivity. This may discourage dentists from providing care to these patients. This creates fear of dental treatment and makes parents feel embarrassed because they cannot control their children's behavior during dental care. As a result, these patients often receive inadequate care. Another difficulty in accessing dental treatment is a cramped dental office, which requires improving the dental work environment to make it more comfortable for patients with ASD. In addition, the office may be too far away, which would entail a longer travel time. Other difficulties may also be considered, such as the inability to pay for treatment costs, dental offices with no or difficult wheelchair access, dental offices with inadequate facilities to provide dental care, no dental insurance coverage, and long waiting times. Therefore, by identifying the barriers to accessing dental care, efforts can be made to reduce them so that patients with ASD can access dental care. One of the most representative actions is the availability of dentists specialized in treating children with ASD.<sup>(29)</sup>

### **Treating autistic patients in the dental office**

Treating children with autism can be complex due to their characteristics and the dentist's lack of training or knowledge. Therefore, more attention must be paid to the patient's expressions of pain or discomfort since they will have difficulty expressing pain verbally due to impaired language development. Implementing a specialized post-treatment followup procedure and a comprehensive approach to address the patient's needs is also necessary. This may include specialists or professionals from other areas. Various techniques can be applied to manage the patient's behavior during the appointment. These include vocal modulation to avoid intimidating the patient, non-verbal communication, playing music to the patient's liking, using distractions or rewards, requesting parents or guardians stay throughout the session, or more invasive techniques, if necessary, such as nitrous oxide, sedation, anesthesia, or behavioral stabilization devices, also called "papoose."<sup>(22,29)</sup> In 2021, Perales et al.<sup>(27)</sup> evaluated three behavioral management techniques for autistic patients in the dental office. The TEACCH (Treatment and Education of Autistic and Related Communication Handicapped Children) technique involves visual learning through pictograms to instruct patients on oral health actions such as going to the dentist, brushing their teeth, or building familiarity with the dentist. This technique is also used to explain how the care procedure will be performed and the events during the care procedure. The systematic desensitization (SD) technique involves exposing patients to images or videos associated with possible anxiety events, so they become aware of them and avoid them or make the reaction to the trigger disappear. The TSD technique allows dentists to give patients a preview of the sensations they will experience during the procedure to avoid complications. This is done through verbal explanations, exposure to the materials or instruments used, and applying the required treatment. Our results show that the three tech-

niques are effective for managing the behavior of autistic patients. The TEACCH technique is the one that yielded the best results at the end of the process.

Regarding pharmacological therapy, ASD patients will require sedation, premedication, general anesthesia, and stabilization drugs when situations are challenging to control. This disorder may include systemic alterations, such as epilepsy, depression, anxiety, or schizophrenia. Therefore, patients may take antipsychotics, anticonvulsants, antidepressants, and sedatives. These drugs adversely affect oral health problems (they contain sugar), a risk factor for dental caries. They also have adverse effects by interacting with the medications used during dental treatment.<sup>(30,31)</sup> Posttreatment should also be considered to prevent these patients' possible oral diseases. Even if there is a certain degree of psychomotor disability, the patient is not the only person responsible for oral health, hygiene, care, and feeding. Therefore, the role of parents and the dentist is essential.

### **Treating patients with ADHD in the dental office**

Treating patients with ADHD in the dental office is as complex as other neurodevelopmental disorders if the dentist does not know the appropriate methods for patient care and the patient's characteristics. The most salient features are inattention, hyperactivity, and impulsivity.<sup>(32,33)</sup> These characteristics that prevent them from focusing on a single activity are associated with a higher rate of decayed, lost, and filled teeth as they neglect oral hygiene due to a lack of motivation or sometimes due to their impaired skills to perform the entire regular hygiene procedure. In addition to the high probability of suffering from oral diseases, these characteristics create a relationship between the dentist and the patient that is not ideal.<sup>(20,34)</sup> Patients with ADHD may have difficulty following the dentist's instructions during the treatment procedure or indications on how to perform good

oral hygiene.<sup>(35)</sup> Patients with ADHD are more prone to anxiety attacks during the appointment because of their hypersensitivity. This significantly affects the treatment process and leads to a bad experience in the dental office, creating a state of dental anxiety that will affect oral health throughout the patient's life.<sup>(36–38)</sup> To manage the behavior of ADHD patients, it is necessary to use techniques that allow dentists to perform the treatment without any issues. The TSD communication technique—as in autistic patients—can be applied to prepare patients before receiving various stimuli during the dental procedure. Voice modulation is also used as a method to guide the patient's behavior, as well as the application of non-verbal communication to forge trust between dentist and patient. Both positive and negative reinforcement can also be applied, as well as elements that the child likes, such as prizes or elements provided by the parent, mainly to avoid negative behaviors and strengthen the child's patience.<sup>(39)</sup> If the child's behavior poses a risk to the dentist's or their staff's integrity, movement restriction or immobilization may be used, such as the hand-over-mouth technique, immobilization with a restraint device, or papoose.<sup>(40)</sup> These techniques are not recommended as they are aggressive toward the child and can create fear. Instead, pharmacological techniques such as sedation or general anesthesia can be applied to control the situation and provide treatment. The choice of technique will depend on the patient's age, anxiety level, cooperation, and procedure duration. It is important to remember that patients with ADHD take medication to treat their disorder. This should be considered before prescribing the sedative to be used.<sup>(41,42)</sup>

### **Alternatives for oral health care in patients with neurodevelopmental disorders**

Patients with disorders may present delayed intellectual capacity or learning limitations compared to neurotypical persons. Therefore, the treatment provided at the dental office must be

adapted to their differential characteristics.<sup>(21)</sup> Dental treatment will help patients with neurodevelopmental disorders solve the oral health problems they are prone to suffering. However, if no educational action is taken to maintain oral health, the problem will persist, and its recurrence will bring the patient back to the dental office. It is essential to educate patients on the habits to be maintained, oral hygiene techniques, consistency of care, and changes in diet to promote oral health. Parents are in the best position to monitor these actions, which will require training by the dental staff to educate and thus transfer the knowledge to their children.<sup>(22)</sup> Visual learning is one of the most effective techniques for educating parents and children. It entails showing a series of images depicting the method to be used, such as the brushing procedure or the use of dental floss. The photos can explicitly indicate how the procedure will be carried out, the place, time, movements, etc. Several studies have shown that this technique has helped parents improve their teaching procedures for their children. This significantly improves the child's oral health and, consequently, a lower incidence of oral diseases.<sup>(43-46)</sup>

## Discussion

This study identified patients with neurodevelopmental disorders by determining certain characteristics. Patients with ASD display hypersensitivity to touch, reduced eye contact, and no spoken language. This disorder presents itself in several forms: Rett syndrome, which manifests with loss of manual ability; Asperger's syndrome, where patients display inappropriate behaviors for their age; and Heller syndrome, which affects manual abilities. Patients with ADHD are easily distracted, impulsive, cannot sit still, and have language delays. In addition, they are a vulnerable population often suffering from dental caries and periodontal disease caused by a lack of manual dexterity and caregiver carelessness. Therefore, emphasis should

be placed on their care and attention. Also, medication can cause xerostomia and other conditions contributing to dental caries.<sup>(12,15,16)</sup> The results of this review support several previous studies stating that patients with disorders can be identified by observing their behavior, motor skills, etc. Also, access to a dental office is not always easy. The most frequent difficulties are the low percentage of dental specialists trained in treating patients with ASD or ADHD, fear of treatment, parents' embarrassment as they cannot control their children's behavior, limited office space, etc. The first barrier is the most significant one. It is important to note that identifying and addressing these barriers could increase accessibility to dental care.<sup>(47)</sup>

Additionally, several studies recommend that patients with ASD be treated jointly with other health professionals, such as pediatricians, psychologists, and dentists who specialize in this type of patient. The first step would be to manage the patient's behavior with techniques such as TSD, visual or auditory learning, specialized care, the TEACCH technique, which consists of visual assistance through pictograms that help patients with ASD brush their teeth correctly. Systematic desensitization can also be used. This technique simulates anxiety-provoking simulations such as dental procedures but with the support of family members and the help of images and videos prepared for this purpose, which will help the patient adapt to the dental environment. The dentist must also pay attention to any gestures or discomfort the patient may display during the dental procedure. Drug treatment, such as sedation and general anesthesia, can also be used. Taking antipsychotics, anticonvulsants, and antidepressants can cause oral health problems such as increased incidence of caries lesions and periodontal disease (gingivitis, periodontitis) if the patient is not given proper care. Therefore, it is important to educate parents about oral health care and good hygiene, and eating habits.<sup>(22,27,29,30)</sup> The

characteristics of patients with ADHD must be identified before the treatment. In addition, these patients could have anxiety attacks. The following techniques can be used to manage their behavior better: TSD, voice modulation, and positive reinforcement. In case of aggressive behavior, drugs such as general anesthesia can be used to provide dental treatment.<sup>(32,33,42)</sup> The neurodevelopmental disorders discussed in this article can be identified and distinguished by observing behaviors such as hypersensitivity to touch, loss of manual abilities, being easily

distracted, and anxiety, among others. In addition, there was a relationship between these disorders and the increased incidence of caries lesions and periodontal disease. We also noted that this might be related to the medications taken, difficulty performing adequate oral hygiene, difficulty providing dental care, and lack of trained personnel to care for these patients. Parents or caregivers must be empowered to fulfill their role for the treatment to have the expected outcomes.

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**Authorship contribution:**

1. Conception and design of study
2. Acquisition of data
3. Data analysis
4. Discussion of results
5. Drafting of the manuscript
6. Approval of the final version of the manuscript

MAHQ has contributed in 1, 2, 4, 5, 6.

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