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Dental Hygienists' Practices, Attitudes, and Confidence in Providing Care to Child Patients with Autism Spectrum Disorder (ASD)

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DENTAL HYGIENISTS' PRACTICES, ATTITUDES, AND CONFIDENCE IN PROVIDING
CARE TO CHILD PATIENTS WITH AUTISM SPECTRUM DISORDER (ASD)

by

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B.S.D.H. May 2014, King Saud University

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ABSTRACT

DENTAL HYGIENISTS' PRACTICES, ATTITUDES, AND CONFIDENCE IN PROVIDING CARE TO CHILD PATIENTS WITH AUTISM SPECTRUM DISORDER (ASD)

Fatimah Abdulrahman Alshehri
Old Dominion University, 2022
Director: Prof. Ann Bruhn

Problem: Given the growing number of children diagnosed with autism spectrum disorder (ASD) over the past decades and their significant need for access to dental care, it becomes essential to have dental hygienists adequately prepared to provide care to child patients with ASD. This study aimed to assess dental hygienists' practices, attitudes, and confidence levels in providing care for child patients with ASD. **Methods:** An 18-item, adapted survey was validated and administered to participants at the Virtual ODU Continuing Education Annual Conference. Data was collected via Qualtrics® from 187 dental hygienist attendees. The survey domains studied included demographics, practice settings, attitudes, practices, and confidence levels. Survey methods included multiple-choice questions with Likert Scales responses ranging from "strongly disagree to strongly agree," "never to often," "little confidence to very confident," "unconfident to very confident," and "no impact to high impact," and an open-ended question. Descriptive statistics were used to analyze the data. Fisher's exact test was performed to determine if years of experience predictor practicing dental hygienists' practices, attitudes, and confidence levels in providing care to child patients with ASD. A p-value of ≤ 0.05 was considered statistically significant. Old Dominion University Health Sciences Human Subjects Review Committee approved the study as exempt (#1818330-2). **Results:** Of the 187 attendees, the response rate was 31% (n=58). Although most participants, 87.93% (n=51), reported providing care to a child patient with ASD in a clinical setting, 82.35% (n=42) reported the

percentage of child patients with ASD treated within a month as 1–10%. The majority used ASD-specific practices to overcome the characteristic challenges and had positive attitudes and confidence in providing care to child patients with ASD. However, the attitudes of participants with ≤ 10 years of experience were significantly more positive than those of participants with > 10 years of experience on understanding the unique needs of children with ASD ($p=0.04$), understanding the dental needs of children with ASD ($p=0.01$), comfort level working with children with ASD ($p=0.04$), and enjoyment in providing care to children with ASD ($p=<0.001$). In addition, participants with ≤ 10 years of experience were more confident treating child patients with ASD than participants with > 10 years of experience ($p=0.03$). Over half of the participants, 51.72% ($n=30$), disagreed that their dental hygiene education program prepared them to treat child patients with ASD, and almost all the participants, 91.38% ($n=53$), were interested in the interventions that reduce dental anxiety in child patients with ASD and completing continuing education courses. Conclusion: Years of experience and prior training impacted dental hygienists' reported attitudes and confidence in caring for child patients with ASD. Increased curricular content and clinical experiences in treating child patients with ASD may be needed to give dental hygienists the necessary skills to treat child patients with ASD.

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CHAPTER I

INTRODUCTION

The National Institute of Child Health and Human Development (NICHD) states that autism spectrum disorder (ASD) is a complex, neurological, and developmental disorder that starts early in life and affects a person's behavior, interactions with others, social communication, and learning.¹ Diagnosing ASD often begins before the age of three based on symptoms, signs, and testing according to the Diagnostic and Statistical Manual of Mental Disorders–Fifth Edition (DSM–5), a guide created by the American Psychiatric Association (APA) to diagnose mental disorders.² In 2013, the APA released the fifth edition of its DSM which changed the way ASD was diagnosed by including the four previously separate categories: Autistic Disorder, Asperger Syndrome, Childhood Disintegrative Disorder, and Pervasive Developmental Disorder–Not Otherwise Specified (PDD–NOS) as a part of one all-encompassing ASD diagnosis.^{3,4}

As for the prevalence, the percentage of developmental disabilities, including ASD, among U.S. children aged 3–17 years increased from 2009 to 2017, with rates of 16.2% and 17.8%, respectively.⁵ According to the Autism and Developmental Disabilities Monitoring Network, 1 in 54 children are diagnosed with ASD by age 8.⁶ Autism spectrum disorder (ASD) diagnosis is observed in all racial, ethnic, and socioeconomic groups, with males being four times more likely than females to have ASD.⁶ The National Autism Association (NAA) states that the prevalence rate of ASD has steadily increased over the last two decades, making it the fastest-growing developmental disorder in the United States.^{7,8} There is no agreed-upon explanation for this continual growth; however, one frequently highlighted reason for the

increased prevalence rates of ASD is the recent revisions to the diagnostic criteria in the DSM–5. The new broader ASD diagnostic criteria may have contributed to the increases seen.^{9,10}

Autism spectrum disorder (ASD) is a life–long, heterogeneous, neurodevelopmental disorder characterized by social communication impairments and restricted, repetitive patterns of behaviors, interests, or activities. It varies in severity and combinations of symptoms from person to person.¹¹ Social communication and interaction deficits may include difficulty understanding or using spoken language, gestures, eye contact, facial expressions, tone of voice, and nonverbal cues appropriately. Additional social challenges may include difficulty recognizing and expressing emotions, seeking emotional comfort from others, taking turns in conversation, and gauging personal space. Restricted interests and repetitive behaviors may include hand–flapping, rocking, jumping, and twirling; hypo or hypersensitivity to sensory sensations such as touch, light, and sound; extreme difficulty coping with change; fussy eating habits; the need to follow specific routines and arranging things in a very particular manner; and a lack of coordination.¹² Other characteristics related to ASD can include delayed language, movement and learning skills, epilepsy or seizure disorder, gastrointestinal issues, unusual mood, anxiety, and lack of fear or more fear than expected.¹³ The awareness of healthcare professionals regarding ASD among children and DSM–5 updates can help achieve better care results.

Statement of the Problem

The increased prevalence of ASD and its effect on oral health status make it increasingly important to have dental hygienists adequately trained to provide care to children with ASD. Established features of children with ASD, such as difficulty with social communication and interaction, along with restricted or repetitive behavioral stereotypes, may hinder professionally delivered dental care.¹⁴ These difficulties may challenge dental hygienists when providing care

for child patients with ASD and make dental hygiene treatment extremely difficult.

Unfortunately, children with ASD are at high risk of developing oral disease.⁹ In order to improve the oral health of children with ASD, there is a need to assess dental professional practices, attitudes, and confidence levels in treating children with ASD in professional oral healthcare settings. Dental hygienists' practices, attitudes, and confidence in providing care for child patients with ASD may be highly correlated with improving oral health outcomes for this unique population and increasing their access to dental care.

Significance of the Problem

Autism spectrum disorder may be considered an indicator of high caries risk, with oral hygiene being the most significant risk indicator associated with new caries in children with ASD.¹⁵ Several studies reported that the majority of children with ASD have poor oral hygiene and, consequently, a higher risk for dental caries, periodontal disease, and oral injuries.^{9,16,17} Moreover, there are significant differences in oral health behaviors between children with and without ASD, particularly regarding tooth-brushing habits, toothpaste use, and assistance with tooth-brushing.¹⁸ Since the prevalence of ASD has risen significantly over the past few decades, there will undoubtedly be an increase in healthcare needs associated with ASD. Furthermore, children with ASD are more likely to have unmet health needs and decreased access to health care when compared to children with other special health care needs.¹⁹ Studies have also reported unmet oral health care needs in children with ASD and significant difficulties accessing adequate dental care.^{20,21} This decreased access to dental care may be due to the presence of impaired communication, repetitive behaviors, obsessive routines, unpredictable body movements, self-injurious behavior, sensory sensitivities, and anxiety in children with ASD. As a result, these characteristics of children with ASD may make dental hygiene appointments and associated

behavior management a difficult task.^{20,22,23} Accordingly, parents and caregivers of children with ASD reported difficulty finding a dentist or dental hygienist to provide oral hygiene services compared to parents and caregivers with typically developing children.²¹ Specifically, parents/caregivers of children with ASD often reported challenges finding a dental provider with the skills or willingness to provide care to their child.²⁴

Given the unique characteristics of children with ASD and the resulting challenges for dental professionals, it is essential to understand dental professionals' practices, attitudes, and confidence in treating child patients with ASD, and how they cope with these challenges. A limited number of studies have investigated dental professionals' knowledge, attitudes, and confidence when treating child patients with ASD.^{23,25,26,27} To date, no studies have focused on dental hygienists, who play an integral role in preventing, intervening, and controlling oral diseases.²⁸ The most recent *Commission on Dental Accreditation (CODA), Standards for Dental Hygiene Education*, standard 2–12, states, “Graduates must be competent in providing dental hygiene care for the child, adolescent, adult, geriatric, and special needs patient populations (p. 24).”²⁹ Dental hygienists receive education on treating patients with special needs in their dental hygiene curricula. However, these curricula may have different definitions of competency and clinical experiences related to treating patients with ASD. Research shows that a high percentage of dental professionals reported inadequate preparation to provide care to patients with ASD.^{23,26} Despite this, no studies have been conducted to investigate dental hygienists' educational preparation, practices, attitudes, or confidence in providing care to the ASD population.

This information is needed to improve oral care experiences and increase this unique population's access to care and oral health–related quality of life. Additionally, investigating dental hygienists' practices and behaviors might give other providers a better understanding of

the behavior management techniques useful in these interactions. As such, this study examined dental hygienists' practices, attitudes, and confidence in providing care to child patients with ASD, as well as their ability to cope with the challenges related to dental visits with child patients with ASD. Understanding current dental hygienists' perspectives could contribute to the development of training that better equips them with the proper skills to successfully treat children with ASD.

Definition of Terms

The following terms are defined to help the reader understand the context of each term in this study.

- *Dental hygienists*: “Dental hygienists in a clinical role assess, diagnose, plan, implement, evaluate and document treatment for the prevention, intervention, and control of oral diseases (para. 2).”²⁸
- *Commission on Dental Accreditation (CODA)*: CODA’s mission states, “The Commission on Dental Accreditation serves the public and dental professions by developing and implementing accreditation standards that promote and monitor the continuous quality and improvement of dental education programs (p. 3).”²⁹
- *Autism Spectrum Disorder (ASD)*: A neurodevelopmental disorder that affects communication and behavior. ASD is known as a “spectrum” disorder because there is wide variation in the type and severity of symptoms individuals experience.³⁰
- *Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM–5)*: A guide created by the American Psychiatric Association to define and classify mental disorders to improve diagnosis, treatment, and research.^{4,31} The DSM–5 is the most recent edition.

- *National Autism Association (NAA)*: A nonprofit organization focused on addressing urgent issues that families and individuals in the ASD community often face. The NAA’s mission is to “respond to the most urgent needs of the autism community, providing real help and hope so that all affected can reach their full potential (para. 1).”³²
- *The National Institute of Child Health and Human Development (NICHD)*: The NICHD’s mission is to “lead research and training to understand human development, improve reproductive health, enhance the lives of children and adolescents, and optimize abilities for all (para. 3).”³³

This study addressed the following research questions:

- 1) What are dental hygienists' reported practices and attitudes in providing care to child patients with ASD?
- 2) What are dental hygienists’ self-perceived confidence in providing care to child patients with ASD?
- 3) What factors affect dental hygienists’ confidence when providing care to children with ASD?

Hypotheses

The following null hypothesis will be tested at the 0.05 level of significance:

- 1) There will be no statistically significant difference between dental hygienists who practiced dental hygiene for more than ten years and dental hygienists who practiced dental hygiene for ten years or less in practices, attitudes, and confidence levels in providing care to children with ASD as measured by *The Survey of Dental Hygienists’ Practices, Attitudes, and Confidence in Providing Care to Child Patients with ASD* ($p=0.05$).

Assumptions

Assumptions of this study include:

- All participants answered the survey questions honestly.
- The participants were able to comprehend the survey questions.
- The inclusion and exclusion criteria for dental hygienists were acceptable for this research study.

CHAPTER II

REVIEW OF THE LITERATURE

To gain an understanding of existing research and to support the importance of this subject, a literature review was conducted regarding ASD and dental professionals' practices, attitudes, and confidence levels in providing care to patients with ASD.

ASD Behavioral Characteristics Related to the Dental Visit

Individuals with ASD represent a very heterogeneous population, with the diagnostic criteria outlined in the DSM–5 resulting from the merger of four distinct disorders previously categorized as pervasive developmental disorders (PDD): autistic disorder, childhood disintegrative disorder, pervasive developmental disorder–not otherwise specified (PDD–NOS), and Asperger's syndrome.³ Autism spectrum disorder (ASD) is a condition with a wide range of symptoms and severity related to how the brain develops. Typical symptoms are related to communication issues, impairment of social interactions, and repetitive, stereotypical behavior patterns.¹³ Although the deficits associated with ASD manifest differently in each individual, the manner through which a person with ASD perceives and socializes with others will be impacted; therefore, the DSM–5 includes a description of the severity levels for ASD: “Level 0 = none, Level 1 = mild requiring support, Level 2 = moderate requiring substantial support, and Level 3 = severe requiring very substantial support.”^{3,4,12} ^{3,4} With the changes made to the DSM–5, it is essential that dental care providers are aware of the characteristics associated with ASD since these characteristics can profoundly impact how dental treatment is provided to child patients with ASD.

Knowledge and a deep understanding of the basic characteristics of ASD are essential for successfully providing care to child patients with ASD. One of the earliest indicators of ASD is

the impairment of social interactions, which means a lack of curiosity about the environment and failure to develop joint attention.³⁵ In dental settings, a child patient with ASD may not respond to demonstrations or make eye contact with the clinician, and they may feel uncomfortable with dental personnel being close to them.²⁵ These difficulties may challenge dental providers when providing care for a patient with ASD and hinder professional oral care.²⁵ Moreover, child patients with ASD have difficulties communicating and sharing information with others through spoken language, gestures, and eye contact.³⁵ Estimates of the proportion of children with ASD presented with minimal or no functional speech vary from 25% to 30%.^{36,37} It is conceivable that the lack of communication skills and understanding between dental professionals and child patients with ASD during dental visits might be potentially dangerous during treatments.²⁵ For example, if a patient with ASD feels pain or is fearful, but they are unable to communicate those sensations appropriately, they may engage in an inappropriate behavior (i.e., yelling, hitting, biting) as a result.²⁵

Stein et al. reported that children with ASD exhibit significantly more uncooperative behaviors during routine dental hygiene treatment, correlated with lower expressive communication ability and physiological distress than children without ASD.³⁸ The dental hygiene appointment poses many challenges to child patients with ASD since the child is in an unfamiliar environment and presented with sensory–stimulating activities and possible discomfort.^{22,39} Kuhaneck and Chisholm confirmed that the dental environment involved extreme sensations associated with visual, auditory, tactile, olfactory, and gustatory stimuli that can create anxiety for children with ASD due to their heightened sensory awareness.³⁹ Bright lights, unfamiliar textures, smells, tastes, and sounds of the dental equipment, such as those associated with the polishing brush, suction, and handpieces, are all stimuli that can trigger children with

ASD to react with anxiety and be uncooperative, as well as aggravate sensitivities.^{14,22,39-41} Stein et al. reported that children with ASD, as opposed to typically developing children, were afraid of, disliked, and complained more about loud sounds, drilling, bright lights, instruments in the mouth, being leaned back in the chair, and smells in the dental setting.²¹

Children with ASD who have hyperresponsivity to sensory stimuli may demonstrate negative reactions such as self-injurious behavior, physical withdrawal, vocal outbursts, aggressive behaviors, tantrums, or attempts to block the stimuli.^{21,32,41,42} Mazurek et al. reported that anxiety and sensory over-responsivity are highly correlated in children with ASD, with higher anxiety levels among children, and with greater reactivity to various sensory stimuli.⁴³ Kerns et al. found that approximately 40% of children with ASD received a comorbid diagnosis of anxiety disorder.⁴⁴ Anxiety among child patients with ASD can lead to deficits in communication and social interaction along with increased inappropriate behaviors such as self-stimulation, self-injury, and tantrums.^{22,44} Furthermore, Chandrashekhara and Bommangoudar described that the incapability to manage emotions, repetitive body movements, and low frustration threshold could be barriers to accessing dental treatment for children with ASD.⁴⁵ Therefore, dental professionals need to be aware of the unique characteristics of child patients with ASD and the many stimuli that occur during oral health care visits and be prepared to make individualized adaptations for each presenting child.

Oral Health Status and Dental Needs of Patients with ASD

Children with ASD do not exhibit any specific oral manifestations related to their condition, but rather oral problems because of ASD-related behaviors.^{46,47} Autism spectrum disorder (ASD) impacts children's oral health status, resulting in poorer oral health status than the general population.^{9,14,17,48} Kopycka-Kedzierawski and Auinger analyzed data from the 2003

National Survey of Children's Health in the US to determine the dental needs and the dental status of children with ASD (1–17 years of age).⁴⁹ The study illustrated that parents of children with ASD were more likely to report their child's dentition as fair to poor condition than parents of children without ASD. Jaber mentioned that some characteristic behaviors of children with ASD, such as communication limitation, personal negligence, self-injurious behavior, eating habits, side effects of drugs, opposition to dental care, hyposensitivity to dental pain, and hypersensitivity to external stimuli, are often responsible for the deterioration of the oral health of children with ASD.¹⁷

Given the increased risk that behavioral characteristics associated with food selectivity, poor collaboration in practicing proper oral hygiene, and limited access to preventive and oral health care services can pose to dental health, children with ASD are at a greater risk of dental caries and are more susceptible to developing chronic oral health conditions.^{9,17,18} Onol and Kırzioğlu stated that children with ASD are more likely to develop dental caries due to the difficulties in brushing and flossing their teeth and a lack of manual skills, resulting in poor oral hygiene.⁵⁰ Sarnat et al. found that about 25% of children with ASD did not brush their teeth at all.⁵¹ However, the evidence of increased caries risk conflicts with some studies reporting a higher dental caries experience,^{15,17,52,55} and others suggesting a similar or even lower dental caries experience.^{16,46,53,54,56-61} Overall, the discrepancy in the literature regarding evidence of increased caries risk in children with ASD supports the need for future studies in order to obtain a more reliable and valid result.

In addition, the majority of children with ASD have poor oral hygiene and more periodontal problems such as gingivitis.^{16,17,46,54,62-66} According to a recent meta-analysis conducted by Da Silva et al., the pooled prevalence of dental caries and periodontal disease in

children with ASD is considered high as most assessed children with ASD had at least one of these oral conditions.⁵⁵ Du et al. stated that children with ASD are at a greater risk of periodontal disease due to problems in plaque control and oral defensiveness to tooth brushing.¹⁸ These changes could also be related to irregular brushing habits or lack of the necessary manual dexterity of children with ASD, which often results in inadequate tooth brushing.⁶⁷ The presence of generalized gingivitis might be the side effects of medications used to control the manifestations of ASD, such as psychoactive drugs or anticonvulsants like phenytoin to control seizures, correlated to an increase of hypertrophic–hyperplastic gingivitis and an eruption delay. Other common drug classes used in these patients are antidepressants, stimulants, and antipsychotics which may have oral side effects and pose dental problems.^{9,68}

Furthermore, oral clinical manifestations reported in children with ASD included bruxism, tongue thrusting, and self–injurious behavior that create ulcerations in gingival tissues, erosion, poor dietary habits, increased tartar build–up, pica (eating objects and substances), tooth crowding, and open bite.^{14,21,46,48,68} In addition, the rate of dental injuries is higher among ASD children.⁹ Altun et al. reported that the most common dental injury was enamel fracture, and the most frequently injured teeth were the permanent maxillary central incisors.⁵³

According to Kuhneck and Chisholm, the dental needs of children with ASD are not being met, perhaps due to high rates of poor cooperation and difficulties during dental examinations and procedures.³⁹ A study by Lai et al. described the unmet dental needs and associated barriers to oral health care among children with ASD utilizing questionnaires sent to caregivers listed in the autism registry.²⁰ The results showed that 12% of children had unmet dental needs, and 11% of children who had been to a dentist still reported unmet needs. This study showed that children with perceived poor behavior in the dental office usually had higher

instances of unmet dental needs, and of these, children with ASD have the greatest number of unmet oral healthcare needs. These findings align with the results of a study conducted by Jaber.¹⁷ The study indicated that children with ASD have more unmet dental treatment needs, as only 9.5% of children received restorative treatment compared with 29.6% of children without ASD, and this may be attributed to the limited access to dental services for children with ASD or the behavior challenges in dental settings. Another study by Loo et al. stated more patients with ASD required restorative and surgical dental treatment.⁶¹ Unfortunately, the lack of timely prevention due to difficulties in managing children with ASD in dental settings leads them to have untimely dental care, resulting in greater restorative and surgical treatment needs.

Barriers to Dental Care Access

Barriers to dental care have been reported among children with ASD, influencing their access to regular dental care and the interval between dental appointments.^{20, 24,69}

Chandrashekhar and Bommangoudar stated the main challenge during dental treatment as the reduced ability of children with ASD to communicate and relate to others.⁴⁵ Other problems like lack of capability to manage their emotions, repetitive body movements, hyperactivity, attention deficiency, sensory issues, and low frustration threshold can be barriers to accessing dental care.

Stein et al. reported that children with ASD had greater behavioral difficulties and sensory sensitivities that parents believed interfered with their child's oral care.⁴⁰ Access to dental services for children with ASD might be limited because of the lack of knowledge and experience among dental professionals about ASD in addition to, a constrained work environment due to limited financial resources, inadequate facilities, and insufficient time.^{64,70}

Other factors can affect access to dental care such as lack of insurance coverage, poverty, race or

ethnicity, child's age, and rural residency, particularly for those from low-income households for children with ASD.⁶⁴

El-Khatib et al. aimed to assess the oral health status and behaviors of children with ASD.⁶⁴ The study concluded that parents of children with ASD were less able to access dental care than the parents of children without ASD and had difficulty in finding a dentist willing to treat their children, and this may be linked to parents' inadequate knowledge about ASD or inadequate training of dental professionals. A study by Du et al. compared oral health behaviors and barriers to dental care among preschool children with and without ASD.¹⁸ The results showed a significant difference in reported barriers to accessing dental services among preschool children with and without ASD; parents also reported that the ASD condition itself was a significant barrier for their children to undergo dental treatment. In order to minimize unmet dental needs among children with ASD, it is essential to understand the challenges in oral self-care and barriers to dental services by both parents, caregivers, and dental professionals as they are the primary oral health caregivers of children with ASD.

Providing Oral Care to Patients with ASD

Autism spectrum disorder (ASD) characteristics can have a profound impact on how dental professionals provide care for child patients with ASD. Behavior management is a critical factor in providing dental care for children with ASD. Behavioral management techniques and approaches can aid dental professionals in managing children with ASD effectively in the clinical setting. These techniques and approaches could improve oral care experiences, lead to successful treatment outcomes, and build a trusting and positive relationship between professionals and patients.⁴⁵ Further, it is essential for dental professionals to be knowledgeable about ASD and its associated clinical manifestation so that they can modify the treatment

approach according to the patient's individual needs and use the appropriate behavioral guidance strategies to garner maximum cooperation.^{14,20}

A literature review on technologies to assist children with ASD by Elmore et al. supported socio-behavioral interventions for children using picture cards, video technology, and mobile applications to reduce dental anxiety and increase communication between the patient and the professional.²² The literature discussed how using Picture Exchange Communication System® (PECS) helped children learn to express wants, needs, and emotions, thus stimulating social interaction between the child and the communicative partner.²² The PECS improves verbal communication skills in non-verbal or limited speech children by utilizing picture cards to communicate requests, needs, and feelings. It consists of six training phases: how to communicate, distance and persistence, picture discrimination, sentence structure, responsive requesting and commenting.^{45,71} An ideal educational tool for children with ASD is video technology due to the ASD population favoring visual stimulation.²² Children with ASD tend to be more engaged in verbal and physical imitation when viewing electronic screen media such as video technology.^{22,72} Other interventions, such as mobile applications, are appropriate and convenient for use in most situations and settings and can be valuable tools for improving the cooperation of children with ASD during the dental hygiene experience.²²

Chandrashekhar and Bommangoudar described several behavioral guidance techniques to develop rapport, lessen anxiety, and provide quality dental treatments. Using short and clear commands and maintaining good, continuous communication throughout and after the visit is vital to establish trust and foster needed cooperation.⁴⁵ Some patients with ASD who have little to no verbal communication skills require assistive communicative devices, such as a Smart/Scan™ 32 pro, an augmentative communication device, or PECS.⁴⁵ A study by Gordon et

al. found that ASD children's spontaneous communication using picture cards, speech, or both increased significantly following PECS training.⁷³

The “tell–show–do” technique is a behavioral management technique to overcome communication challenges. It is an effective way to introduce dental instruments or equipment to patients with limited verbal communication, such as pictures of radiographic film, mouth mirrors, mouth props, and saliva ejectors.⁴⁵ In addition, the dental professional can explain the dental procedure by telling the patients what will be done, demonstrating how it will be done, and then performing the procedure. Another helpful method is utilizing social stories (personalized, easy short narrations and illustrations) to help an individual understand the events and what to look forward to during the dental visit.⁷⁴ A study by Dailey and Brooks stated that using a social story may be helpful to communicate the desired tasks needed to conduct the radiographic examination.⁷⁴

Delli et al. described behavioral management approaches that can be used when providing care to child patients with ASD.¹⁴ Visual pedagogy uses a series of photos or videos explaining step–by–step dental procedures and toothbrushing techniques to help children with ASD become familiar with a dental environment and learn oral hygiene skills.¹⁴ Pilebro and Bäckman conducted a study to evaluate the use of visual pedagogy as a teaching method for oral hygiene to children with ASD. The results showed that visual pedagogy is a helpful method in teaching oral hygiene techniques such as toothbrushing and was a widely used tool for communication.⁷⁵

The sensory–adapted environment is another method discussed by Delli et al. to help reduce the level of distressing stimuli, manage hypersensitivity during the dental visit, and decrease anxiety and oral defensiveness.¹⁴ Methods such as creating relaxing light conditions,

playing rhythmic music, and having the patient listen to their favorite music video or CD can relieve anxiety or stress the patient may encounter, reduce the patient's negative reactions and increase positive participation for dental hygiene treatment.¹⁴ Kuhaneck and Chisholm recommended some modifications to dental procedures and environments to diminish sensory stimuli for patients with ASD, such as altering the gloves used or the paste used to reduce unpleasant smells or tastes, making as little contact as possible with the face and tongue, wearing transparent face shields, and blocking as much light as possible by providing sunglasses and dimming the overhead lights.³⁹ Other techniques include verbally preparing the patient by describing what will occur, preventing startling them, offering alternative products with tastes and smells consistent with patient preferences, and using a firm, deep touch rather than a light touch.

The abovementioned interventions can help dental professionals manage child patients with ASD in dental settings. However, pharmacologic intervention may be necessary when basic behavioral management techniques have been unsatisfactory or unsuccessful, including nitrous oxide/oxygen analgesia, anxiolysis, sedation, and general anesthesia.^{74,76} Jaber stated that when dental needs are great, and attempts at behavior modification are unsuccessful, general anesthesia in the operating room creates a controlled environment where care is delivered efficiently and effectively.¹⁷ In select cases, protective stabilization with physical restraints may be considered; however, this practice remains controversial or objectionable. When communication is impaired, the oral condition is urgent, and there is inadequate time for behavior modification strategies, using restraints for challenging patients with ASD is a reasonable option and can lead to a safer working environment.⁷⁷ Other studies said that physical restraint is not safe and effective and can cause psychological and physical trauma in people with intellectual disabilities.^{22,78} To conclude,

unique patient needs, communication barriers, atypical sensory issues, and appropriate behavioral techniques must be considered to achieve a more successful outcome of care for children with ASD.

Dental Professionals' Attitudes and Confidence Levels in Providing Dental Care to Patients with ASD

The availability of dental services for child patients with ASD is impeded by various problems associated with the physical, medical, intellectual, and social deficits that affect access to oral health care. These problems can be exacerbated by the limited availability of adequately trained dental professionals to provide dental care to child patients with ASD.^{14,79} For example, it has been suggested that dental professionals' attitudes may be a barrier to care. Parents of children with ASD have often reported struggling to find dental professionals willing to treat their child, with up to 25% of children with ASD being refused by dental clinics.²⁴ A study conducted in 2020 by Taneja and Litt found the greatest barrier caregivers reported in receiving dental treatment for their children with ASD was finding a dental professional willing to treat their child.⁸⁰ Undoubtedly, many factors affect dental professionals' willingness to provide care for children with ASD, such as the training and education they receive to treat children with ASD successfully. Lack of training and the type and quality of dental education acquired can affect dental professionals' self-competence and willingness to care for patients with special care needs.^{23,81}

Dao et al. aimed to explore how dental education concerning treating special needs patients affected various dental professional behaviors, practices, and confidence levels.⁸¹ In this study, a sample of 208 general dentists responded to a self-administered survey that asked questions about their educational background, personal experiences, and attitudes concerning the

treatment of special needs patients, ASD being one.⁸¹ The results showed that the majority of the dentists did not consider that their dental education prepared them to provide the proper treatment and interventions to treat patients with special needs, and as such, they did not feel confident in doing so. In addition, when asking general dentists whether they would treat patients with a range of special healthcare needs, adult patients with ASD were the least accepted group, with only 33% of professionals being willing to treat them and only 40.1% willing to treat children with ASD. The participants agreed that there was a lack of experience, training, and education in treating these individuals in dental school.⁸¹ The study concluded the more prepared dental professionals were to treat special needs patients, the more positive their attitudes, and the more confident when providing care for these patients.⁸¹

Weil et al. aimed to examine the attitudes and behaviors of 75 members of the Special Care Dentistry Association (SCDA) in providing care to patients with ASD.²⁶ The results showed that nearly half of the respondents did not feel their professional education adequately equipped them with the skills necessary to treat patients with ASD.²⁶ Despite these rather negative evaluations of how well their dental education had prepared them for treating patients with ASD, the majority of dental professionals felt confident and had positive attitudes toward providing care for children and adults with ASD.²⁶ In 2019, Eades et al. reported that only over half of UK dental professionals surveyed felt moderately confident in treating their ASD patients because of their training.²³ Despite this fact, most dental professionals, had positive attitudes when it came to adapting their practices to meet the needs of this population, yet they found it difficult to achieve due to the lack of funding to provide special services. The results showed that nearly all participants reported that they had experience treating patients with ASD and the majority agreed that they are more challenging to treat.

A study by Mohebbi et al., to evaluate the effectiveness of training 70 senior dental students on oral health care for disabled patients, found that a lack of proper training resulted in those students being hesitant in providing care to patients with disabilities.⁷⁹ The results found a significant improvement in the knowledge and attitude of dental students towards the oral health care of patients with disabilities following the training. Therefore, the study revealed that a short-term training program on oral health care influenced students' knowledge, attitudes, and adherence to treating disabled patients.⁷⁹ Moreover, in 2014, Alkahtani et al. found that pre-doctoral training undertaken while at university in treating individuals with special needs, including patients with ASD, is associated with positive attitudes, a willingness to treat these patients, and an interest in undertaking further training.⁸²

Dehaitem et al. aimed to explore how dental hygiene programs in the United States educated their students on treating patients with special needs.⁸³ The study found that nearly all the dental hygiene programs in the United States included material regarding treating patients with special needs in their curricula. In addition, 42% of program directors indicated that dental hygiene students were required to have clinical experience, and 29.4% supported increasing their students' clinical experiences to allow more opportunities to interact with individuals with special needs.⁸³ The results of these studies revealed many factors, such as inadequate educational preparation and lack of clinical experiences and training, play an essential role in dental professionals' ability and willingness to provide care for patients with developmental disabilities. However, focusing on these factors can positively affect dental professionals' knowledge, attitudes, self-perceived confidence, and comfort levels when providing care to individuals with developmental disabilities and special needs, including the ASD population.

Summary

To the researcher's observation, most of the literature has focused on dentists' practices and behaviors toward providing care to patients with special needs, with no studies focusing on dental hygienists. Moreover, limited literature addresses child patients with ASD specifically. Further research is needed to investigate dental hygienists' educational preparation, practices, attitudes, and confidence in providing care to child patients with ASD.

CHAPTER III

METHODOLOGY

A cross-sectional, descriptive survey design was used on a convenience sample of practicing dental hygienists in the United States to examine self-reported practices, attitudes, and confidence in providing care to children with ASD. The target and accessible population consisted of attendees at a Virtual Continuing Education Annual Conference on February 2022, sponsored by a 4-year public institution located in a metropolitan area of Southeastern Virginia. Inclusion criteria for the proposed study included clinical practicing dental hygienists who were 18 years or older and carried an active dental hygiene license in the U.S. Old Dominion University Health Sciences Human Subjects Review Committee approved the study as exempt (Appendix A).

Data Collection Tool

This study utilized the modified “Dental Hygienists’ Practices, Attitudes, and Confidence in Providing Care to Child Patients with ASD Survey” adapted from Mohebbi et al., which measured dental students’ knowledge, attitudes/confidence, and barriers in providing oral health care to patients with disabilities; and Well et al. which measured dentists’ attitudes and behaviors concerning providing care to patients with ASD.^{25,79} In the present study, the survey was modified to measure dental hygienists’ practices, attitudes, and confidence levels in providing care to children with ASD while performing dental hygiene services. Moreover, the researchers developed demographic questions and additional information to understand better dental hygienists’ self-reported practices, attitudes, and confidence in treating child patients with ASD. The survey was pilot tested twice among a small cohort of clinical practicing dental hygienists and reviewed by an expert panel of dental hygiene faculty members from Old Dominion University for face and content validity. Modifications were made to the survey after the results

were received from the pilot tests. Further, the internal consistency for Likert scale items on the questionnaire were examined using Cronbach's Alpha during the pilot testing process. The Cronbach's Alpha for the scales were the following: attitudes (0.70), confidence (0.85), practice (0.71), and impact (0.34).

The survey contained 18-items that consisted of multiple-choice, Likert-type questions, as well as closed and open-ended questions within five main domains: n=8 (demographic questions); n=4 (practice settings questions); n=1 (attitude statements toward providing care to children with ASD); n=1 (practices being used by dental hygienists); and n=3 (confidence questions). Also, an open-ended question was included that asked participants to describe any additional thoughts concerning treating child patients with ASD. The survey was disseminated online through Qualtrics® (Qualtrics Lab, Provo, Utah) software.

Procedures

At a Virtual Continuing Education Annual Conference in February 2022, 187 dental hygienist attendees were invited to participate in the survey via a Qualtrics® link made available on the conference webpage and in the chatbox feature during the conference for three days. Only attendees who registered to attend the Virtual Continuing Education Annual Conference had access to the conference webpage and chatbox feature during the conference. In addition, dental hygienist attendees were invited to participate in the survey via email utilizing the Qualtrics® link. Dental hygienists provided their email addresses when they registered for the continuing education (CE) to earn 15-hours of continuing education credit hours during the Virtual Continuing Education Annual Conference. The participants received four email reminders to complete the survey, and the survey was made available for thirty days (Appendix B). When the thirty-day survey period ended, the survey link was deactivated and removed from the Virtual

Continuing Education Annual Conference web page, which was managed by information technology services (ITS) at the 4-year public institution that hosted the event.

Respondents voluntarily provided informed consent through the completion of the survey. The participants supplied the study's details, purpose, risks, and benefits, which were presented to them before beginning the study. Participants were required to read the aforementioned information and provide their consent to participate in the survey by selecting the option "I have read the consent and agree to participate." After consenting to participate in the survey, they advanced to the study questions. The survey was unavailable to participants until consent and participation agreement were obtained.

The self-administered electronic survey took approximately 15–20 minutes to complete. Further, to increase participation in the study, participants were invited to submit their email addresses utilizing an additional link to enter a raffle drawing for a \$200 gift card. To keep data anonymous, another Qualtrics® link that asked for the participants' emails for a \$200 gift card was provided within the original survey so that the participants' emails went to a secondary Qualtrics® survey link. This research study did not collect any identifiable, confidential, or sensitive data from the participants. All data collected were anonymous and remained confidential via secured electronic password documents. Only the research team had access to the password-protected data and maintained confidentiality and privacy. All data were reported in aggregate form. Researchers with access to data have already completed human subject certification to ensure confidentiality and privacy policies are adhered to properly.

Data Analysis

Statistical analysis was performed using the STATA statistics software version 14.0 (STATA, Texas, USA). Descriptive statistics, such as frequencies and percentages, were

provided to give an overview of the findings. Fisher's exact test was performed to determine if years of experience predicted practicing dental hygienists' attitudes and confidence levels in providing care to child patients with ASD. Ten statements, using a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5), were used to assess practicing dental hygienists' attitudes in providing care to child patients with ASD. All disagreement responses were combined into one category, and all agreements were combined into another category, creating polytomous variables for attitudes; disagree, don't know, and agree.

A 3-point Likert scale (1= never to 3= often) was used to measure practices being used by dental hygienists when providing care to child patients with ASD. The practice questions were divided into four sets according to the categories of ASD defining characteristics: communication challenges, social relations problems, an aversion to change and new situations, and repetitive and restricted behaviors. In addition, confidence levels in providing care to child patients with ASD were measured using a 4-point (1= little confidence to 4= very confidence). Regarding confidence with specific dental hygiene tasks (i.e., oral examination, oral hygiene instructions, oral photos, dental radiographs, scaling, polishing, fluoride treatment), confidence levels were measured using a 5-point Likert scale (1= unconfident to 5= very confident). Responses were combined into three categories for confidence; little to no confidence, don't know, and confident. For the measures of the factors that impact their confidence when providing care to children with ASD, a 4-point Likert scale (1= no impact to 4= high impact) was used. A p-value of ≤ 0.05 was considered statistically significant.

Responses to the open-ended question, "Please provide any additional thoughts concerning the treatment of child patients with ASD" were reviewed and analyzed by the researchers using the general inductive approach.⁸⁴ The first researcher reviewed the statements

and developed the themes based on the responses provided to the question. Next, a second researcher paired the text with the themes provided by the first researcher. Both researchers reviewed the themes and corresponding statements to determine the final agreement. Lastly, a third reviewer examined the content to establish the trustworthiness of the content with the themes and sub-themes.⁸⁴

CHAPTER IV

RESULTS

Of the 187 dental hygienist attendees at the Virtual Continuing Education Annual Conference, 78 completed the survey. Of the 78 responses received, 20 were excluded due to incomplete data and failure to meet the inclusion criteria, such as not actively practicing clinical dental hygiene or having no active U.S. dental hygiene license, yielding a response rate of 31% (n=58).

Participant characteristics and background are presented in Table 1. All respondents (100%, n=58) were female; nearly half of the participants (43.10%, n=25) were between aged 25 and 34 years, and one-fifth (20.96%, n=12) were aged 55-years or older. The majority of the sample identified as white and non-Hispanic (79.31%, n=46). Over half of the participants, 60.34% (n=35), earned a bachelor's degree, 55.17% (n=32) had over 10-years of experience as a dental hygienist, and 58.62% (n=34) were employed full-time. Most participants, 86.21% (n=50), worked in a private practice setting, with 58.62% (n= 34) practicing in a suburban setting. The majority of participants, 87.93% (n=51), reported providing care to a child patient with ASD in a clinical setting. Among these participants, on average within a month, 82.35% (n=42) reported that the percentage of child patients with ASD treated was 1–10%.

An overview of attitudinal responses by years of experience is presented in Table 2. This table shows that a higher proportion of participants with ≤ 10 years of experience agreed significantly more than participants with > 10 years of experience for the following statements: “I understand how to assess the unique needs of children who have ASD” (76%, n=19 vs. 50%, n=16; p=0.04), “I feel that I understand the dental needs of children who have ASD” (65.38%, n=17 vs. 46.88%, n=15; p=0.01), “I am comfortable working with children who have ASD”

(92.31%, n=24 vs. 65.62%, n=21; $p=0.04$), and “I enjoy providing oral health care to children with ASD” (88.46%, n=23 vs. 46.88%, n=15; $p<0.001$). Over half of the participants, 51% (n=30), believed that their dental hygiene education did not prepare them to treat child patients with ASD. In addition, almost all the participants, 91.38% (n=53), were interested in learning more about the interventions that reduce dental anxiety in child patients with ASD and taking additional continuing education courses on treating child patients with ASD. Overall, practicing dental hygienists had positive attitudes toward providing care to child patients with ASD.

Dental hygienists were asked how frequently they use certain practices to overcome communication challenges, social relations problems, an aversion to change and new situations, and behavior management strategies when providing care to child patients with ASD (Table 3). No statistically significant differences were observed between participants’ reported practices and years of experience. Concerning the techniques used to overcome communication challenges, over three-quarters of the participants reported that they often use positive reinforcement (83.93%, n=47), tell-show-do (80.36%, n=45), and tell-show-feel (75.00%, n=42) when treating child patients with ASD. Regarding the findings relevant to overcoming social relations problems, over half of the participants, 57% (n=32), reported that they sometimes let child patients with ASD observe their parents’ dental treatment.

More than half of the participants indicated that they sometimes offer familiarization visits before the first appointment (52.73%, n=29) or use technology (53.57%, n=30) to overcome aversion to change and new situations. However, most participants reported never using special scheduling arrangements (53.57%, n=30) or special office set-up (71.43%, n=40) when providing care to child patients with ASD. Most of the participants reported never using restraining techniques as behavior management strategies, such as papoose board/ physical

restraints (96.43%, n= 54), having the dental assistant restrain the child (94.64%, n=53), or having a parent restrain the child (71.43%, n=40). Nearly three-fourths of the respondents, 71.43% (n=40), reported sometimes referring their patients to specialists.

In terms of overall confidence in providing care to child patients with ASD, 76%(n=19) of participants with ≤ 10 years of experience reported “confident” compared to 55.17% (n=16) of participants with >10 years of experience ($p=0.03$). Regarding confidence with specific dental hygiene tasks, most dental hygienists reported feeling “confident” when providing dental hygiene services to child patients with ASD (i.e., oral examination, oral hygiene instructions, oral photos, dental radiographs, scaling, polishing, fluoride treatment). However, there was a statistically significant difference in the proportion of participants with ≤ 10 years of experience that reported “confident” compared to participants with >10 years of experience, respectively, on the following items, polishing (92.31%, n=24 vs. 77.42%, n=24; $p=0.03$) and fluoride application (92.31%, n=24 vs. 83.87%, n=26; $p=0.04$) (Table 4).

Participants were asked to rate the factors that impact their confidence when providing care to children with ASD. Most participants reported that the level of ASD severity (60.34%, n=35), child behavior (68.97%, n=40) highly impacted their confidence when providing care to children with ASD.). Additionally, over one-third of these participants, 39.66% (n=23), considered the level of dental disease a medium impact factor (Figure 1).

Lastly, out of the total sample (n=58), 13 participants provided comments to the open-ended question, “Please provide any additional thoughts concerning the treatment of child patients with ASD.” The themes of no clinical experience, clinical experience, patient management, and future training were created based on the responses. However, two out of 13 responses were general comments outside the created themes. In general, participants reported

varying levels of clinical experiences with ASD patients, while others reported no experiences.

One participant reported, “I have not had the opportunity to provide care for a pt who is very low functioning on the spectrum, all of my ASD pts have been moderate to high functioning.”

Another participant reported, “I never had the opportunity to treat patients with Autism. CODA requires that students feel competent to treat patients with special needs. This was not required

when I graduated.” In terms of patient management, one participant reported, “I find working very slowly and allowing patients with ASD to ask questions and take breaks is very helpful

during treatment. Sometimes, if I am able to put off a procedure like radiographs until another appointment increases compliance and rewards the patient, giving them a positive outlook on the

treatment.” In terms of future trainings, one participant reported, “CEU on ASD should be

available yearly and perhaps make it mandatory along with special needs patients” (Figure 2).

CHAPTER V

DISCUSSION

The majority of child patients with ASD have poor oral hygiene and are at a higher risk for dental caries, periodontal disease, and oral injuries.^{15-17,52-55, 62-66} Dental hygienists are oral health care professionals who have a vital role in preventing, intervening, and controlling oral diseases.²⁸ Results from the present study revealed that most participants reported experience treating child patients with ASD in a clinical setting. Despite this, the majority indicated that the percentage of child patients with ASD treated within a month was $\leq 10\%$. In an earlier study by Dao et al., child patients with ASD were the least likely to be accepted as patients by dental professionals.⁸¹ This limited access to dental hygiene services for child patients with ASD may have been due to the established characteristics of child patients with ASD, such as lack of communication, self-injurious behavior, sensory sensitivities, and increased anxiety, which make dental hygiene appointments difficult and create confounding barriers to accessing dental treatment. It is also possible that the lack of training and experience among dental professionals about ASD, and a constrained work environment, led to limited access to adequate dental hygiene care.

The intent of the present study was to address the gap in the literature regarding dental hygienists' practices, attitudes, and confidence in providing care to child patients with ASD. This study found that most participants had positive attitudes toward providing care to child patients with ASD and felt confident in their abilities to treat these patients. Participants with ≤ 10 years of experience reported having more positive attitudes and feeling more confident treating child patients with ASD compared to participants with >10 years of experience.

This research and related findings showed that having more years of experience practicing dental hygiene did not positively affect the participants' attitudes and confidence in providing care to child patients with ASD. Considering these findings, it is important to note that educational changes, increased prevalence of the ASD population, and community awareness may play a role in dental hygienists' attitudes and confidence levels when providing care to the ASD population. Given the growing number of children diagnosed with ASD over the last two decades and their significant need for access to dental care, it becomes critical to prepare dental hygienists to provide care to child patients with ASD. The modifications to the *Commission on Dental Accreditation (CODA)* standards are evidence of this recognition.⁸³

In the present study, despite positive attitudes and confidence being demonstrated, over half of the participants disagreed that their dental hygiene education prepared them to treat child patients with ASD. In addition, the majority of participants indicated that the current level of training/education highly impacted their confidence when caring for child patients with ASD. Overall, participants were interested in pursuing future training about treating child patients with ASD. Similarly, a study by Weil et al. found that despite the positive attitudes toward providing care for patients with ASD, dental professionals believed their dental education did not adequately prepare them to treat patients with ASD.²⁶ A study by Eades et al. found that only over half of dental professionals feel moderately confident in treating their ASD patients due to a lack of formal training.²³ Similar to findings in the present study, participants in Dao et al. stated they were less than or not well enough prepared to provide care to individuals with special needs, with a majority agreeing that their dental education did not prepare them well. The study concluded that the better dental professionals felt prepared to treat special needs patients, the more positive their attitudes and the more confident they were when treating them.⁸¹ Previous

findings correlate with the present study regarding inadequate educational preparation experiences in a school setting. In addition, the previous literature confirmed that educational preparation, clinical experiences, and training are related to dental professionals' knowledge, attitudes, and self-perceived confidence when providing care to individuals with developmental disabilities and special needs, including the ASD population.^{23,26,79,81,82} These findings should alert dental and dental hygiene programs to improve the curricula concerning treating patients with ASD and provide additional experiences for students during their formal training.

Dental professionals receive education on treating patients with special needs in their dental and dental hygiene curricula. However, these curricula may have varying definitions of competency and clinical experiences related to treating special needs patients and may not include patients with an ASD diagnosis. The most recent *Commission on Dental Accreditation (CODA), Standards for Dental Hygiene Education*, standard 2–12, contributed to addressing the needs of special needs patients more comprehensively in the dental hygiene curriculum and increasing the opportunities for dental hygiene students to obtain clinical experiences with special needs patients. To meet this standard, Dehaitem et al. reported that nearly all the dental hygiene programs in the United States addressed the treatment of patients with special needs in their curricula and supported increasing their students' clinical experiences in providing care to those patients.⁸³ Some programs may find it difficult to reach child patients with ASD, or children with ASD may have difficulties in dental hygiene treatment response due to long appointments with novice student providers. To assist with these challenges, ASD Simulated Patient (SP) experiences may be approved by the Commission on Dental Accreditation (CODA) to educate undergraduate dental hygiene students in clinical settings. Programs could specify the competency required number of simulated patients to complete, which could increase students'

knowledge, attitudes, and confidence in treating child patients with ASD. Increased dental hygiene student clinical experiences might result in more positive attitudes and confidence in this context. Therefore, dental hygienists with ≤ 10 years of experience may have varying educational experiences compared to those with >10 years of experience, which translates to disparities in attitudes and self-perceived confidence levels in providing care to child patients with ASD. A participant in this study confirmed the difference in educational experiences regarding treating patients with special needs. Thus, the lower levels of confidence reported by dental hygienists with >10 years of experience may be explained by the fact that they have little or no education or clinical training in treating child patients with ASD.

Participants in this study were very aware of the specific practices related to overcoming the characteristic challenges of child patients with ASD. The majority indicated that they often or sometimes used specific techniques aimed at overcoming communication challenges such as positive reinforcement with words, tell-show-do, and tell-show-feel; techniques aimed at overcoming social relations problems such as letting the child observe their parents' dental treatment; and techniques aimed at overcoming aversion to change and new situations such as offering familiarization visits before the first appointment or use of technology. Results from the present study were consistent with the results of the Weil et al. study, in which dental professionals use special accommodations and techniques to cope with behavioral challenges when providing care to patients with ASD.²⁶ Moreover, Weil et al. found that the more dental professionals had positive attitudes, the more they used ASD-specific accommodations and techniques to overcome problems with communication, social interactions, and aversion.²⁶ In the present study, most participants had quite positive attitudes toward providing care for child

patients with ASD, which may be correlated with the usage of practices related to overcoming challenges these patients may create.

The majority of participants in the present study reported never using special scheduling arrangements or special office set-up when providing care to child patients with ASD. This finding could be interpreted as a clear indicator of a lack of understanding of the specific characteristics of children with ASD, particularly their problems with an aversion to change and new situations. Similarly, an earlier study by Weil et al. reported that only a few dentists adopted a special office set-up while caring for patients with ASD, which might be attributed to their lack of awareness of these patients' unique traits.²⁵ A study by Dao et al. found that the more dental professionals agreed that their dental education had prepared them well to provide care to special needs patients, the more likely they were to set up their practices to treat special needs patients.⁸¹ The negative evaluation of educational preparation reported by participants in the present study could be a possible explanation for this finding. ASD patients struggle with environmental changes and new situations. Dental professionals need to be knowledgeable about setting up and adapting the dental environment for a patient with ASD. For example, having the patient with ASD treated in the same clinic and by the same provider who wears the same personal protective equipment. Delli et al. indicated the sensory-adapted environment helps reduce the level of distressing stimuli, manage hypersensitivity during the dental visit, decrease anxiety and oral defensiveness, and increase positive participation in dental prophylactic cleaning.¹⁴ Further, it is essential to modify the treatment approach according to the patient's individual needs and use appropriate behavioral guidance strategies to garner maximum cooperation. Overall, practicing dental hygienists in the present study were knowledgeable about

ASD-specific behavior management techniques and had positive attitudes and confidence in providing quality care to child patients with ASD.

Limitations

Although the results of this study contribute to the literature, there were limitations present. First, the convenience sample of practicing dental hygienists who attended a Virtual Continuing Education Annual Conference resulted in a relatively small and homogenous sample size. Second, participants may have been susceptible to recall bias, mainly when dealing with attitudes and practice questions. In addition, some participants did not complete the entire survey. As a result, non-response bias should be considered in the findings of this study. Considering the limitations and design of this study, future research should consider using a random sampling technique, increasing the sample size by expanding the targeted population, and completing the survey in a controlled environment to minimize potential threats to internal and external validity.

Despite these limitations, this is the first study to the researchers' knowledge, to examine attitudes, practices, and confidence among the U.S. practicing dental hygienists. The survey is useful in identifying behavior management techniques for overcoming the characteristic challenges of child patients with ASD and areas that could be addressed in dental hygiene education programs and continuing education courses. The validated, pilot-tested survey could be used in future studies in a larger sample of practicing dental hygienists. Future studies should explore the impact of dental hygiene education and training on dental hygienists' practice, attitudes, and confidence in providing care to child patients with ASD. Research is needed to determine the factors that influence the confidence and attitudes of dental hygienists with >10 years of experience when treating child patients with ASD.

CHAPTER VI

CONCLUSION

Dental hygienists are well positioned to play a vital role in preventing and controlling oral diseases. Most of the dental hygienists in the present study had provided care to child patients with ASD in a clinical setting. The majority used specific practices to overcome the characteristic challenges and had positive attitudes and confidence in providing care to child patients with ASD. However, the results showed that the participants with ≤ 10 years of experience had more positive attitudes and confidence in treating child patients with ASD than participants with >10 years of experience. In addition, most dental hygienists indicated their dental hygiene education didn't prepare them to treat child patients with ASD and were interested in the interventions that reduce dental anxiety in child patients with ASD and completing continuing education courses. Years of experience and prior training impacted dental hygienists' reported attitudes and confidence in caring for child patients with ASD. Increased curricular content and additional clinical experiences in treating child patients with ASD may be needed to give dental hygienists the necessary skills to treat child patients with ASD.

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Table 1. Characteristics and Background of Dental Hygienists

N=58	n	%
Gender		
Female	58	100
Age Group		
18–24	2	3.45
25–34	25	43.10
35–44	10	17.24
45–54	9	15.52
Over 55	12	20.69
Race/ Ethnicity		
Hispanic	2	3.45
White alone, non–Hispanic	46	79.31
American Indian and Alaska Native alone, non–Hispanic	1	1.72
Asian alone, non–Hispanic	4	6.90
Native Hawaiian and Other Pacific Islander alone, non–Hispanic	2	3.45
Multiracial, non–Hispanic	1	1.72
Prefer not to answer	2	3.45
Years Of Experience		
≤ 10 Years	26	44.83
> 10 Years	32	55.17
Education		
Associates	11	18.97
Bachelors	35	60.34
Graduate	12	20.69
Employment Status		
Full–Time	34	58.62
Part–Time	24	41.38
Practice Setting		
Clinical Private Practice	50	86.21
Other Practice (e.g., DSO or group practice setting, federally qualified health center, public/private school setting, or dental hygiene, dental assistance educational setting)	8	13.79
Location Of Practice Setting		
Rural	10	17.24
Suburban	34	58.62
Urban	13	22.41
Large Urban	1	1.72
Ever Treated ASD*		
Yes	51	87.93
No	7	12.07
Percentage Of ASD Treated†		
0%	7	13.73
1–10%	42	82.35
11–20%	2	3.92

*ASD refers to Autism Spectrum Disorder

† Only those who answered “yes” to the question “Have you provided care to a child patient with Autism Spectrum Disorder (ASD) during your clinical practice?” responded

Table 2. Differences in Reported Attitudes by Dental Hygienists' Years of Experience

		Responses	Total	10 Years or Less	More than 10 Years	p-value
			N(%)	n(%)	n(%)	
I understand how to assess the unique needs of children who have ASD	Disagree	10(17.54)	1(4.00)	9(28.12)	0.04	
	Don't Know	12(21.05)	5(20.00)	7(21.88)		
	Agree	35(61.40)	19(76.00)	16(50.00)		
I feel that I understand the dental needs of children who have ASD	Disagree	9(15.52)	–	9(28.12)	0.01	
	Don't Know	17(29.31)	9(34.62)	8(25.00)		
	Agree	32(55.17)	17(65.38)	15(46.88)		
I am comfortable working with children who have ASD	Disagree	9(15.25)	1(3.85)	8(25.00)	0.04	
	Don't Know	4(6.90)	1(3.85)	3(9.38)		
	Agree	45(77.59)	24(92.31)	21(65.62)		
I enjoy providing oral health care to children who have ASD	Disagree	8(13.79)	–	8(25.00)	<0.001	
	Don't Know	12(20.69)	3(11.54)	9(28.12)		
	Agree	38(65.52)	23(88.46)	15(46.88)		
Working with children who have ASD is stressful	Disagree	20(35.09)	9(34.62)	11(35.48)	1.00	
	Don't Know	11(19.30)	5(19.23)	6(19.35)		
	Agree	26(45.61)	12(46.15)	14(45.16)		
I would prefer to work in a private practice setting that refers children who have ASD to a specialist	Disagree	41(70.69)	21(80.77)	20(62.50)	0.27	
	Don't Know	9(15.52)	2(7.69)	7(21.88)		
	Agree	8(13.79)	3(11.54)	5(15.62)		
I would prefer not to work with children who have ASD	Disagree	42(72.41)	21(80.77)	21(65.62)	0.44	
	Don't Know	12(20.69)	4(15.38)	8(25.00)		
	Agree	4(6.90)	1(3.85)	3(9.38)		
I think my dental hygiene education prepared me for treating children who have ASD	Disagree	30(51.72)	11(42.31)	19(59.38)	0.37	
	Don't Know	11(18.97)	5(19.23)	6(18.75)		
	Agree	17(29.31)	10(38.46)	7(21.88)		
I am interested in learning more about the interventions that reduce dental anxiety in children who have ASD	Disagree	2(3.45)	–	2(6.25)	0.62	
	Don't Know	3(5.17)	1(3.85)	2(6.25)		
	Agree	53(91.38)	25(96.15)	28(87.50)		
I would like to take additional continuing education courses on treating children who have ASD	Disagree	–	–	–	0.25	
	Don't Know	5(8.62)	1(3.85)	4(12.50)		
	Agree	53(91.38)	25(96.15)	28(87.50)		

Note: Not all total columns equal N=58 due to nonresponse to some questions/statements. p-value obtained from Fisher's exact test

Table 3. Reported Practices Used by Dental Hygienists (N=58)

Practices	Responses	Total n(%)
Overcoming Communication Challenges		
Visual aids	Never	7(12.73)
	Sometimes	32(58.18)
	Often	16(29.09)
Behavior shaping with rewards (i.e., giving a 15-second break for every 60 seconds of compliance)	Never	8(14.55)
	Sometimes	28(50.91)
	Often	19(34.55)
Positive reinforcement with words	Never	3(5.36)
	Sometimes	6(10.71)
	Often	47(83.93)
Tell-show-do	Never	3(5.36)
	Sometimes	8(14.29)
	Often	45(80.36)
Tell-show-feel	Never	3(5.36)
	Sometimes	11(19.64)
	Often	42(75.00)
Overcoming Social Relations Problems		
Letting them observe other children	Never	25(44.64)
	Sometimes	26(46.43)
	Often	5(8.93)
Letting them observe their parents' dental treatment	Never	9(16.07)
	Sometimes	32(57.14)
	Often	15(26.79)
Overcoming Aversion to Change and New Situations		
Familiarization visits before the first appointment	Never	17(30.91)
	Sometimes	29(52.73)
	Often	9(16.36)
Special scheduling arrangements (e.g., before or after regular working hours or longer appointments)	Never	30(53.57)
	Sometimes	15(26.79)
	Often	11(19.64)
Special office set-up (e.g., using room farthest from treatment rooms, using isolated room versus open-bay operatories)	Never	40(71.43)
	Sometimes	14(25.00)
	Often	2(3.57)
Using technology	Never	13(23.21)
	Sometimes	30(53.57)
	Often	13(23.21)

Behavior Management Strategies		
Hand-over-mouth technique	Never	52(92.86)
	Sometimes	4(7.14)
	Often	
Papoose board/physical restraints	Never	54(96.43)
	Sometimes	1(1.79)
	Often	1(1.79)
Having dental assistant(s) restrain child	Never	53(94.64)
	Sometimes	2(3.57)
	Often	1(1.79)
Having parent restrain child	Never	40(71.43)
	Sometimes	15(26.79)
	Often	1(1.79)
Nitrous oxide inhalation	Never	44(78.57)
	Sometimes	11(19.64)
	Often	1(1.79)
Refer to specialists	Never	6(10.71)
	Sometimes	40(71.43)
	Often	10(17.86)

Note: Not all columns equal N=58 due to nonresponse to some questions/statements

Table 4. Differences in Reported Confidence by Dental Hygienists' Years of Experience

	Responses	Total	10 Years or Less	More than 10 Years	p-value
		N(%)	n(%)	n(%)	
Overall Confidence in Providing Care to Child Patients with ASD*	Little Confidence	10(18.52)	1(4.00)	9(31.03)	0.03
	Don't Know	8(14.81)	5(20.00)	3(10.34)	
	Confident	35(64.81)	19(76.00)	16(55.17)	
	Very Confident	1(1.85)	–	1(3.45)	
Oral Examination	Little to No Confidence	5(8.77)	1(3.85)	4(12.90)	0.68
	Don't Know	2(3.51)	1(3.85)	1(3.23)	
	Confident	50(87.72)	24(92.31)	26(83.87)	
Oral Hygiene Instructions	Little to No Confidence	12(21.05)	3(11.54)	9(29.03)	0.19
	Don't Know	4(7.02)	3(11.54)	1(3.23)	
	Confident	41(71.93)	20(76.92)	21(67.74)	
Taking Photographs	Little to No Confidence	15(62.32)	5(19.32)	10(32.26)	0.33
	Don't Know	11(19.30)	4(15.38)	7(22.58)	
	Confident	31(54.39)	17(65.38)	14(45.16)	
Technique and Radiation Safety When Exposing Dental Radiographs	Little to No Confidence	11(19.30)	4(15.38)	7(22.58)	0.85
	Don't Know	8(14.04)	4(15.38)	4(12.09)	
	Confident	38(66.67)	18(69.23)	20(64.52)	
Scaling	Little to No Confidence	9(15.79)	3(11.54)	6(19.35)	0.74
	Don't Know	5(8.77)	2(7.69)	3(9.68)	
	Confident	43(75.44)	21(80.77)	22(70.97)	
Polishing	Little to No Confidence	6(10.53)	–	6(19.35)	0.03
	Don't Know	3(5.26)	2(7.69)	1(3.23)	
	Confident	48(84.21)	24(92.31)	24(77.42)	
Fluoride Treatment	Little to No Confidence	5(8.77)	–	5(16.13)	0.04
	Don't Know	2(3.51)	2(7.69)	–	
	Confident	50(87.72)	24(92.31)	26(83.87)	

* This question has a different Likert scale

Note: Not all total columns equal N=58 due to nonresponse to some questions/statements. p-value obtained from Fisher's exact test

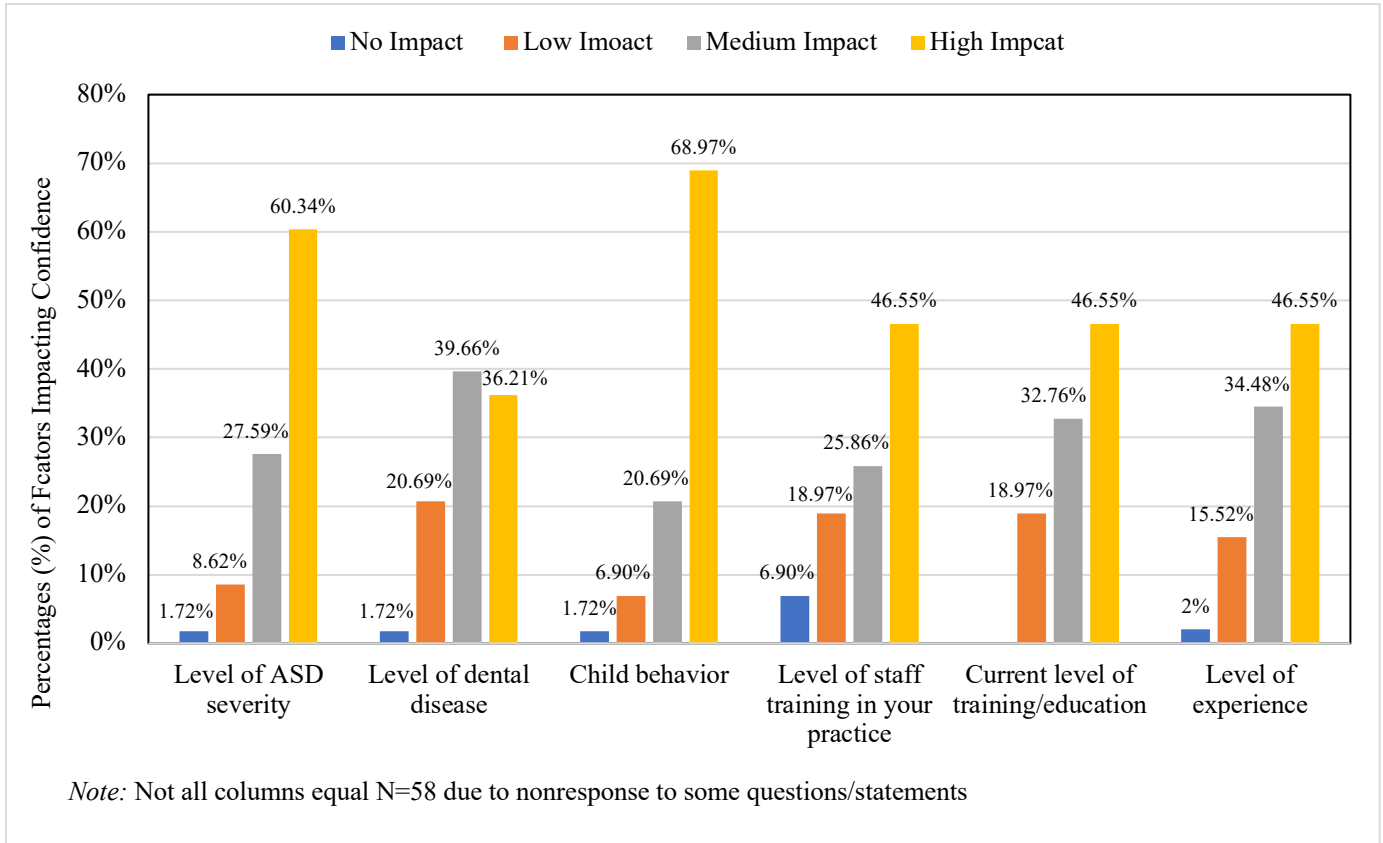


Figure 1. Dental Hygienists' Perception of Factors Impacting Confidence (N=58)

Education and Clinical Experiences

No Clinical Experience

“Working in a Navy dental clinic, our patients are 18 yrs and older. I’ve been there for 16 yrs and have not seen any pediatric patients.”

“In answering these questions and time in clinical practice. I have not provided care/ treatment to a child with ASD.”

“I never had the opportunity to treat patients with Autism. CODA requires that students feel competent to treat patients with special needs. This was not required when I graduated.”

Clinical Experience

“I have a nephew with ASD so am more familiar outside of my own practice with what he has to go through for treatment. He has had to have his treatment under sedation due to the severity of his ASD. But being around him has helped me be familiar with sensitivities that affect patients with ASD as I provide treatment. Unfortunately that is very few due to the fact that pediatric patients in my office are not always being seen by the hygienist.”

“I used to work in a pediatric setting and have recently moved to a FQHC Community Health Center I am more comfortable than several of my colleagues.”

“Have not had the opportunity to provide care for a pt who is very low functioning on the spectrum, all of my ASD pts have been moderate to high functioning.”

Patient Management

“It takes special person to treat this group of patients.”

“I find this a difficult topic because no one persons ASD is identical to that of the next person; therefore, the challenges to the clinical staff are not the same challenges when discussing patient care.”

“I find working very slowly and allowing patients with ASD to ask questions and take breaks is very helpful during treatment. Sometimes, if I am able to put off a procedure like radiographs until another appointment increases compliance and rewards the patient, giving them a positive outlook on the treatment.”

Future Training

“Would love to increase access to care to this population--training and reduction of the stigma associated with neurodivergence is critical to this.”

“CEU on ASD should be available yearly and perhaps make it mandatory along with special needs patients.”

Figure 2. Participants’ Responses on Providing Care to Child Patients with ASD (N=11)

Note: Two out of 13 responses were general comments outside the created themes

APPENDIX A

EXEMPT APPROVAL LETTER



OFFICE OF THE VICE PRESIDENT FOR RESEARCH



Physical Address
 4111 Monarch Way, Suite 203
 Norfolk, Virginia 23508
Mailing Address
 Office of Research
 1 Old Dominion University
 Norfolk, Virginia 23529
 Phone(757) 683-3460
 Fax(757) 683-5902

DATE: January 6, 2022

TO: Ann Bruhn, MS

FROM: Old Dominion University Health Sciences Human Subjects Review Committee

PROJECT TITLE: [1818330-3] Dental Hygienists' Practices, Attitudes, and Confidence in Providing Care to Child Patients with Autism Spectrum Disorder (ASD)

REFERENCE #:

SUBMISSION TYPE: Amendment/Modification

ACTION: DETERMINATION OF EXEMPT STATUS

DECISION DATE:

REVIEW CATEGORY: Exemption category # 2

Thank you for your submission of Amendment/Modification materials for this project. The Old Dominion University Health Sciences Human Subjects Review Committee has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

We will retain a copy of this correspondence within our records.

If you have any questions, please contact Harry Zhang at 757-683-6870 or qzhang@odu.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Old Dominion University Health Sciences Human Subjects Review Committee's records.

APPENDIX B

INVITATION LETTERS TO DENTAL HYGIENIST ATTENDEES

Email Subject: Dental Hygienists' Practices: Child Patients with Autism Spectrum Disorder (ASD) – Survey

Dear Dental Hygienists:

Thank you to those who have completed the survey on understanding dental hygienists' practices, attitudes, and confidence related to Autism Spectrum Disorder (ASD) launched at the ODU Winter Weekend CE Event. Please consider completing the survey if you have not done so already. Data from the study will be more accurate with a larger sample size, and we appreciate your consideration. Specifically, you will complete an anonymous, self-administered electronic questionnaire through a Qualtrics® link. The questionnaire should only take 15 to 20 minutes to complete. If you would like to participate in this research study, please use the questionnaire link below. The survey will not be available to you until consent and participation agreement are obtained by selecting the option "I have read the consent and agree to participate." Once you have completed the survey, you are invited to submit your email address utilizing an additional Qualtrics® link to enter into a raffle drawing for a **\$200 VISA gift card**.

Follow this link to the survey:

https://odu.co1.qualtrics.com/jfe/form/SV_enzYDFk7n9PnDbU

If you have any questions about the survey, please contact Prof. Ann M. Bruhn at abruhn@odu.edu or Ms. Fatimah Alshehri at falsh001@odu.edu.

We appreciate your time,

Fatimah Alshehri and Research Team (Profs. Ann Bruhn, Denise Claiborne and Jonna Bobzien).

Email Subject: YOUR RESPONSE IS NEEDED: Dental Hygienists' Practices: Child Patients with Autism Spectrum Disorder (ASD)–Survey

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Ann Bruhn

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Norfolk, VA 23529
Phone: (757) 683–3851
Email: abruhn@odu.edu

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We appreciate your time,

Fatimah Alshehri and Research Team (Profs. Ann Bruhn, Denise Claiborne and Jonna Bobzien).

Email Subject: Final Time to Complete the Survey; We Need Your Response! Dental Hygienists' Practices: Child Patients with ASD–Survey

Dear Dental Hygienists:

Thank you to those who have completed the survey on understanding dental hygienists' practices, attitudes, and confidence related to Autism Spectrum Disorder (ASD) launched at the ODU Winter Weekend CE Event. If you have not already completed the survey, we encourage you to take a few minutes to do so before **Friday, April 1st end of the day (11:59 pm)**. Please take a few minutes to complete the survey, as data from the study will be more accurate with a larger sample size, and we appreciate your consideration. Once you have completed the survey, you are invited to submit your email address utilizing an additional Qualtrics® link to enter a raffle drawing for a **\$200 VISA gift card**.

Follow this link to the survey:

https://odu.co1.qualtrics.com/jfe/form/SV_enzYDFk7n9PnDbU


PLEASE NOTE: **The survey will CLOSE on Friday, April 1st end of the day (11:59 pm)**.

If you have any questions about the survey, please contact Prof. Ann M. Bruhn at abruhn@odu.odu or Ms. Fatimah Alshehri at falsh001@odu.edu.

We appreciate your time,
Fatimah Alshehri and Research Team (Profs. Ann Bruhn, Denise Claiborne and Jonna Bobzien).

APPENDIX C

SURVEY TOOL



OLD DOMINION
UNIVERSITY

Consent Form

INFORMED CONSENT
OLD DOMINION UNIVERSITY

PROJECT TITLE: Dental Hygienists' Practices, Attitudes, and Confidence in Providing Care to Child Patients with Autism Spectrum Disorder (ASD)

INTRODUCTION

The purposes of this form are to give you information that may affect your decision whether to say YES or NO to participation in this research and to record the consent of those who say YES. Dental Hygienists' Practices, Attitudes, and Confidence in Providing Care to Child Patients with Autism Spectrum Disorder (ASD); Old Dominion University, Health Science Building, Room 2011.

RESEARCHERS

Ann M. Bruhn, BSDH, MS, RDH, Associate Professor, Old Dominion University School of Dental Hygiene, Principal Investigator [faculty investigator]

Denise M. Claiborne, Ph.D., RDH, Assistant Professor, Old Dominion University School of Dental Hygiene, Co-Principal Investigator [faculty investigator].

Jonna L. Bobzien, Ph.D., Associate Professor, Old Dominion University Department of Communication Disorders and Special Education, Co-Principal Investigator [faculty investigator].

Fatimah Alshehri, BSDH, Old Dominion University School of Dental Hygiene Co-Principal Investigator [student investigator].

DESCRIPTION OF RESEARCH STUDY

Several studies have been conducted looking into the subject of providing dental care to children with Autism Spectrum Disorder (ASD). No studies have focused on dental hygienists, who play an integral role in the prevention, intervention, and control of oral diseases. This information is needed to understand dental hygienists' practices, attitudes, and confidence in providing care to child patients with ASD, and where additional education may be needed to ensure the clinical oral care needs of children with ASD are met. If you decide to participate, then you will join a study involving research using an anonymous electronic survey to assess dental hygienists' practices, attitudes, and confidence in providing care to children with ASD. If you say YES, then your participation will last for 15 to 20 minutes to complete the survey. Approximately 100 dental hygienists' attendees at the virtual ODU continuing education annual conference on February 25-27, 2022 will be participating in this study.

EXCLUSIONARY CRITERIA

You should be 18 years of age or older, a clinical practicing dental hygienist, and carry an active license in the United States. To the best of your knowledge, you should not be 17 years of age or younger, uncurrent clinical practicing dental hygienist, or possess an inactive dental hygiene license in the United States, as that keeps you from participating in this study.

RISKS AND BENEFITS

RISKS: If you decide to participate in this study, then you may face a risk of a security breach or cyber threat that could threaten the confidentiality of your responses. The researcher tried to reduce these risks by keeping all data collected in the survey anonymous and confidential via electronic documents secured by password. Only the research team will have access to the password-protected data, and they will maintain confidentiality and privacy. All data will be reported in aggregate form. And, as with any research, there is some possibility that you may be subject to risks that have not yet been identified.

BENEFITS: There are no direct benefits to participants. ASD community may benefit by increasing their access to oral health care and improving their oral health outcomes.

COSTS AND PAYMENTS

The researchers want your decision about participating in this study to be absolutely voluntary. Yet they recognize that your participation may pose some costs, inconvenience, etc., such as conference registration fees. To thank you for your participation you will be able to enter a raffle drawing of a \$200 gift card to help defray incidental expenses associated with participation.

NEW INFORMATION

If the researchers find new information during this study that would reasonably change your decision about participating, then they will give it to you.

CONFIDENTIALITY

The researchers will take reasonable steps to keep private information, such as surveys confidential. The researcher will remove identifiers from all identifiable private information collected. This research study will not collect any identifiable, confidential, or sensitive data from the participants. To protect participants' confidentiality, all data collected will be anonymous and remain confidential via secured by password electronic documents. Only the research team will have access to the password-protected data and will maintain confidentiality and privacy. All data will be reported in aggregate form. Researchers with access to data have already completed human subject certification to ensure confidentiality and privacy policies are adhered to properly. The subject's information will not be used or distributed for future research studies. The results of this study may be used in reports, presentations, and publications; but the researcher will not identify you. Of course, your records may be subpoenaed by court order or inspected by government bodies with oversight authority.

WITHDRAWAL PRIVILEGE

It is OK for you to say NO. Even if you say YES now, you are free to say NO later, and walk away or withdraw from the study at any time. Your decision will not affect your relationship with Old Dominion University or otherwise cause a loss of benefits to which you might otherwise be entitled. The researchers reserve the right to withdraw your participation in this study, at any time, if they observe potential problems with your continued participation.

COMPENSATION FOR ILLNESS AND INJURY

If you say YES, then your consent in this document does not waive any of your legal rights. However, in the event of harm, injury, or illness arising from this study, neither Old Dominion University nor the researchers are able to give you any money, insurance coverage, free medical care, or any other compensation for such injury. In the event that you suffer injury as a result of participation in any research project, you may contact Prof. Ann Bruhn the responsible principal investigator at 757-683-3851, or investigators at the following phone numbers Dr. Denise Claiborne at 757-683-5949, Prof. Jonna Bobzien at 757-683-3307, Mrs. Fatimah

Alshehri at 757-685-6220, Dr. Tancy Vandecar-Burdin the current IRB chair at 757-683-3802 at Old Dominion University, or the Old Dominion University Office of Research at 757-683-3460 who will be glad to review the matter with you.

VOLUNTARY CONSENT

By signing this form, you are saying several things. You are saying that you have read this form or have had it read to you, that you are satisfied that you understand this form, the research study, and its risks and benefits. The researchers should have answered any questions you may have had about the research. If you have any questions later on, then the researchers should be able to answer them:

Ann Bruhn 757-683-3851

Denise Claiborne 757-683-5949

Jonna L. Bobzien 757-683-3307

Fatimah Alshehri 757-685-6220

If at any time you feel pressured to participate, or if you have any questions about your rights or this form, then you should call Dr. Tancy Vandecar-Burdin, the current IRB chair, at 757-683-3802, or the Old Dominion University Office of Research, at 757-683-3460.

And importantly, by signing below, you are telling the researcher YES, that you agree to participate in this study. The researcher should give you a copy of this form for your records.

- I have read the consent and agree to participate
- I have read the consent and disagree to participant

Demographic Questions

Q1. Are you currently a practicing clinical dental hygienist?

- Yes
- No

Q2. Do you have an active license to practice dental hygiene in the United States?

- Yes
 No
-

Q3. To which gender identity do you most identify?

- Male
 Female
 Other (specify)
 Prefer not to answer
-

Q4. What is your age?

- Under 18
 18 - 24
 25 - 34
 35 - 44
 45 - 54
 Over 55
-

Q5. Please specify your race/ethnicity:

- Hispanic
 White alone, non-Hispanic
 Black or African American alone, non-Hispanic
 American Indian and Alaska Native alone, non-Hispanic
 Asian alone, non-Hispanic

- Native Hawaiian and Other Pacific Islander alone, non-Hispanic
 - Some Other Race alone, non-Hispanic
 - Multiracial, non-Hispanic
 - Prefer not to answer
-

Q6. What is the highest certificate/degree that you have earned?

- Certificate in Dental Hygiene
 - Associate degree in Dental Hygiene
 - Bachelor's Degree in Dental Hygiene
 - Bachelor's Degree in another discipline
 - Master's Degree (in any discipline)
 - Doctoral Degree (in any discipline)
-

Q7. How many years of experience do you have practicing dental hygiene? (Fill in the blank)

Q8. What is current employment status?

- Full-time (≥ 40 hours per week)
 - Part-time (≤ 39 hours per week)
-

Practice Setting

Q9. What is your current primary practice setting?

- Public health or community setting

- Clinical private practice
 - DSO or group practice setting
 - Federally qualified health center
 - Local health oral community setting
 - Public/private school setting
 - Dental hygiene, dental assistance educational setting
 - Other [fill in the blank]
-

Q10. Which of the following best describes your current practice setting?

- Rural
 - Suburban
 - Urban
 - Large urban
-

Q11. Have you provided care to a child patient with Autism Spectrum Disorder (ASD) during your clinical practice?

- Yes
 - No
-

Q12. On average, what percentage of child patients with ASD have you treated within a month?

- 0%
- 1–10%
- 11–20%
- 21–30%
- 31–40%
- 41–50%
-

over 50%

Attitudes Questions

Q13. Indicate the extent to which you agree with each of the following statements.

	Strongly disagree	Disagree	Don't know	Agree	Strongly agree
I understand how to assess the unique needs of children who have ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that I understand the dental needs of children who have ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am comfortable working with children who have ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoy providing oral health care to children who have ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Working with children who have ASD is stressful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would prefer to work in a private practice setting that refers children who have ASD to a specialist	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would prefer not to					

work with children who have ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think my dental hygiene education prepared me for treating children who have ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am interested in learning more about the interventions that reduce dental anxiety in children who have ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like to take additional continuing education courses on treating children who have ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Practices being used by dental hygienists

Q14. How often do you use the following techniques with your child patients with ASD?

Practices for overcoming communication challenges

	Never	Sometimes	Often
Visual aids	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Behavior shaping with rewards (i.e., giving a 15-second break for every 60 seconds of compliance)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Positive reinforcement with words	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tell-show-do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tell-show-feel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How often do you use the following techniques with your child patients with ASD?

Practices for overcoming social relations problems

	Never	Sometimes	Often
Letting them observe other children	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Letting them observe their parents' dental treatment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How often do you use the following techniques with your child patients with ASD?

Practices for overcoming aversion to change and new situations

	Never	Sometimes	Often
Familiarization visits before the first appointment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Special scheduling arrangements (i.e. before or after regular working hours or longer appointments)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Special office set-up (i.e. using room farthest from treatment rooms, using isolated room versus open-bay operatories)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using technology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How often do you use the following techniques with your child patients with ASD?

Behavior management strategies

	Never	Sometimes	Often
Hand-over-mouth technique	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Papoose board/physical restraints	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having dental assistant(s) restrain child	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having parent restrain child	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nitrous oxide inhalation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Refer to specialists	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Confidence Questions

Q15. How confident do you feel about providing care to child patients with ASD?

- Very Confident
 Confident
 Don't Know
 Little Confidence

Q16. Please rate each of the below-listed skills by your perceived level of confidence when providing care to a child patient with ASD

	Unconfident	Little Confidence	Don't Know	Confident	Very Confident
Oral Examination	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Oral Hygiene Instructions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Taking Photographs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technique and radiation safety when exposing dental radiographs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scaling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Polishing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fluoride Treatment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q17. Rate your perception of how the following factors impact/affect your confidence when providing care to children with ASD?

	No Impact	Low Impact	Medium Impact	High Impact
Level of ASD severity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Level of dental disease	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Child behavior	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Level of staff training in your practice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Current level of training/education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Level of experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q18. Please provide any additional thoughts concerning the treatment of child patients with ASD.

Powered by Qualtrics

VITA

NAME: Fatimah A. Alshehri, RDH, BSDH
ADDRESS: 4253 Llewellyn Avenue
 Norfolk, VA 23504

EDUCATION:

In Progress	Old Dominion University Norfolk, VA
2014	Master of Science, Dental Hygiene King Saud University Riyadh, Saudi Arabia
	Bachelor of Science, Dental Hygiene

PROFESSIONAL EXPERIENCE:

Present	Dental Hygiene Instructor, Department of Dental Hygiene, King Saud University, Riyadh, Saudi Arabia
2015–2019	Registered Dental Hygienist Saudi Health Ministry, Riyadh, Saudi Arabia

COMMUNITY ENGAGEMENT:

2018–2019	Registered Dental Hygienist Volunteer, Dental Health Camps, Riyadh, Saudi Arabia
2017–2019	Registered Dental Hygienist Volunteer, Mobile Health Care Units, Riyadh, Saudi Arabia

HONORS, RECOGNITION, AWARDS, AND PRIZES:

2017	Mobile Dental Clinics, Health Ministry, Riyadh, Saudi Arabia
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MEMBERSHIP IN PROFESSIONAL SOCIETIES:

2020–Present	American Dental Hygienists' Association
2019–Present	Saudi Dental Hygiene Society
2015–Present	Saudi Dental Society