

A new way to approach ASD children in Dentistry



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Abstract

Aim To present an innovative dental approach for children with autism spectrum disorder to the scientific community, along with the 3 questionnaires formulated to evaluate its effectiveness.

Study design To evaluate if approaching oral problems starting from the resolution of malocclusion is an effective method of gaining the cooperation of children with autism spectrum disorder, the Dental Department of Gaslini Hospital devised 3 questionnaires to be filled in by the family or the caregiver of the child with autism spectrum disorder at different times during the orthodontic treatment.

Methods Development of the 3 questionnaires occurred in five stages: observation of the behaviours of ADS children and their caregivers attending the Dental Department in the year 2021; issues detection: anxiety in parents, crying, difficulty in waiting and hyperactivity of the children, fear of both parents and children; formulation of the questionnaires in order to obtain all the information necessary to assess the patient's psychological well-being; validation with submission of the questionnaires to two specialists; modification and final drafting.

Results The 3 questionnaires aim to investigate if the orthodontic treatment, undertaken as the first dental act, may facilitate the relationship between children with ASD and the dentist, leading to possible improvements in their approach to oral hygiene. To date this study cannot provide results because the questionnaires have not been administrated, however, is possible to anticipate some of the usefulness that these new tools will provide and the benefits of undertaking orthodontic treatment, characterised by painless repetitive appointments that involve easy manoeuvres and allow for gradual familiarisation between operator and child.

Conclusions Using the 3 questionnaires, the dentist will be able to assess the wellbeing of the patient and his/her family when attending the dental environment, monitor oral hygiene manoeuvres and verify the usefulness of the orthodontic approach to ADS child while creating a trusting relationship with the patient and his/her caregivers.

KEYWORDS Autism spectrum disorder, Dentistry, Paediatric Dentistry, Malocclusion, Orthodontic.

Introduction

Paediatric dentistry deals with treatment during the developmental age, from early childhood to adolescence and includes the treatment of patients with special needs.

This branch handles various aspects of dentistry, such as prevention, restorative, endodontics, periodontology, surgery and maxillary oral pathology; additionally, it requires precautions and techniques for the treatment of young patients, who are often uncooperative; one of the fundamental aspects to consider in this speciality, as well as in all paediatric disciplines, is the lack of collaboration due to age, fear, states of anxiety, and special needs, such as patients with mental disabilities. [American Academy of Pediatric Dentistry, 2011]

According to the Italian National Guidelines of 2019, "Patients with special needs are the ones who in preventive, diagnostic and therapeutic operations require different methods and timing than routine work." "In cases of "non-cooperation", the presence of a suitably equipped operating environment and adequately trained medical staff is necessary.

"The same individual, a person with disabilities, may have lasting physical, mental, intellectual or sensory impairments that, in interaction with barriers of different nature, can hinder their full and effective participation in society on the basis of equality with others". [Ministero della Salute, 2011]

One of the most difficult groups of patients to treat in the dental environment are children with autism spectrum disorders (ASDs). ASDs are neurodevelopmental disorders that include autistic disorder, Asperger syndrome and pervasive developmental disorder—not otherwise specified, as defined by the Diagnostic and Statistical Manual-TR 4th Ed7 (DSM-IV-TR) [Charles JM, 2010]. Autism is characterised by deficits in initiating social interactions, maintaining social communication, and a range of restricted repetitive behaviours, interests, and activities [American Psychiatric Association, 2013; Bagattoni S. et al, 2021], in addition to repetitive mannerisms (e.g., hand flapping, rocking), stereotype behaviour, unusually strong interests, or perseveration. Sensory hypo- or hyper-reactivity to sensory stimuli has recently been added to this

symptoms. [Lord C et al, 2018; Como DH, 2021; Masi A, 2017]. Autism affects many parts of the brain; we do not understand how this occurs. This is a highly variable brain development disorder that first appears during infancy or childhood, and generally follows a steady course without remission. Overt symptoms gradually begin after the age of six months and settle towards the age of two or three. Symptoms continue throughout adulthood, often in a milder form [Mohamed Abdullah J, 2011]. The prevalence, according to ASDEU (Autism Spectrum Disorder in the European Union) results, indicate that 1 in every 100 children is affected by ADS in Italy [International Society for Autism Research, 2018].

As stated in 2018 by the Italian National Institute of Statistics (ISTAT), the incidence rate of ASDEU/ASD has increased from 10% to 17% per year. There is no shared explanation for this continuous increase; however, one factor that is often mentioned concerns the improvement of the diagnostic process, which allows for a correct diagnosis of children that would not have been correctly diagnosed in the past [Ferrazzano GF et al, 2020]. Patients with ASD do not exhibit oral anomalies related to the spectrum [Paglia L., 2020]. Due to their condition, they have a high risk for oral diseases like caries, periodontal disease, dental trauma, parafunctions, and malocclusions [Meuffels SA et al, 2022]. Oral health care is a major public health concern and has been identified as a Leading Health Indicator, which are topic areas determined to be of high priority for action. Given the high prevalence of ASD, it is likely that an increasing number of dental practitioners will encounter children with this syndrome in their practice or will be asked to treat children with ASD. Therefore, it is important to consider how the symptomatology and severity of an ASD diagnosis may impact the health and the type of treatment delivered [Como DH, 2021]. The most frequent oral problems in children with ASD are bruxism, gum diseases, dry mouth, self-inflicted injury, tongue thrusting, non-nutritive chewing on objects and repeated regurgitation; malocclusions such as high-arched palate and anterior open bite have also been reported [Ferrazzano GF et al, 2020; Bagattoni S. et al, 2021]; they are also significantly more likely to have posterior crossbites and severe maxillary crowding. Children with ASD have a higher prevalence of incompetent lips, short philtrum and an open-mouth expression, compared to normal individuals. Certain types of malocclusions seem to be present more frequently in children with ASD, often caused by bad habits that these patients maintain for a long time, sometimes their whole life; for example, higher prevalence of malocclusion in the ASD group was associated with increased overjet and Class II molar relationship; this could be due to the parafunctional use of mouth, tongue, and jaw by this category of patients [Farmani S et al, 2020].

Studies in literature do not agree on the different occurrence of malocclusion between children with ASD and non-ASD children: several studies indicate similar malocclusion and orthodontic treatment needs in children with and without the pathology; others show that children with ASD are more likely to have malocclusion than non-ASD children, no matter what their demographic characteristics are [Farmani S et al, 2020; Fontaine-Sylvestre C, 2017]. It is essential to diagnose, intercept and treat malocclusions as early as possible, especially orthodontic emergencies in both healthy children and those with ASD.

Orthodontic emergencies are:

- Increased overjet
- Monolateral crossbite

- Anterior crossbite
- Maintenance of extractive spaces [Ministero della salute, 2017].

Increased overjet is one of the major risk factors for dental trauma. The most common dental injury is enamel fracture in maxillary central incisors. Given the high prevalence of increased overjet in ASD patients, this group of children should be considered at risk for oral trauma. Injuries are often caused by falls due to walking problems and lack of caution by these patients in risky situations, which increase vulnerability to accidents [Orellana LM, 2012]. Additionally, almost 70% of patients with ASD present with self-injurious behaviour (SIB) in the head and neck region; the most frequent are traumatic ulcerated lesions, often caused by head banging, face tapping, and gingival picking. Another important aspect to consider in children with ADS is the caries's risk. The prevalence of dental cavities in patients with ASD, showed that the caries prevalence, and the pooled prevalence is 60.6%.

Furthermore, children with ASD exhibited a higher caries prevalence in primary teeth than in permanent ones.

The salivary pH and buffering capacity are lower in children with ASD, with a related dental caries incidence higher in ASD children when compared to their healthy siblings.

Current literature shows the validity of considering ASD as an indicator of high caries risk and low oral hygiene may be the most influential risk indicator associated with new caries in children with ASD [Ferrazzano GF et al, 2020; Marshall J et al, 2010]. There is inadequate information about the prevalence of dental disease and access to dental care among children with autism [Onol S et al, 2018].

Research has identified several factors that contribute to poor oral health in children with autism, including:

- Difficulty in tolerating home and professional oral care
- Sensory processing differences
- Uncooperative behaviours
- Communication impairments
- Diet high in simple sugars (mono or disaccharides) and a high intake frequency [Como DH, 2021; Meuffels SA et al, 2022].

An important aspect to consider is that these patients often have oversensitivity in and around the mouth, leading to extreme aversive responses to touch to different textures of food or objects in this area. The ranges of food selectivity are between 46 and 89% in children with ASD [Chistol LT et al., 2018] therefore these children's diets are often limited to a few soft, sticky sweet foods. To make it worse, parents and caregivers often use sweet snacks as positive reinforcement.

Additionally, due to their condition, autistic children receive medications that can have adverse effects on gingival health, like gingival overgrowth [Meuffels SA et al., 2022]. It is essential that the child with ASD undergoes a dental examination within the first year of life, as indicated in the Italian National Guidelines [Wolfe, 2006], so that a primary prevention protocol can be established, and the child does not have the first contact with a dentist in situations of pain or infectious urgency. Uncooperative behaviours like crying, screaming, verbal protests, unwillingness to comply, may influence the success of the visit. These refusals of treatment, require dental practitioners to consider alternative methods, such as the use of restraint and general anaesthesia [American Academy of Pediatric Dentistry, 2021a; Capurro C et al., 2020].

A study that analysed data from a national survey of general dentists, reports that patient's behaviour was a high-level barrier to their willingness to treat children with special

health care needs (CSHCNs) [Casamassimo PS et al., 2004].

The American Academy of Pediatric Dentistry recommends several basic behaviour guidance techniques to help a child, including:

- Tell–Show–Do
- Voice control
- Nonverbal communication
- Positive reinforcement.

However, these traditional strategies may not be sufficient for children with ASD [American Academy of Pediatric Dentistry, 2021a].

Managing dental anxiety in the dental setting involves pharmacological and non-pharmacological interventions. Pharmacological methods are found to be more aggressive. However, non-pharmacological behavioural management techniques involve strategies that aim to cognitively modify the patients' behaviours [Murphy et al 1984].

The American Academy of Pediatric Dentistry (AAPD) [2023] defined behavioural management as: "Behavioural management a continuum of interaction involving the dentist and dentist's team, the patient and directed toward communication and education while ensuring the safety of both oral health professionals and the child, during the delivery of medically necessary care."

Most parents are unaware of the existence of non-pharmacological techniques to gain trust and collaboration of ADS children; a positive experience on a dental chair is the steppingstone for achieving the trust of the child [American Academy of Pediatric Dentistry; 2021a].

Given all the difficulties in managing the behaviour of autistic patients during dental treatment, a new method has been considered to bring the child closer to the dental environment and is presented in this pilot study: when there is a malocclusion and there are no pain or infective urgencies, undertake orthodontic treatment as the first therapeutic step, postponing conservative, endodontics and surgical therapies until the child's confidence has been gained.

Orthodontic treatment has characteristics that make it optimal for a dental approach to the ASD patient, as it is painless, provides repetitive appointments, involves easy manoeuvres and it allows for gradual familiarisation between the operator and the child.

The aim of this study is to evaluate if approaching oral problems starting from the resolution of malocclusion is a good way to gain the cooperation of ADS children. To this end the Dental Department of Gaslini Hospital devised 3 questionnaires aimed to:

- evaluate if the orthodontic treatment is helpful in starting the approach of the children with ASD.
- evaluate if during/after an orthodontic treatment the children with ADS are more cooperative during other dental therapies.
- investigate if the use of an orthodontic device improves the oral care at home of children with ADS.
- illustrate, through the questionnaires, the psychological and physical wellbeing of the ASD children and their families when presenting at the Dental Department, both at the first visit and at subsequent appointments.

Materials and Methods

The Dental Department of the Gaslini Hospital, Genoa, Italy, offers various services for patients with special needs:

dental first aid, internal consultations, orthodontics, oral and maxillofacial surgery, gnathology, oral hygiene and prevention, conservative and endodontics. To bring ASD children closer to dentistry, the dentists of G. Gaslini Hospital propose, in cases where there is an indication, to address dental problems by starting from orthodontic treatment. To evaluate the effectiveness of this new approach and the impact on the psychological well-being of the child and his or her family when visiting the dentist, they have devised 3 questionnaires.

The 3 questionnaires are to be filled in at different times during the orthodontic pathway.

This pilot study presents the 3 questionnaires:

- Questionnaire A is to be filled up at the first visit
- Questionnaire B is to be filled up at subsequent dental examination visits (detection of orthodontic records)
- Questionnaire C is to be filled up at subsequent orthodontic check-ups.

To validate the questionnaires, they were shown to two clinicians. Modifications were made to the questionnaires in light of suggestions made by the clinicians. The development of the questionnaires consisted of five stages:

Phase 1: Observation

The behaviours of ADS children and their caregivers attending the Gaslini Hospital Dental Department in the year 2021 were observed during the first visit and the subsequent check-ups, in the waiting room, in the operating area and at the time of discharge.

Phase 2: Issues detected

Anxiety in parents about not being able to manage the children during the visit, crying, difficulty in waiting and hyperactivity of the children, fear of both parents and children.

Inadequate information about maintaining correct oral hygiene and on healthy eating habits of special needs children was also found.

Phase 3: Formulation of the questionnaires

The questions of the 3 questionnaires were formulated to obtain all the information necessary to assess the patient's psychological wellbeing, the level of compliance during dental visit and the application of the instruction of oral hygiene and correct dietetic habits at home.

Phase 4: Validation

The three questionnaires were submitted to two specialists attending the Dental Department of Gaslini Hospital, to evaluate their comprehensiveness and comprehensibility.

Phase 5: Modification and final drafting

Changes were made to the questionnaires in light of suggestions made by the clinicians; the three questionnaires were written in Italian, the official language in Gaslini Hospital, to be administered to ADS families, and translated into English to be presented to the scientific community. Since this is a pilot study this publication does not require a scientific ethics committee. It does not recruit patients, an experimental centre is not opened, and patient data is not published.

Results

Every year, about 900 patients with disabilities access the Dental Department of Gaslini Hospital, 200 of whom have ASD and about 30 are autistic in a syndromic setting.

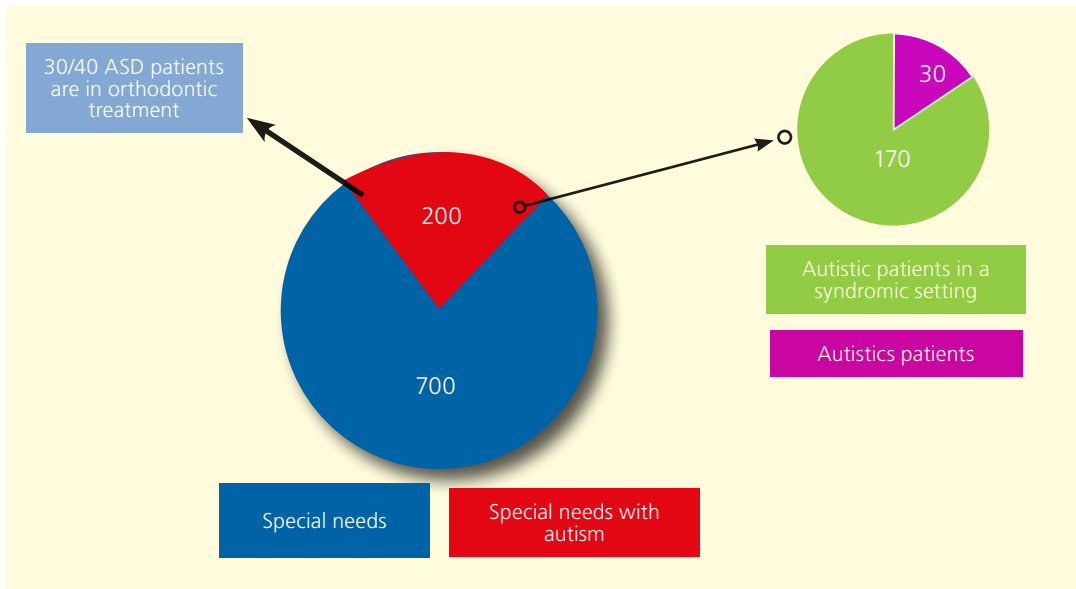


FIG. 1 Performance in patients special needs in Dental Department of G. Gaslini Hospital, 2021.

Most of ADS children present oral disease such as cavity, abscess, dental calculus and dental-skeletal malocclusion, and are eligible for treatment with general anaesthesia due to lack of cooperation.

Every year to date, 30 to 40 children with ADS undergo orthodontic treatment after resolution of infectious oral diseases (Figure 1).

The purpose of the questionnaires is to assess the psychological wellbeing, state of anxiety, discomfort and fears of both patients and their caregivers before and after the approach at the dental department, in addition to the maintenance of a better oral hygiene condition at home, the correct management of the orthodontic appliance and the improvement of collaboration in the dental environment. Collaboration is measured through the reevaluation of the Frankl behaviour scale (Figure 2), an instrument that is based on the observation of the child's behaviour in the dental environment and his willingness to collaborate.

The time of administration of the 3 questionnaires is shown in Figure 3. Questionnaire A (Figure 4) is to be filled during the first visit; it includes personal data, and it refers to the

aspects of the diagnosis of ASD and to the child's behaviour with regard to the oral cavity, for a general professional classification by the operator. It is divided into 11 sections. The first section collects the personal data of the patient: first and last name, date of birth, gender.

The second section refers to the diagnosis of ASD, and has 5 sub-sections:

1. The age of certain diagnosis of ASD or syndrome presenting autistic spectrum
2. The degree of autism: grade 1 (support is needed), grade 2 (significant support is needed), grade 3 (very significant support is needed).
3. The social behaviour of the patient when he/she is with other people: isolated (annoyed by contact with others), passive (low social initiative), active (inadequate modalities).
4. The degree of language development: fluent, restricted form, echolalia.
5. The percentage level of cognitive delay presented.
6. The third section refers to the patient's rehabilitation supports such as speech or neuro-psychomotor therapy.

FRANKL BEHAVIOR RATING SCALE		
Rating	Attitude	Definition
1	Definitely negative	Refusal of treatment, crying forcefully, fearful or any other overt evidence of extreme negativism.
2	Negative	Reluctant to accept treatment, uncooperative, some evidence of negative attitude but not pronounced, i.e./sullen, withdrawn
3	Positive	Acceptance of treatment; at times cautious, willingness to comply with the dentist, at times with reservation but patient follows the dentist's directions cooperatively.
4	Definitely positive	Good rapport with the dentist, interested in the dental procedures, laughing, and enjoying the situation

FIG. 2 Frankl Behavior rating scale.

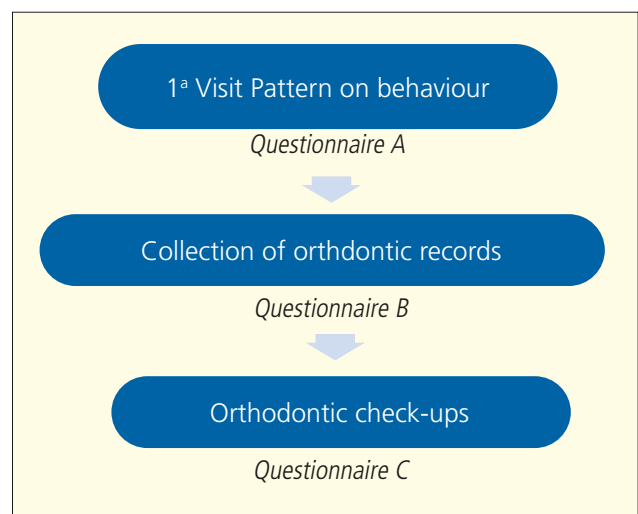


FIG. 3 Time of administration of each questionnaire.

QUESTIONNAIRE A: FIRST VISIT

1) **Personal data:** Name..... Surname.....
Date of birth Gender M F

2) **Diagnosis of ADS:**
I) Patient's age at diagnosis of ASD or syndrome presenting autistic spectrum:
II) **Grade (autonomy):**
 1 support is needed
 2 significant support is needed
 3 very significant support is needed
 III) **Social behaviour:**
 Isolated, annoyed by contact with others
 Passive, low social initiative
 Active (inadequate modalities)
 IV) **Language:**
 Fluent
 Restricted form
 Echolalia
 V) **% cognitive delay:**

3) **Rehability supports (logopedist, neuropsychomotricist):**
 Yes
 No

4) **Child's fears:**
 Flash of light
 Darkness
 Sudden noise
 Being touched
 New people
 Animals
 New experience
 Unknow smell
 Unknow flavours

5) **Prent's fears:**
 Child's anxiety attending the odontoiatric environment
 Child's behaviour during the odontoiatric visit
 Failure in carrying out odontoiatric therapy on the child
 Being unable to maintain adequate oral health of the child
 Being unable to follow dietary advice.

6) **Oral hygiene habits:**
 Autonomous
 Collaborative with parent's support
 Oppositional

7) **Bad habits:**
 No
 Finger sucking
 Lip sucking
 Object sucking
 Onycophagy

8) **Episodes of self-harm (attention to the orthodontic devices):**
 Yes
 No

9) **Behaviour of the child taking care of his belongings:**
 Responsible
 Unsettled
 Unable

10) **Previous experience in dentistry:**
 Yes
 No

11) **Behaviour in previous odontoiatric visits:**
 Autonomous
 Collaborative
 Oppositional

12) **Behaviour in other medical environments:**
 Autonomous
 Collaborative
 Oppositional

FIG. 4 Questionnaire A

QUESTIONNAIRE B: DETECTION OF ORTHODONTIC RECORDS OR CHECK-UP VISITS.

Child's attitude returning to the dentist:
 Autonomous
 Collaborative with parent's support
 Oppositional

How do parents feel taking the child back to the dentist?
 Tranquil
 Nervous
 Happy

Improvement of oral hygiene care as a result from instructions given in previous appointments:
 Yes
 No

Did going back to the dentist generate anxiety in the whole family?
 Yes, why? _____
 No

Parents' judgement on the mobile device management capabilities or tolerability of the fixed device:
 Autonomous
 Collaborative
 Oppositional

- FOR THE CHILD -

Do you enjoy going to the dentist?
 Yes
 No

Is there anything that bothers you at the dentist?
 Yes, what bothers you?
 No
 I don't know

Did you enjoy to see your teeth on the screen?
 Yes
 No

FIG. 5 Questionnaire B

QUESTIONNAIRE C: ORTHODONTIC CHECK-UPS

Child's attitude returning to the dentist:
 Autonomous
 Collaborative with parent's support
 Oppositional

Improvement of oral hygiene care as a result from instructions given in previous appointments:
 Yes
 No

How do parents feel taking their child back to the dentist?
 Tranquil
 Nervous
 Happy

Did going back to the dentist generate anxiety in the whole family?
 Yes, why? _____
 No

Has the use of an orthodontic device improved the child's oral hygiene?
 Yes
 No

Has the orthodontic device improved the child-dentist relationship?
 Yes
 No

Has the child been able to take care of its orthodontic device? (in case of removable orthodontic device)
 Yes, with continuous parental/care giver supervision
 No

Has the child taken better care of his/her teeth since wearing fixed braces?
 Yes, with continuous parental/care giver supervision
 No, the child refused oral hygiene manoeuvres because he/she was annoyed by the braces

-FOR THE CHILD-

Do you enjoy going to the dentist?
 Yes
 No

FIG. 6 Questionnaire C

The fourth section investigates the fears of the child.

The fifth section investigates the parent's fears when they bring their child for a dental check-up.

The sixth section refers to the patient's attitude towards home oral hygiene manoeuvres.

The seventh section is about the presence of bad habits such as finger, lip or objects sucking and onychophagy.

The eighth section concerns the presence of self-harm, to assess the child's suitability for orthodontic therapy.

The ninth section concerns the behaviour of the child taking care of his belongings, rating in: responsible, unsettled, unable.

The last three sections investigate the behaviour of the child in medical environments. Questionnaire B (Figure 5) is completed at the end of the visit for the detection of orthodontic records (extra-oral photographs, intra-oral photographs, maxillary and mandibular 3D scans, orthopantomography, cephalometric path). It is structured in such a way that it can also be used for following dental examinations in case the child does not need orthodontic treatment (they will not answer the last question for parents and children). It investigates the child's as well as the caregiver's attitude returning to the dentist and the degree of anxiety; additionally, it assesses whether the child, with the help of the family, has improved oral hygiene habits at home after the suggestion given at the time of the first visit.

It also aims to investigate parents' opinion about undertaking orthodontic therapy. It is divided into 8 sections. The first five sections are answered by the parents/caregivers, the last three are reserved to the child if he/she is capable of responding. The last question aims to investigate if the use of visual technology, like the dental scanner, can help the relationship between ASD children and the dentist. Questionnaire C (Figure 6) is completed during orthodontic check-ups: the first part of questionnaire C mirrors Questionnaire B; the second part is focused on whether the use of the orthodontic device may have improved the dentist/patient relationship. It is divided into 9 sections. The first eight sections are answered by the parents/caregivers, the last one is reserved to the child if he/she is capable of responding. All the questionnaires are administered to patients in the waiting room, and filled out by the parent or caregiver with the help of the child, if his/her verbal and cognitive abilities allow it. Certain language skills are required to complete the questionnaires, as specific terms are used in the wording of some questions. For this reason, dentists are available to assist parents if there are doubts about what is required. Normally, the questionnaires take two to three minutes to finish; Questionnaires B and C in particular are very short and quick to complete; if the autistic children want to participate, the time required to complete the questionnaire increases, as do to the requests for a clarification. This study aims to present, to the scientific community, an innovative dental approach to patients with ADS and 3 questionnaires formulated to evaluate its effectiveness. The 3 questionnaires seek to investigate if the orthodontic treatment, undertaken as the first dental act, may facilitate the relationship between children with ASD and the dentist, leading to possible improvements in their approach to oral hygiene. To date, this study cannot provide results because the questionnaires haven't been administered, however, it possible to anticipate some of the usefulness that these new tools will provide.

Discussion

Currently at the G. Gaslini Hospital Dental Department, the

psychological well-being of the patient and his/her family in accessing dental care is assessed through an interview with parents and the Frankl Scale. The new tools presented in this article might allow for a better patient classification.

Questionnaire A: collecting a synthetic and targeted anamnesis, it provides initial data on the child's behavioral characteristics, useful for the first step of the approach. Afterwards, it allows the dentist to suggest rehabilitation supports, if deemed necessary and not yet undertaken, or interact with other health care professionals to improve rehabilitation support (e.g. the dentist can advise/address interventions for the re-education of the oral and perioral musculature in the case of atypical swallowing). Furthermore, by investigating the fears of the child and their past experience in a medical environment, the dentist may try to mitigate certain aspects of the dental visit that could potentially intimidate the child. The section that refers to the parent's fears of bringing their child to a dental environment aides the dentist in rating the overall anxiety level of the family, and it supports the dentist during communication with the parents/caregivers.

By addressing the family fears, parents can better collaborate in calming down their child, if necessary, during dental check-ups. Data on oral hygienic habits, the presence of bad habits, the incidents of self-harm and the capacity of the child of taking care of his belongings is also collected: this information is useful to assess the child's suitability for orthodontic therapy.

Questionnaire B: the dentist can understand whether he/she conducted the first visit properly, and whether he/she was clear and incisive in providing advice for better oral health care. Furthermore, the dentist can assess how the return to the dental office has been handled, by both the patient and the family. Parents are offered the opportunity to express their opinion on the possibility of undertaking orthodontic therapy. The questions reserved for the child allow the patient to become an active part of the visit, involving him/her in their oral care and making him/her realise the importance of his/her opinion. Additionally, in Questionnaire B, the child's feedback regarding the use of the scanner for digital impression is requested; this tool should be ASD child-friendly since it is very well-accepted by all children, who use and are interested in electronic devices. It is also known from the literature that many children with ADS are visual learners, i.e. individuals who, in order to learn and understand the reality that surrounds them, prefer the visual channel rather than the auditory one. Therefore one of the methods for improving communication with ADS children is through visual strategies that broaden the communicative process, improving the effectiveness of reception, elaboration, and expression (Augmentative and alternative communication, AAC) [Ganz JB, 2015]. In this regard, the study conducted by Pagano et al. [2022] shows how the aid of new visual technologies, including virtual reality, improves the collaboration of ASD children during dental care. The dentist can use the scan image to better explain the dental problems to the child and the family, and the therapy delivered. This may improve the relationship between the child and the dentist.

Questionnaire C: in addition to continuing the investigation of both the comfort of the child and the family in going to the dentist and on the adherence to the oral hygiene instructions given during the previous meetings, the questionnaire aims to investigate the influence of the orthodontic device on the child's relationship with their mouth through questions aimed at the care of oral hygiene and the orthodontic device

itself. Therefore, it will be possible to establish whether the orthodontic treatment taken as the first dental act is a good starting point for bringing the ASD child closer to dentistry.

We are waiting for the above questionnaires to be approved by the scientific and health direction of G. Gaslini Institute, for them to be used on every patient with ASD who is presented for their first visit to the Dental Department of G. Gaslini Hospital. Once these questionnaires are validated, they can be administered to all children affected by ASD attending any dental department; updates will be necessary to report the results obtained from the data provided by the completion of the questionnaires once they have been distributed to a comprehensive number of patients.

The 3 questionnaires aim to evaluate if the approach of ASD children to the dental environment and the dentist, starting from orthodontic treatment, is helpful in gaining the patient's trust and initiating a treatment plan; another objective is to investigate if the presence of the orthodontic device improves oral hygiene at home. In fact, studies in the literature report that as few as 50% of children with ASD brush their teeth twice a day as recommended, and up to 61% of parents with children with ASD report that tooth brushing is difficult [Marshall J et al, 2010; Stein, L.I et al., 2012]. ASD patients need parents' assistance for brushing teeth at home. Mansoor D. et al. [2018] report that 25% of the parents of ASD children involved in their study state that brushing teeth at home is always difficult, the remaining parents, instead reports that occasionally or rarely children resist tooth brushing. The key word for having a better chance of success in the treatment of the special needs patients is careful planning: first, it is important to collect information by an interview with the patient's family, so that the operator can be well informed about the child's condition and be ready to receive him.

Since it is well described in the literature that the provision of visual aids increases the collaboration of non-cooperating children, like ASD patients, the use of an intraoral scanner during collection of the orthodontic records can promote acceptance of dental treatment; for this purpose, digital dental impressions are used at the Dental department of G. Gaslini Hospital. The use of a 3D scanner to obtain the models of dental arches is particularly useful when treating patients with special needs, who in most of the cases do not tolerate alginate impressions [Christopoulou I et al., 2022; Gurav KM et al., 2022]. This technology stimulates visual approach; in this way, children can see their teeth reproduced on the screen and feel more involved in the process, they can interpret what the dentist is doing to them as 'magic', and feel more sympathy towards the operator. The models are faster to obtain, and are less bulky in the mouth than with conventional impressions. Episodes of gagging or vomiting are also reduced.

This approach is investigated by the questionnaires. Short, quick and repetitive visits are the gold standard for special needs patients that are stressed by changes and long visits [Charles JM, 2010; American Academy of Pediatric Dentistry, 2021b]. The target is to make them preserve a positive memory of the experience at the dentists. This is possible during orthodontics check-ups and is investigated by the questionnaires. It is important to organise both the visit schedule and the visit protocol: orthodontic treatment makes it easier, due to its need of regular check-ups and repetitive examination procedures.

Conclusions

The success of any paediatric dental treatment is contingent on the child's cooperation level. Behaviour management plays a key role in successful management of paediatric cases.

Most of the parents are unaware of the presence of non-pharmacological techniques offered for this purpose. Therefore, dentists treating ADS paediatric patients should increase the cooperation level of the children by applying various behaviour guidance techniques.

The treatment of patients with ASD is always complicated due to poor cooperation.

Orthodontic treatments can be a good starting point for improving the dentist-patient-family relationship, as visits are usually short and include repeated procedures; this makes it easier for an ASD child to become acquainted with dental environment. Starting from orthodontic treatment could gain the child's trust and permission to carry out other dental therapy without use of general anaesthesia, only postponing those treatments, when possible. Through use of the 3 questionnaires, the dentist will be able to assess the wellbeing of the patient and his/her family when attending the dental environment, monitor oral hygiene manoeuvres and verify the usefulness of the orthodontic approach to ADS child while creating a trusting relationship with the patient and his/her caregivers. It is expected that a higher number of children with ADS will undergo orthodontic treatment in the coming years since it will become the first step of the dental approach; this will guarantee a better occlusion to a higher number of children and it could lead to better cooperation from the child during other dental therapy since the relationship with the dentist has been gained. To date, the number of children with ADS undergoing orthodontic treatment is low because their ability to collaborate is often lost when trying to carry out other dentistry therapy. Since this work is a pilot study, its weakness is the lack of data on the effectiveness of the 3 questionnaires in responding to their intended objectives because they have not yet been administered. It will be necessary to update the results obtained after the questionnaires have been approved by the Health Directorate of Gaslini hospital and submitted to a patient cohort.

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Conflicts of Interest

The authors declare no conflict of interest.

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