Dental Management of Children with Intellectual Disabilities : A Literature Review.

Abstract

Children with intellectual disabilities (ID) may experience distinct oral health needs and challenges accessing and receiving dental care. Cognitive, communication, sensory, behavioral, medical, and social factors can influence their ability to tolerate dental procedures and maintain adequate oral hygiene. Although studies frequently report greater plaque accumulation, poorer gingival health, and unmet restorative needs among children with ID, caries findings are heterogeneous and vary across populations and diagnostic subgroups. Dental care may also be affected by caregiver demands, financial limitations, transportation difficulties, inadequate provider training, and limited availability of appropriately equipped services.

This narrative review examines the oral health status of children with ID and discusses barriers to dental care, behavior guidance, pharmacological management, preventive strategies, and professional education. Particular attention is given to individualized behavior management, sensory-adapted environments, caregiver-supported prevention, anesthesia selection, and informed consent. The literature supports an individualized, prevention-centered approach that combines accessible communication, environmental modification, appropriate behavior guidance, and pharmacological techniques when clinically indicated. General anesthesia may be necessary for comprehensive treatment when other approaches are insufficient. However, the evidence base remains limited by heterogeneous study populations, inconsistent outcome measures, and a shortage of well-designed pediatric intervention trials. Future research should prioritize disability-inclusive care models, caregiver support, and standardized clinical outcomes.

Keywords

Intellectual disability; children; pediatric dentistry; oral health; behavior management; dental anxiety; sedation; general anesthesia; preventive dentistry.

1. Introduction

Intellectual disability is a neurodevelopmental condition characterized by limitations in intellectual functioning and adaptive behavior, with onset during the developmental period. These limitations may affect conceptual, social, and practical skills and can influence a child's ability to understand instructions, communicate discomfort, and participate independently in oral hygiene and dental treatment.

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As medical care and life expectancy improve, children with ID increasingly require comprehensive dental services. However, dental professionals may feel inadequately prepared to manage their clinical, behavioral, and communication needs. Dental treatment can be particularly challenging when cognitive limitations, sensory sensitivities, behavioral difficulties, and associated medical conditions occur together.

Children with ID may have coexisting conditions such as epilepsy, cardiac abnormalities, cerebral palsy, and other developmental or medical disorders. These conditions can influence treatment planning, medication selection, and anesthetic risk. Furthermore, dependence on caregivers for daily oral hygiene may contribute to plaque accumulation and gingival inflammation.[3,6,11]

The management of children with ID therefore requires more than modification of conventional pediatric dental techniques. It involves an individualized approach that considers the child's functional abilities, communication preferences, sensory responses, medical history, caregiver support, and access to appropriate dental services.

This review aims to summarize the available evidence on the oral health status of children with ID and discuss contemporary approaches to their dental management, including barriers to care, behavior guidance, pharmacological management, preventive strategies, and professional education.

2. Methods

A narrative literature review was developed using literature identified through PubMed/MEDLINE, Scopus, and the Cochrane Library. Search terms included combinations of *intellectual disability*, *developmental disability*, *children*, *dentistry*, *oral health*, *behavior management*, *dental anxiety*, *sedation*, and *general anesthesia*. Reference lists of relevant systematic reviews and clinical guidelines were also considered.

Priority was given to systematic reviews, meta-analyses, randomized controlled trials, observational studies, and professional guidelines. Literature addressing children with ID was prioritized. Studies involving broader intellectual and developmental disability (IDD) populations, autism spectrum disorder (ASD), and Down syndrome were included where relevant, while recognizing that these populations are not interchangeable.

This is a narrative synthesis rather than a systematic review. No formal risk-of-bias assessment or quantitative pooling was undertaken. Findings from mixed disability populations and general pediatric dentistry are identified where they inform clinical practice but do not provide direct evidence specific to children with ID.

3. Oral Health Status of Children with Intellectual Disabilities

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3.1 Dental caries experience

The evidence concerning dental caries among children with ID is heterogeneous. Anders and Davis reported poorer oral health and greater untreated dental disease among individuals with ID.[3] Similarly, Zhou et al. found higher plaque levels, poorer gingival health, and greater untreated caries in children and adolescents with ID compared with typically developing controls.[6]

Robertson et al. reported lower care and restorative indices among children with learning disabilities, suggesting that a substantial proportion of dental disease may remain untreated.[7] These findings highlight that differences in caries experience may reflect not only disease development but also unequal access to restorative services.

However, caries risk is not uniform across all diagnostic groups. A systematic review and meta-analysis by Silva et al. reported lower caries experience among children and adolescents with Down syndrome compared with controls.[8] Delayed tooth eruption, hypodontia, and differences in salivary characteristics have been proposed as possible contributing factors. Nevertheless, children with Down syndrome may experience greater periodontal problems and malocclusion.

These findings emphasize the importance of avoiding generalizations about caries susceptibility based solely on an ID diagnosis. Individual risk assessment should consider dietary habits, oral hygiene, salivary function, medication use, fluoride exposure, caregiver assistance, and previous caries experience.[9,10]

3.2 Periodontal and soft-tissue health

Plaque accumulation and gingival inflammation are frequently reported oral health concerns among children with ID. McGrath et al. identified poorer plaque control and gingival health in children and adolescents with ID.[11] Dependence on caregivers for effective daily brushing may contribute to these findings.

Motor limitations, reduced manual dexterity, difficulty understanding oral hygiene instructions, and behavioral resistance may further compromise plaque removal. Some children may also experience drooling, mouth breathing, oral habits, and difficulty maintaining adequate oral hygiene.

Oral mucosal trauma, cheek biting, gingival enlargement associated with certain medications, and other soft-tissue conditions may also require attention. Therefore, dental assessment should include examination of the periodontal tissues, oral mucosa, occlusion, and functional habits rather than focusing exclusively on dental caries.

4. Barriers to Dental Care

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Access to dental care for children with ID is influenced by multiple interacting factors. These barriers may originate from the child, caregiver, dental provider, clinical environment, financial circumstances, and broader healthcare system.[35–38]

4.1 Child-related and communication barriers

Dental visits may cause anxiety and distress in children who have difficulty understanding unfamiliar procedures or communicating their needs. Sensory sensitivities to bright lights, sounds, tastes, smells, and tactile stimulation may increase discomfort.

Limited receptive or expressive communication can make it difficult for children to explain pain, fear, or treatment preferences. As a result, distress may be expressed through withdrawal, crying, resistance, or other behaviors that complicate dental treatment.[36,37]

4.2 Caregiver-related barriers

Many children with ID depend on caregivers for brushing, dietary supervision, appointment scheduling, transportation, and treatment decisions. Caregivers may experience competing responsibilities, limited time, financial pressures, and difficulty establishing consistent oral hygiene routines.

Caregiver knowledge, confidence, and ability to provide daily assistance can therefore influence oral health outcomes. Studies involving children with Down syndrome have also described the challenges caregivers experience when attempting to maintain regular oral hygiene.[14,36]

4.3 Provider-related barriers

Limited training and clinical experience in special care dentistry may reduce dentists' confidence in treating children with ID. Some providers may be reluctant to accept patients who require additional time, communication adaptations, or specialized behavior guidance.

Negative attitudes, stigma, inadequate understanding of disability-related needs, and inappropriate expectations regarding cooperation can further restrict access. In some circumstances, patients may be referred unnecessarily or offered only limited treatment options.[35–38]

4.4 Environmental and healthcare-system barriers

Children with ID may have difficulty accessing dental clinics that provide suitable physical environments, accessible equipment, adequate appointment time, and trained staff. Transportation difficulties and long travel distances can further complicate attendance.

Limited availability of special care dental services, fragmented referral pathways, and insufficient coordination between dental and medical professionals may delay treatment.

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Financial constraints and treatment costs can also prevent families from obtaining timely care.[37,38]

Recent literature has emphasized that these barriers are interconnected rather than independent. Addressing only the child's behavior without considering caregiver resources, provider attitudes, and service accessibility is unlikely to resolve the broader problem.[35–38]

Table 1. Barriers to dental care among children with intellectual disabilities

Barrier category	Examples	Supporting literature
Child-related	Dental anxiety, behavioral challenges, sensory sensitivities	Star et al. (2024); Bernath and Kanji (2021)[35,36]
Communication-related	Limited communication skills; difficulty expressing pain or treatment needs	Bernath and Kanji (2021); Al-Mashhadani et al. (2024)[36,37]
Caregiver-related	Dependence on caregivers; difficulty maintaining daily oral hygiene	Bernath and Kanji (2021)[36]
Provider-related	Negative attitudes, inadequate knowledge, limited confidence, reluctance to treat	Star et al. (2024); Bernath and Kanji (2021); Al-Mashhadani et al. (2024); Alwadi et al. (2024)[35–38]
Environmental and access-related	Transportation, distance, unsuitable clinic environments, difficulty finding accepting providers	Star et al. (2024); Bernath and Kanji (2021); Alwadi et al. (2024)[35,36,38]
Financial	Treatment costs and financial constraints	Alwadi et al. (2024)[38]
Healthcare-system	Inadequate professional training and limited availability of appropriate services	Al-Mashhadani et al. (2024); Alwadi et al. (2024)[37,38]

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5. Behavior Management

The primary goal of behavior management in children with ID is to establish effective communication, reduce anxiety, develop trust, and facilitate cooperation during dental examinations and treatment. Behavior guidance should be individualized according to the child's developmental level, functional abilities, previous dental experiences, sensory preferences, and medical needs.[20,21]

5.1 Establishment of a dental home

Establishing a dental home early in childhood provides an opportunity to develop a positive relationship between the child, caregiver, and dental team. The American Academy of Pediatric Dentistry (AAPD) recommends establishing a dental home by the child's first birthday.[21]

Early visits allow the dental team to assess oral health, discuss dietary practices, provide oral hygiene instruction, and monitor developmental and medical concerns. Familiarity with the dental environment may also help reduce anxiety during future appointments.

The dental home should be individualized to the child's abilities and family circumstances. Consistent communication between the dental team and caregivers supports continuity of care and helps establish realistic treatment and prevention goals.

5.2 Assessment and individualization

A comprehensive assessment should be completed before initiating dental treatment. Information should be obtained from caregivers regarding the child's medical history, medications, seizures, feeding patterns, drooling, mouth breathing, oral habits, communication abilities, and previous dental experiences.

The dental team should also assess the child's sensory responses, tolerance of oral examination, ability to follow instructions, and level of cooperation. Caregiver questionnaires and structured behavior assessment tools can help identify appropriate management strategies.

General pediatric behavior rating scales, including the Frankl and Venham scales, may provide useful information. However, these instruments were not developed specifically for children with ID. Varela et al. developed a pilot model to predict dental behavior among individuals with intellectual disabilities, highlighting the need for further development and validation of pediatric-specific assessment tools.[39]

5.3 Communication- and learning-based guidance

Traditional behavior guidance techniques can be effective when adapted to the child's developmental level and communication abilities. Common approaches include:

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- **Tell-Show-Do:** Explain the procedure using simple language, demonstrate it, and then perform it.
- **Modeling:** Allow the child to observe a caregiver, sibling, or another cooperative patient undergoing a dental procedure.
- **Positive reinforcement:** Use praise, encouragement, or an agreed reward to reinforce cooperative behavior.
- **Visual aids:** Use pictures, social stories, and visual schedules to explain the sequence of dental procedures.
- **Video modeling:** Demonstrate dental procedures through short videos before the appointment.
- **Short and predictable appointments:** Begin with simple procedures and gradually increase treatment complexity.

These approaches should be adjusted according to the child's understanding, attention span, and ability to communicate. Building a trusting relationship with both the child and caregiver is central to successful behavior guidance.[20,22]

5.4 Graduated exposure and desensitization

Desensitization involves gradually introducing the child to the dental environment and procedures, allowing familiarity and tolerance to develop over multiple visits.

Initial appointments may involve entering the clinic, sitting in the dental chair, exploring dental instruments, or tolerating a brief oral examination. More complex procedures can be introduced gradually as the child's cooperation improves.

Nelson et al. evaluated 168 children with ASD who participated in a university-based dental desensitization program. Approximately 77.4% eventually cooperated with a dental examination, and 87.5% of those who achieved cooperation required approximately five visits.[40]

Although these findings are encouraging, the study involved children with ASD and should not be interpreted as an equivalent success rate for all children with ID. Further research is needed to determine whether desensitization can reliably facilitate more complex procedures, including restorations, pulpotomies, and extractions.

5.5 Sensory-adapted dental environments

Conventional dental environments may expose children to sensory stimuli that increase anxiety and behavioral distress. Modifying these stimuli can improve comfort and facilitate treatment.

Potential adaptations include:

- Reducing bright overhead lighting.
- Using calming music or noise-reduction devices.
- Minimizing unnecessary background noise.

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- Providing sunglasses or visual distractions.
- Using familiar objects or comfort items.
- Allowing additional time for the child to become familiar with the environment.
- Modifying tactile stimulation according to individual tolerance.

Shapiro et al. reported reduced anxiety following sensory adaptation in children with developmental disabilities.[22] Cermak et al. subsequently evaluated sensory-adapted dental environments in children with autism.[23] A randomized crossover trial by Stein Duker et al. also reported improvements in physiological and behavioral distress during dental visits in autistic children.[24]

Systematic reviews and meta-analyses have further suggested that sensory-adapted environments may reduce anxiety-related outcomes in children with ASD and individuals with IDD.[25,26] However, evidence from autism and mixed IDD populations should not automatically be generalized to every child with ID.

5.6 Distraction and digital interventions

Distraction can be used as an adjunct to other behavior guidance approaches. Audiovisual distraction, electronic screens, music, and interactive digital content may help redirect attention during dental procedures.

Bagattoni et al. reported reduced distress with audiovisual distraction during restorative treatment in children with Down syndrome.[27] Isong et al. also evaluated electronic screen media as an intervention for dental fear in children with ASD.[28]

These approaches are relatively accessible and can be incorporated into routine dental visits when appropriate. Their effectiveness depends on the child's preferences, sensory profile, and ability to engage with the chosen distraction.

5.7 Protective stabilization

Protective stabilization is an advanced behavior guidance technique intended to limit movement when necessary to protect the patient and facilitate safe dental treatment. It may involve devices or techniques designed to support the child's position and reduce uncontrolled movement.

Although protective stabilization may permit completion of necessary procedures in selected circumstances, its use requires careful consideration. Some caregivers report relief that essential treatment can be completed, whereas others describe the experience as distressing or traumatic.

The decision should be individualized and guided by professional recommendations, the child's needs, the urgency of treatment, and available alternatives. Informed consent from the parent or legal guardian is essential, and the child's comfort, dignity, and safety must remain central considerations.[12]

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5.8 Escalation to pharmacological management

Behavior guidance may be more successful for dental examinations and preventive procedures than for extensive restorative treatment, extractions, biopsies, or gingival surgery.

Some children may be unable to tolerate necessary procedures despite appropriate communication, environmental modification, and desensitization. In these situations, pharmacological management or referral to a suitably equipped specialist service may be appropriate.

The choice should be based on the child's clinical needs, medical history, treatment complexity, available resources, and anticipated risks rather than the ID diagnosis alone.[20,21]

6. Pharmacological Management

Pharmacological management may be necessary when non-pharmacological approaches are insufficient to provide safe and effective dental treatment. The selection of an appropriate technique should consider the child's cooperation, medical history, airway characteristics, treatment requirements, and the availability of appropriately trained personnel and facilities.

6.1 Nitrous oxide/oxygen inhalation sedation

Nitrous oxide/oxygen inhalation sedation is commonly used as a pharmacological adjunct in pediatric dentistry. It provides anxiolysis and mild analgesia and may help children tolerate dental procedures while remaining responsive.

Faulks et al. evaluated sedation with 50% nitrous oxide/oxygen for outpatient dental treatment in individuals with intellectual disabilities and reported favorable treatment outcomes.[31] AAPD guidance recognizes nitrous oxide as an option when behavioral techniques alone are insufficient.[30]

However, successful administration depends on the child's ability to tolerate the nasal hood and breathe through the nose. Some children may be unable to accept the equipment or follow the instructions required for effective administration. Medical history and contraindications must be reviewed, and appropriate monitoring and emergency preparedness are necessary.

Nitrous oxide should not be described as universally suitable or risk-free for children with ID. Its use should be based on individual assessment and the clinician's training and experience.

6.2 Oral and intranasal sedation

Oral and intranasal sedative agents may be considered when treatment cannot be completed using non-pharmacological techniques or nitrous oxide alone.

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Midazolam is commonly used in pediatric sedation because of its anxiolytic and amnestic effects. However, paradoxical reactions, respiratory depression, and variable individual responses must be considered.

Salerno et al. conducted a systematic review and meta-analysis of conscious sedation for dental treatment in individuals with intellectual disabilities. The review suggested that conscious sedation can facilitate treatment in patients who may otherwise be unable to receive dental care. Nevertheless, the authors identified limitations in the available evidence, including heterogeneous protocols and low-quality studies.[32]

Sedation planning must consider comorbidities, airway anatomy, medication interactions, and the anticipated depth of sedation. Appropriate monitoring, recovery arrangements, and emergency preparedness are essential. The American Academy of Pediatrics and AAPD guidelines provide recommendations for monitoring pediatric patients before, during, and after sedation.[33]

6.3 General anesthesia

General anesthesia (GA) may be required for children with ID who cannot tolerate necessary dental treatment using behavioral guidance or sedation. It can facilitate comprehensive treatment in a controlled setting and may reduce the need for repeated unsuccessful appointments.

GA is particularly relevant when extensive restorative treatment, multiple extractions, or other complex procedures are required. It can allow treatment to be completed during a single anesthetic episode, although it carries greater resource requirements and medical risks than routine behavior guidance or minimal sedation.

The decision to use GA should involve an individualized assessment of the child's medical status, treatment needs, previous behavior guidance attempts, and anesthetic risk. It should not be regarded as an automatic consequence of an ID diagnosis or as a substitute for appropriate preventive care and behavior guidance.

6.4 Anesthesia selection and clinical safety when caregivers also have intellectual disabilities

An additional consideration arises when a child with ID is cared for by a parent or caregiver who also has an intellectual disability. This situation may introduce challenges that extend beyond the child's immediate anesthetic risk.

Han et al. described dental treatment under general anesthesia in a child with intellectual disabilities whose parents also had intellectual disabilities. The report highlighted practical concerns associated with outpatient anesthesia, particularly the caregiver's ability to understand preoperative fasting instructions, follow discharge recommendations, recognize postoperative complications, and respond appropriately if an emergency occurs.[34]

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Outpatient facilities may have different monitoring and support resources from hospital-based services. In selected cases, inpatient management or overnight observation may therefore be more appropriate, particularly when reliable postoperative monitoring at home cannot be assured.

Anesthesia planning should consider both the child's clinical needs and the practical arrangements for postoperative care. Relevant considerations include:

- The child's medical history and anesthetic risk.
- The complexity and anticipated duration of dental treatment.
- The caregiver's understanding of fasting and medication instructions.
- The availability of a responsible adult to provide postoperative supervision.
- The caregiver's ability to recognize warning signs and seek emergency assistance.
- The availability of hospital-based monitoring or overnight observation when indicated.

The purpose of this assessment is not to assume that a caregiver with ID cannot provide appropriate support. Rather, it is to identify what assistance, communication adaptations, and postoperative arrangements are needed to ensure safe care.

6.5 Informed consent and parental decision-making capacity

Informed consent is an important ethical and legal consideration when providing dental treatment to children with ID. Because children generally cannot provide independent legal consent for major treatment decisions, consent is ordinarily obtained from a parent or legally authorized guardian, according to applicable law.

However, when a parent also has an intellectual disability, clinicians must ensure that consent is informed, voluntary, and appropriately supported.

A diagnosis of intellectual disability does not automatically establish that a parent lacks the legal capacity to provide informed consent. Capacity must be assessed individually and in relation to the particular decision. A person may be able to make some decisions independently while requiring additional support for more complex decisions.

Appropriate measures may include:

- Explaining the proposed treatment in plain, accessible language.
- Using pictures, diagrams, or other communication aids.
- Allowing sufficient time for questions and discussion.
- Explaining the benefits, risks, alternatives, and consequences of declining treatment.
- Asking the parent to describe their understanding in their own words.
- Providing supported decision-making where needed.
- Following jurisdiction-specific legal procedures if the parent is unable to provide valid consent for the particular decision.

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A legal representative or alternative authorized decision-maker should be involved only when required under applicable law and after appropriate assessment. Intellectual disability severity labels alone should not be used to determine legal incapacity.

The child's participation should also be encouraged according to their developmental level and communication abilities. Respect for the child's preferences, assent where possible, dignity, and best interests should remain central to treatment planning.

7. Preventive Strategies

Prevention is central to dental management in children with ID because restorative treatment may be difficult to deliver and maintain. An effective preventive plan should combine daily plaque control, appropriate fluoride exposure, protection of susceptible tooth surfaces, dietary counseling, caregiver support, and regular professional review.

Importantly, the evidence supporting individual preventive interventions varies. Some recommendations are based on studies involving children with ID, while others are derived from mixed IDD populations or general pediatric dentistry. These evidence sources should be distinguished when interpreting clinical recommendations.

7.1 Individualized caries-risk assessment

Caries-risk assessment should consider previous caries experience, active lesions, plaque accumulation, fluoride exposure, dietary habits, salivary function, medication use, and protective factors.

An ID diagnosis alone should not determine the child's caries-risk category. Children with the same diagnosis may differ substantially in their dietary exposure, oral hygiene ability, caregiver assistance, and disease experience.

Functional assessment is equally important. Clinicians should determine which brushing tasks the child can perform independently and where caregiver assistance is required. Motor limitations, sensory sensitivities, swallowing difficulties, and medication-related xerostomia or gingival enlargement may require additional adaptations.

Risk assessment should be reviewed periodically as the child's medical status, functional abilities, oral health, and caregiver support change.[9,10,46]

7.2 Oral hygiene and mechanical plaque control

Twice-daily brushing with fluoride toothpaste is a fundamental component of prevention. The degree of assistance should be based on the child's demonstrated ability to clean effectively rather than chronological age alone.

Adaptations may include:

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- Small toothbrush heads.
- Modified or enlarged handles.
- Adapted grips for children with limited dexterity.
- Caregiver-assisted brushing.
- Powered toothbrushes when tolerated and effective.
- Visual schedules and structured brushing routines.

Waldron et al. reviewed 34 studies involving 1,795 people with ID and 354 caregivers. The evidence was predominantly low or very low certainty. Moderate-certainty evidence suggested similar medium-term gingival outcomes with powered and manual toothbrushes. The review did not establish improvements in caries or quality of life.[41]

Lai et al. reported moderate-certainty evidence for short-term plaque reduction with selected modified toothbrushes among children and adolescents with IDD. However, the review did not demonstrate compelling superiority of powered toothbrushes.[42]

These findings support individualized toothbrush selection based on grip, tolerance, usability, and observed cleaning performance rather than assuming that one type of toothbrush is universally superior.

7.3 Fluoride-based prevention

7.3.1 Fluoride toothpaste

Fluoride toothpaste supports remineralization and reduces the risk of dental caries. Routine toothpaste concentrations and amounts should be selected according to age, caries risk, ability to expectorate, and total fluoride exposure.[43]

Caregivers should dispense an appropriate amount and supervise brushing when the child cannot reliably spit. For children with swallowing difficulties or impaired expectoration, product selection and toothpaste quantity require individualized assessment.

The evidence supporting fluoride toothpaste is strong in general pediatric populations, although the specific magnitude of benefit in children with ID has not been separately quantified.

7.3.2 Professional topical fluoride

Professional fluoride varnish may provide additional protection for children at increased caries risk. A Cochrane review of fluoride varnish trials reported prevented fractions of approximately 43% for permanent tooth surfaces and 37% for primary tooth surfaces. These findings represent relative reductions in mean caries-surface increments and are based on general pediatric evidence, not exclusively on children with ID.[44]

Professional fluoride application should be individualized according to caries risk, swallowing ability, clinical tolerance, and feasibility.

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Zhou et al. reviewed preventive interventions among children and adolescents with ID. The favorable fluoride findings in that review involved fluoride tablets or fluoride-containing dietary interventions rather than contemporary trials establishing the effectiveness of fluoride varnish specifically in this population.[6]

7.3.3 Fluoride exposure and supplementation

Before prescribing fluoride supplements, clinicians should review total exposure from drinking water, toothpaste, and other sources. Excessive fluoride ingestion during tooth development may increase the risk of dental fluorosis.

Recommendations concerning ingestible fluoride products have also been subject to recent differences between US regulatory and professional guidance. The FDA's 2025 recommendation and the AAPD's subsequent response should be considered when discussing supplementation. Current product labeling and jurisdiction-specific recommendations should be checked rather than relying on historical dosing schedules.

7.4 Pit-and-fissure sealants and minimally invasive caries management

Pit-and-fissure sealants are recommended for susceptible occlusal surfaces of primary and permanent molars and may also be used to inhibit the progression of selected noncavitated occlusal lesions.

The joint ADA/AAPD guideline supports sealant use in children and adolescents, although most supporting evidence comes from general pediatric populations rather than trials specifically involving children with ID.[48]

Material selection should consider tooth eruption, moisture control, the child's tolerance of the procedure, and the likelihood of follow-up. Resin sealants require adequate isolation, while glass ionomer materials may be considered when moisture control is difficult. Sealant retention should be reviewed periodically and deficient coverage repaired when necessary.

Silver diamine fluoride (SDF) should be distinguished from primary preventive interventions because it is primarily used to arrest existing carious lesions. The 2017 AAPD guideline conditionally recommends 38% SDF for arresting selected cavitated lesions in primary teeth, based on low-quality evidence.[49]

Before treatment, caregivers should be informed about permanent dark staining of treated carious tissue and the possibility of repeat application. Lesions should be assessed for pulpal involvement, and follow-up should evaluate lesion activity and symptoms. SDF should not replace further treatment when disease progresses or pulpal involvement is suspected.

7.5 Dietary counseling and nutritional considerations

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Dietary counseling should address both the amount and frequency of free-sugar exposure. Frequent consumption of sweetened drinks, snacks, and prolonged sipping can increase caries risk.[50]

Counseling should be practical and adapted to the child's feeding abilities and medical needs. Some children require frequent feeding, texture-modified diets, or high-calorie nutritional supplements. In such circumstances, preventive recommendations should not compromise adequate nutrition, hydration, or prescribed feeding plans.

Caregivers may be encouraged to maintain a brief food and drink record to identify modifiable patterns. Where appropriate, sugar-free alternatives to sweetened medications may be discussed with the prescribing clinician or pharmacist. Essential medications should not be changed independently.

7.6 Caregiver-assisted preventive strategies

Caregiver involvement is essential when children cannot perform adequate oral hygiene independently. Prevention programs should focus on practical skills rather than knowledge alone.

A useful approach involves demonstrating brushing techniques, observing caregiver practice, identifying missed surfaces, and agreeing on a realistic daily routine. Written instructions can specify the toothpaste amount, toothbrush type, level of assistance, and follow-up goals.

Fenning et al. conducted a randomized controlled trial involving 119 underserved children with autism aged 3–13 years, of whom 62% also had ID. Parent training was associated with increased reported twice-daily brushing and improved dentist-rated plaque at three months. However, the study did not establish a separate treatment effect for children with ID.[51]

This distinction is important: evidence from children with autism who also have ID may inform caregiver-supported approaches, but autism and ID should not be treated as equivalent diagnostic populations.

7.7 Professional preventive care and recall intervals

Regular dental visits provide opportunities to reassess caries risk, evaluate gingival health, monitor sealants, review SDF-treated lesions, and reinforce home-care practices.

AAPD periodicity guidance generally supports regular examinations, with shorter recall intervals for children at increased caries or periodontal risk. For children with ID, recall frequency should be based on active disease, plaque control, gingival health, caregiver support, and the need for professional preventive interventions.[52]

A universal three-month recall interval solely because of an ID diagnosis is not supported. The interval should be individualized and modified according to clinical findings.

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7.8 Integrated preventive care

An integrated preventive plan combines complementary interventions:

- Mechanical plaque removal through daily brushing.
- Fluoride exposure to support remineralization.
- Sealants to protect susceptible pits and fissures.
- Dietary counseling to reduce frequent sugar exposure.
- Caregiver assistance to support consistent home care.
- Professional review to monitor disease and revise the preventive plan.

The effectiveness of a complete preventive package should not be assumed to equal the sum of the effects of its individual components. Existing studies often evaluate short-term plaque or gingival outcomes, and long-term evidence remains limited.

Table 2. Preventive interventions and supporting evidence

Intervention	Primary purpose	Evidence and clinical application
Fluoride toothpaste	Prevent new caries	Strong general pediatric evidence; ID-specific effect is not separately quantified. Use measured amounts and supervise brushing.
Fluoride varnish	Additional caries protection	Moderate-quality general pediatric evidence; apply according to individual caries risk and clinical feasibility.
Adapted toothbrushes	Improve plaque removal	Selected adaptations may improve short-term plaque control in IDD populations; powered-device superiority is unestablished.
Caregiver-assisted brushing	Support effective daily oral hygiene	Caregiver training may improve brushing practices, but long-term clinical effects in children with ID remain uncertain.
Pit-and-fissure sealants	Protect susceptible occlusal surfaces	Supported by general pediatric guidelines; consider isolation, eruption, and follow-up.

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38% SDF	Arrest selected existing carious lesions	Conditional recommendation based on low-quality evidence; obtain consent for staining and arrange reassessment.
Dietary counseling	Reduce cariogenic exposure	Adapt recommendations to feeding abilities, medical requirements, and nutritional needs.
Preventive dental visits	Monitor and modify care	Individualize recall intervals according to disease activity and oral hygiene needs.

Abbreviations: ID, intellectual disability; IDD, intellectual and developmental disabilities; SDF, silver diamine fluoride.

8. Professional Education

The confidence gap among general dental practitioners is an important barrier to providing appropriate care for children with ID. Limited exposure to special care dentistry during undergraduate education may contribute to uncertainty regarding communication, behavior guidance, treatment planning, and pharmacological management.[15,16,37,38]

Professional education should incorporate disability-competent communication, sensory-aware clinical practice, caregiver collaboration, and individualized behavior guidance. Dental students and practicing clinicians should receive opportunities to gain practical experience treating patients with diverse cognitive, behavioral, and medical needs.

Training should also include recognition of when referral is appropriate. Clinicians should understand the limitations of their own facilities and competencies and be able to coordinate care with pediatric dentists, special care dentists, anesthesiologists, and other healthcare professionals.

Incorporating disability-related clinical experiences into dental and dental hygiene curricula may improve professional confidence and willingness to provide care.

9. Research Gaps and Future Directions

Although research concerning the dental management of children with ID has expanded, important evidence gaps remain.

First, many studies use small samples, observational designs, or heterogeneous diagnostic populations. Studies involving autism, Down syndrome, and broader IDD populations are

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sometimes used to inform recommendations for children with ID, even though the clinical characteristics and treatment needs of these groups may differ.[6–8,25–27]

Second, behavior management studies frequently use different outcome measures, making comparisons and quantitative synthesis difficult. Further research should develop and validate behavior assessment tools specifically for children with ID, incorporating communication ability, functional independence, sensory responses, and previous dental experiences.[39]

Third, additional randomized controlled trials are needed to evaluate the long-term effectiveness of preventive interventions, caregiver training, adapted toothbrushes, sensory-modified environments, and graduated exposure programs. Research should distinguish improvements in caregiver knowledge and reported brushing frequency from measurable changes in plaque, gingival health, and caries incidence.[41,42,51]

Fourth, more evidence is needed to compare pharmacological approaches and determine which children are most likely to benefit from nitrous oxide, oral sedation, or general anesthesia. Studies should include clinical outcomes, adverse events, caregiver experiences, resource utilization, and cost-effectiveness.[30–34]

Fifth, the interaction between caregiver capacity and the child's clinical needs deserves greater attention. The case reported by Han et al. illustrates the importance of evaluating postoperative care arrangements when both the child and caregiver have intellectual disabilities.[34] Future studies should explore accessible consent processes, supported decision-making, discharge education, and appropriate postoperative monitoring.

Finally, children with ID and their caregivers should be meaningfully included in research design and service development. Their experiences can help identify practical barriers and inform more accessible, acceptable, and sustainable models of dental care.

A stepped-care approach may provide a useful framework for organizing treatment:

1. Establish a dental home and individualized preventive plan.
2. Introduce communication-based behavior guidance.
3. Adapt the dental environment and use graduated exposure.
4. Consider nitrous oxide or other appropriate sedation when indicated.
5. Refer for general anesthesia when necessary for safe and comprehensive treatment.

This framework should be viewed as a clinical planning approach rather than a validated treatment algorithm. The appropriate sequence and level of intervention depend on the child's individual circumstances.

10. Conclusion

Children with intellectual disabilities may experience significant oral health challenges associated with functional limitations, dependence on caregivers, communication difficulties,

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sensory sensitivities, and barriers to accessing appropriate dental services. Although poorer plaque control, gingival health, and unmet restorative needs are frequently reported, caries experience varies across diagnostic groups and individual circumstances.[3,6–8,11]

Effective dental management requires an individualized and prevention-centered approach. Early establishment of a dental home, caregiver-supported oral hygiene, appropriate fluoride exposure, dietary counseling, and regular professional review are essential components of care. Communication-based behavior guidance, graduated exposure, sensory adaptations, and distraction can improve treatment tolerance and should be considered before escalating to pharmacological interventions when clinically appropriate.[21–28,41–52]

Nitrous oxide, other sedation techniques, and general anesthesia may be necessary for selected patients who cannot tolerate treatment through conventional behavior guidance. Anesthesia planning must consider not only the child's medical and behavioral needs but also the practical arrangements for safe postoperative care. Similarly, informed consent requires accessible communication and an individualized assessment of decision-making capacity, without assuming incapacity on the basis of an intellectual disability diagnosis.[30–34]

Ultimately, improving oral health outcomes for children with ID requires coordinated efforts from dental professionals, caregivers, educators, and healthcare systems. Better professional training, accessible clinical environments, sustained preventive programs, and disability-inclusive research are essential to reducing oral health inequalities in this population.

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