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Organization of Dental Care in Children with Epilepsy

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Abstract. Background: Children with epilepsy, often combined with other neuropsychiatric disorders, have a high burden of dental diseases, but dental care for them remains fragmented, untimely and incomplete because of behavioural difficulties, the risk of seizures during treatment, the side effects of antiepileptic drugs and the lack of a coherent system of interaction between dental and medical services. Aim: To substantiate an organisational model of dental care for children with epilepsy on the basis of current evidence and clinical guidelines. Methods: A narrative review of guidelines, systematic reviews, randomised trials and observational studies on dental care for children with special health care needs and epilepsy was carried out, and the findings were synthesised into an organisational model, a seizure-management algorithm and a risk-based preventive scheme. Results: The main barriers to care are low dental compliance, communication difficulties, fear of seizures, limited access to specialised services and poor coordination between neurologists, paediatricians and dentists. Evidence-based elements of care include behaviour guidance with compliance assessment, a prepared protocol for seizures in the dental chair, sedation and general anaesthesia when indicated, and intensive prevention: fluoride varnish has been associated with a 43% reduction in caries increment in permanent teeth and 37% in primary teeth. Conclusion: Dental care for children with epilepsy should be organised as a four-level, coordinated system with a single record of the child's medical and dental status, risk-based recall intervals and a seizure-safe protocol for every dental visit.

Keywords: epilepsy, children, special health care needs, organisation of dental care, dental compliance, prevention, seizure management, sedation.

1. Introduction

Epilepsy is one of the most common chronic neurological diseases of childhood, and its incidence is highest in the first years of life [1]. At the same time, dental caries and its complications remain the most prevalent chronic conditions in the population, followed by inflammatory diseases of the periodontium [2]. In children with neuropsychiatric disorders, these diseases develop earlier and are more severe: poor oral hygiene, frequent consumption of sugar-containing foods and medicines, hypersalivation or dry mouth and low cooperation during dental visits lead to a higher prevalence of caries and gingival inflammation than in healthy children [3].

Despite a considerable number of publications, the effectiveness of dental care for children with disabilities has not improved substantially. Children with special health care needs are more likely than other children to have unmet dental needs, even when they have access to medical care [4], and parents report that the main barriers are the child's behaviour, the lack of dentists willing and trained to treat such children and difficulties with payment and transport [5]. In children with epilepsy, these barriers are aggravated by the risk of seizures in the dental chair, the side effects of antiepileptic drugs and the need to coordinate dental treatment with the neurologist [6]. The lack of a coherent system of organisation of dental and therapeutic care for this category of children therefore remains an urgent medical and social problem.

The aim of this article is to substantiate an organisational model of dental care for children with epilepsy on the basis of current evidence and clinical guidelines, including the stages of care, the protocol for managing seizures in the dental chair and a risk-based preventive scheme.

2. Materials and Methods

A narrative review of the literature was carried out. Clinical guidelines, systematic reviews, randomised trials and observational studies on dental care for children with special health care needs and with epilepsy were identified in the PubMed, Scopus, Google Scholar and eLIBRARY databases using combinations of the keywords “epilepsy”, “children with special health care needs”, “dental care”, “access to care”, “behaviour guidance”, “sedation”, “seizure management” and “caries prevention”. The guideline of the American Academy of Pediatric Dentistry on the management of patients with special health care needs was used as the reference framework for the organisational analysis [7].

The selected publications were grouped into four thematic blocks: barriers to dental care; behaviour guidance and assessment of dental compliance, for which the Frankl behaviour rating scale was considered as the basic tool [8]; safety of dental treatment, including seizure management, sedation and general anaesthesia; and prevention of dental diseases. For each block, the recommendations and quantitative results were extracted from the original publications, and on their basis an organisational model of care, a seizure-management algorithm and a risk-based preventive scheme were developed by the author. The results were synthesised descriptively.

3. Result

Barriers to dental care. The reviewed studies show that the barriers to dental care for children with epilepsy are organisational as much as clinical. They include low dental compliance and communication difficulties, parents’ and dentists’ fear of seizures, the limited number of dentists trained in special care, the need for sedation or general anaesthesia for some children and poor exchange of information between the neurologist, the paediatrician and the dentist. Improving and maintaining oral health in people with special needs requires moving from episodic treatment to a continuous system of prevention and care that involves families and caregivers [9]. The main barriers and the corresponding organisational solutions are summarised in Table 1.

Table 1. Barriers to dental care for children with epilepsy and organisational solutions

Barrier	Manifestation	Organisational solution
Low dental compliance	Fear, aggressive or passive behaviour, refusal of treatment	Compliance assessment at the first visit; adaptation visits; behaviour guidance
Risk of seizures	Fear of dentists and parents; interruption of treatment	Seizure-safe protocol, emergency kit, rescue medication plan agreed with the neurologist
Side effects of antiepileptic drugs	Gingival enlargement, bleeding, dry mouth, caries	Information exchange with the neurologist; sugar-free forms of medicines; intensive prevention
Limited access to specialists	Long waiting times, travel distance	Referral pathway between levels of care; trained paediatric dentists in each district
Poor coordination	Duplication of examinations, lost information	Single electronic record and dispensary register

Note: compiled by the author on the basis of the cited publications.

Behaviour guidance and dental compliance. Behaviour guidance is the basis of dental treatment of children with neuropsychiatric disorders. Communicative techniques such as tell-show-do, positive reinforcement, distraction and the presence of parents are used first, and protective stabilisation, sedation and general anaesthesia are reserved for children who cannot cooperate [10]. Assessment of the child’s dental compliance at the first visit, using a standard behaviour rating scale and information on the child’s communication abilities, makes it possible to choose the appropriate method of treatment and to plan the number and duration of adaptation visits. For children who require deep sedation or general anaesthesia, the guidelines require pre-procedural assessment, continuous monitoring by trained personnel and documented discharge criteria [11].

Safety of dental treatment. Each dental visit of a child with epilepsy should be prepared in advance: information is collected on the type and frequency of seizures, their triggers and the time of the last seizure, the antiepileptic drugs and the rescue medication prescribed by the neurologist, and the visit is scheduled at a time when the child is rested and has taken the usual medication. Current guidelines recommend initiating emergency treatment when a convulsive seizure lasts 5 minutes or longer, with benzodiazepines as the first-line therapy [12]. In a randomised trial in

children, buccal midazolam stopped seizures within 10 minutes without respiratory depression in 56% of episodes compared with 27% for rectal diazepam [13], which makes buccal or intranasal midazolam convenient for use in a dental setting. The algorithm for managing a seizure in the dental chair is shown in Figure 1.

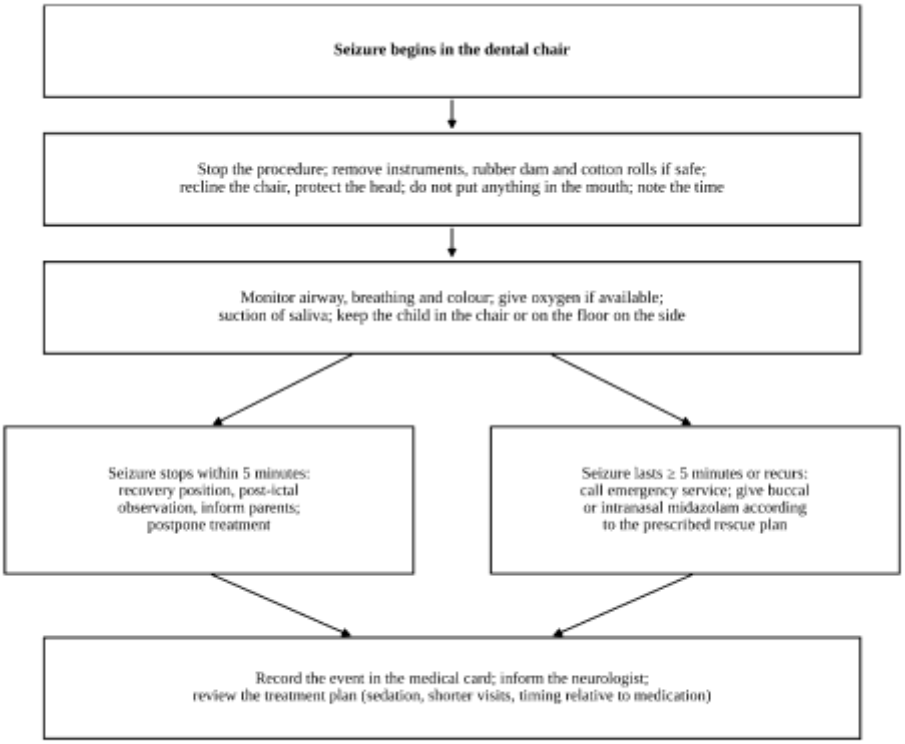


Figure 1. Algorithm for managing an epileptic seizure in the dental chair

Prevention of dental diseases. Antiepileptic drugs require particular attention in the organisation of care: drug-associated gingival enlargement impairs oral hygiene and may require periodontal surgery, and its prevention depends on professional plaque control [14]. The cornerstone of prevention is fluoride: according to a Cochrane review, fluoride varnish applied two to four times a year was associated with a 43% reduction in decayed, missing and filled tooth surfaces in permanent teeth and a 37% reduction in primary teeth [15], and pit-and-fissure sealants are recommended for the occlusal surfaces of permanent molars in children [16]. Studies of oral fluid point to an additional preventive target: oxidative stress parameters in saliva are associated with periodontal disease [17], saliva is regarded as a promising non-invasive diagnostic medium in paediatrics [18], and antioxidant intervention has reduced oxidative stress in children with developmental disabilities [19], which supports the use of oral hygiene products with antioxidant components as an adjunct to standard prevention. A risk-based preventive scheme for children with epilepsy is presented in Table 2.

Table 2. Risk-based scheme of dental prevention for children with epilepsy

Risk level	Criteria	Recall interval	Preventive measures
Moderate	Controlled epilepsy, monotherapy, good cooperation, no active caries	6 months	Fluoride toothpaste, hygiene training of the child and parents, fluoride varnish twice a year, sealants
High	Polytherapy or phenytoin/valproate, active caries or gingivitis, partial cooperation	3 months	As above plus fluoride varnish four times a year, professional hygiene, sugar-free medicines, antioxidant hygiene products
Very high	Frequent seizures, intellectual disability, no cooperation, gingival enlargement	1–3 months	As above plus caregiver-performed brushing, treatment under sedation or general anaesthesia, joint management with the neurologist

Note: proposed by the author on the basis of the cited guidelines and studies; recall

intervals are indicative and should be adjusted individually.

4. Discussion

The reviewed evidence shows that the high dental morbidity of children with epilepsy is determined not only by biological factors but also by the way dental care is organised. Comparative studies show that children taking antiepileptic drugs have higher caries experience, periodontal treatment needs and hygiene index scores than children with epilepsy who are not taking medication [20], which indicates that these children need more intensive prevention rather than only treatment of complications. Long-term population studies show that systematic prevention can substantially improve oral health at the population level [21], and a shift from episodic treatment to continuous preventive care is equally relevant for children with epilepsy.

On this basis, a four-level organisational model of dental care for children with epilepsy is proposed (Figure 2). At the first level, the family and the educational institution provide daily oral hygiene, diet control and the use of sugar-free medicines; at the second, the paediatrician and the neurologist refer the child to the dentist and provide information on antiepileptic therapy; at the third, a paediatric dentist trained in special care assesses dental compliance, plans treatment and prevention and ensures a seizure-safe visit; and at the fourth, a specialised centre provides treatment under sedation or general anaesthesia and complex rehabilitation. The levels are connected by a single electronic record and dispensary register. Because periodontal diseases develop from childhood and accumulate over life [22], such a model should cover the whole period from the first dental visit to the transition to adult care. The model is a conceptual proposal, and its effectiveness should be evaluated in prospective studies using indicators such as caries increment, the proportion of treatment completed without general anaesthesia and the number of emergency visits.

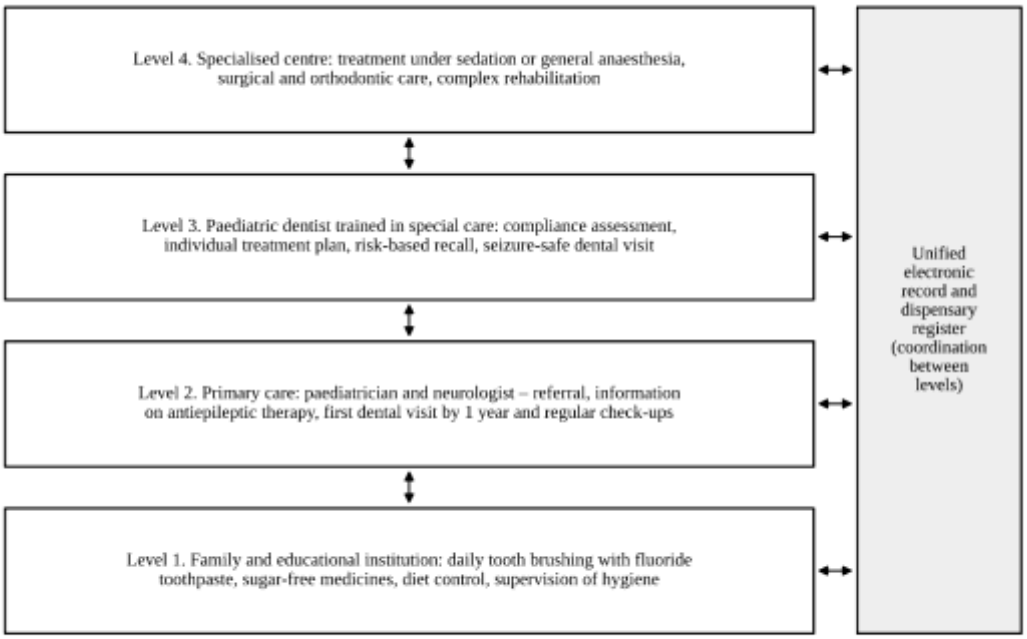


Figure 2. Four-level organisational model of dental care for children with epilepsy

5. Conclusion

The organisation of dental care is a key factor in reducing dental morbidity in children with epilepsy, whose treatment is complicated by low dental compliance, the risk of seizures, the side effects of antiepileptic drugs and poor coordination between medical and dental services. Dental care for these children should be organised as a four-level coordinated system linking the family,

primary care, a trained paediatric dentist and a specialised centre through a single electronic record; it is advisable to assess dental compliance at the first visit, to prepare every visit with a seizure-management protocol and a rescue medication plan agreed with the neurologist, to set recall intervals according to the individual risk level, to use fluoride varnish, sealants and hygiene products with antioxidant components as part of intensive prevention, and to include special-care dentistry in training programmes for general and paediatric dentists. Prospective studies are needed to evaluate the effectiveness of the proposed model.

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