

This is an Open Access document downloaded from ORCA, Cardiff University's institutional repository:<https://orca.cardiff.ac.uk/id/eprint/162609/>

This is the author's version of a work that was submitted to / accepted for publication.

Citation for final published version:

Tinanoff, N., Banerjee, A., Buzalaf, M., Dhar, V., Chen, J.-W., Ekstrand, K.R., Fontana, M., Innes, N. , Koo, H., Listl, S., Lo, E., Schwendicke, F., Sharkov, N., Twetman, S. and Vargas, K. 2023. Caries management pathways for children: IAPD Global Policy Statement. *International Journal of Paediatric Dentistry* 10.1111/ipd.13119

Publishers page: <https://doi.org/10.1111/ipd.13119>

Please note:

Changes made as a result of publishing processes such as copy-editing, formatting and page numbers may not be reflected in this version. For the definitive version of this publication, please refer to the published source. You are advised to consult the publisher's version if you wish to cite this paper.

This version is being made available in accordance with publisher policies. See <http://orca.cf.ac.uk/policies.html> for usage policies. Copyright and moral rights for publications made available in ORCA are retained by the copyright holders.



Caries Management Pathways for Children: IAPD Global Policy Statement

Globally, more than 2 billion people suffer from dental caries of permanent teeth and 500 million children suffer from caries of primary teeth¹. Traditionally, dental caries has been managed by restoring disease affected tissue, with little emphasis on understanding the disease as a non-communicable person-level condition, managing caries risk factors, and considering social determinants of health. Contemporary cariology states that surgical (restorative) intervention alone does not stop the disease process². Yet, research reports from several countries show that oral health care providers continue to treat dental caries primarily with surgical interventions and do not follow evidence-based comprehensive caries management strategies^{3,4,5,6}.

Advances in knowledge of the microbiology of dental caries, the processes involved in de-/re-mineralization, the behavioral and socio-economic factors affecting the caries process, as well as the increasing knowledge of caries risk and diagnosis are achieving a paradigm shift in caries management^{7,8,9,10,11,12}. Such changes may be especially important in children's oral health because of possible difficulties with procedures in preschoolers, access to care and inequities for children. However, to implement such changes it is necessary to identify and address the barriers, such as dental schools' curricula, oral health providers' knowledge of dental caries, reimbursement systems, oral health awareness of the public and the professional inertia to change clinical practice^{2,13}.

The term "caries management pathway" is a more encompassing term than "treatment planning", involving evidence-based and person-focused strategies to preserve tooth structure and restore teeth only when necessary¹⁴. Caries management pathways for children are derived from research supported evidence, as well as the considered judgement of expert consensus. This approach also involves educating and supporting caries preventive behaviors, pediatrician-dentist integration, advocating for the reduction of sugar-containing products and supporting reimbursements to oral health care providers for primary and secondary prevention^{14,15,16}. Application of evidence-based, person-focused care pathways creates greater probability of success, fewer complications and more efficient use of resources¹⁷. At the community level, caries management pathways also can guide the design of public interventions and allocate time and resources to those with greater need.

The core concepts and values of child-focused care pathways for caries management include:

- **Know your child/caregiver** includes obtaining information on the medical history, child's behavior, clinical findings and diagnosis, social determinants of health, barriers to care, health literacy, risk susceptibility, and child/caregiver values and expectations.
- **Shared decision-making** involves a partnership in care decisions between the oral health care provider(s) and the caregiver/child.
- **Child-focused care** is respectful of, and responsive to caregiver/child's preferences, values, ability to adopt healthier behaviors and reduce oral health risks.
- **Evidence-based care** is the integration of the oral healthcare provider's clinical expertise, best available evidence and caretaker/child's needs and preferences.
- **Prognosis** considers the most likely oral health outcomes, primarily affected by person-related variables.
- **Preventive management** includes measures to reduce the risk factors and progression of disease, based on evidence-based findings from clinical trials, guidelines and consensus recommendations.
- **Non-invasive caries management** involves the use of evidence-based preventive strategies, such as fluorides, remineralising agents, dietary interventions and measures to maintain a healthy, balanced microbiome.
- **Micro-invasive interventions** involve the treatment of enamel surfaces at the micro scale, such as fissure sealants and resin infiltration procedures.
- **Minimally invasive interventions** include approaches that repair the cavitated carious lesion, maintain pulp sensibility (vitality) and preserve as much as possible tooth structure. Techniques include selective carious tissue removal, the Hall Technique for primary molars, silver diamine fluoride (SDF) applications, and atraumatic restorative treatment (ART).
- **Restorative management** includes minimally invasive interventions that place direct and indirect restorations to restore form, function, and aesthetics.
- **Active surveillance** is the postponement of invasive caries management on initial and minimal lesions when the caregiver and child adhere to at-home and in-office preventive regimens. The progression/arrest of lesions as well as risk/susceptibility status is re-assessed longitudinally over individualized recall periods.

Advances in the basic and clinical sciences, longitudinal risk/susceptibility assessment, diagnosis and prevention-focused behaviors now fosters contemporary

caries management approaches. To be affordable and accessible such chronic disease management strategies can be delivered and integrated with general health programs in a variety of settings and providers¹⁸. Given the inequities in caries experience among children worldwide, a shift in oral health policy from a conventional surgical restorative dentistry model to a preventive model is essential¹⁹. Stakeholders need to advocate for educational and reimbursement reforms that emphasize person-level, evidence-based care pathways for caries management in children.

References:

1. Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2019 (GBD 2019). Seattle: Institute of Health Metrics and Evaluation (IHME); 2020. Available at: <https://www.healthdata.org/gbd/2019>. Accessed, Nov. 16, 2022.
2. Watt RG, Daly B, Allison P, et al. Ending the neglect of global oral health: time for radical action. *Lancet*. 2019;394:261-272.
3. Mirza AJ, Asad M, Berkth M. Siddiqui AA. Is the current knowledge of treating caries being implement in Saudi Arabia? *Int J Dental Sciences and Research* 2016;4(5):85-89.
4. Elouafkaoui P, Bonetti D, Clarkson J, Stirling D, Young L. Is further intervention required to translate caries prevention and management recommendations into practice? *British Dental J*. 2015;281:E1-E7.
5. BaniHani A, Hamid A, Van Eeckhoven J, et al. Minimal Intervention Dentistry (MID) mainstream or unconventional option? Study exploring the impact of COVID-19 on paediatric dentists' views and practices of MID for managing carious primary teeth in children across the United Kingdom and European Union. *Eur Arch Paediatr Dent*. 2022;(5):835-844.
6. Al-Asmar AA, Al-Hiyasat AS, Pitts NB. Reframing perceptions in operative dentistry relating evidence-based dentistry and clinical decision making: A cross-sectional study among Jordanian dentists. *BMC Oral Health* 2022;22:637-649.
7. Canares G, Hsu KL, Dhar V, Katechia B. Evidence-based care pathways for management of early childhood caries. *Gen Dent*. 2018;66(6):24-28.
8. Bowen WH, Burne RA, Wu H, Koo H. Oral Biofilms: Pathogens, Matrix, and Polymicrobial Interactions in Microenvironments. *Trends Microbiol*. 2018;26(3):229-242.
9. Schwendicke F, Walsh T, Lamont T, et al. Interventions for treating cavitated or dentine carious lesions. *Cochrane Database Syst Rev*. 2021 Jul 19;7(7):CD013039.
10. Lam PPY, Chua H, Ekambaram M, Lo ECM, Yiu CKY. Risk predictors of early childhood caries increment – A systematic review and meta-analysis. *J Evid Based Dent Pract*. 2022;22(3):101732.
11. Dawett B, Deery C, Banerjee A, Papaioannou D, Marshman Z. A scoping literature review on minimum intervention dentistry for children with dental caries. *Br Dent J*. 2022 Mar 4. doi: 10.1038/s41415-022-4038-8.
12. Banerjee A. Minimum Intervention oral healthcare delivery - Is there consensus? *Brit Dent J* 2020; 229(7):393-395.

13. Innes NPT, Frencken JE, Schwendicke F. Don't know, can't do, won't change. *J Dent Res.* 2016;95(5):4850-486.
14. Ismail AI, Tellez M, Pitts NB, Ekstrand KR. Caries management pathways preserve dental tissues and promote oral health. *Community Dent Oral Epidemiology* 2013;41:e12-e40.
15. Hajishengallis E, Forrest CB, Koo H. Early Childhood Caries: Future Perspectives in Risk Assessment. *JDR Clin Trans Res.* 2016;1(2):110-111.
16. Listl S, Grytten JI, Birch S. What is health economics? *Community Dent Health.* 2019; 28;36(4):262-274.
17. Edelstein BL and Chinn C. Update on disparities in oral health and access to dental care of America's children. *Acad Pediatr* 2009;9(6):415-419.
18. Edelstein BL and Ng MW. Chronic disease management strategies of early childhood caries: Support from the medical and dental literature. *Pediatric Dent.* 2015;37(3):281-287.
19. World Health Assembly, Geneva, May 24-June 1, 2021. Summary and verbatim records. Available at: https://apps.who.int/gb/ebwha/pdf_files/WHA74/A74_R5-en.pdf. Accessed, Dec. 7, 2022.

The IAPD Global Summit on Care Pathways for Caries Management in Children was held in Rome on November Nov. 11-13, 2022. Members of the Expert Panel who composed this summit statement with input from the IAPD Board were A. Banerjee (UK); M. Buzalaf (Brazil), V. Dhar (USA), J-W Chen (USA), K.R. Ekstrand (Denmark), M. Fontana (USA), N. Innes (UK), H. Koo (USA), S. Listl (Netherlands), E. Lo (Hong Kong), F. Schwendicke (Germany). N. Sharkov (Bulgaria), N. Tinanoff (USA), S. Twetman (Denmark), K. Vargas (USA).

Approved Jan., 30, 2023 by the IAPD Board of Directors: Drs. Marcelo Bönecker (Brazil), Jorge Luis Castillo (Peru), James Crall (USA), Varinder Goyal (India), Young K. Kim (Korea) Ari Kupietzky (Israel), Varinder Goyal (India), Figen Seymen (Turkey), Norman Tinanoff (USA), Marietjie Weakley (South Africa)

Corresponding author:
Norman Tinanoff, DDS, MS
Department of Orthodontics and Pediatric Dentistry
University of Maryland, School of Dentistry
650 W. Baltimore St.
Baltimore, Maryland 21001 USA

Ntinanoff@umaryland.edu
410 952 4712

Appendices

Table 1. More easily implementable and more challenging approaches to advance care pathways for caries management in children.

More easily implementable approaches

- Emphasize person-centered care with the child as a whole person, and as part of a family.
- Create simplified, children’s caries management guidance for oral health providers.
- Promote evidence-based, person-centered oral health management in clinical journals, in social media, and by thought leaders.
- Develop a shared-decision guide to aid oral health providers with patient autonomy.
- Target person’s caries risk factors and determinants of health¹⁹.
- Optimize fluoride for population oral health²⁰.
- Use terms such as “oral health” instead of “dental”.

More challenging approaches

- Modify reimbursement systems to emphasize primary and secondary prevention.
- Support policies that provide universal health coverage for oral health¹⁹.
- Support policies that restrict sugar consumption²⁰.
- Utilize behavior change science to improve oral self-care²⁰.
- Empower individuals to maintain good oral health.
- Integrate oral health with medical systems²⁰.
- Strengthen global capacity for health care equity.

Table 2. Approaches to foster care pathways in pre- and postgraduate dental education.

- Emphasize health outcomes rather than restorative treatment.
- Train and calibrate faculties on evidence-based caries management strategies.
- Focus on cariology and preventive care before teaching restorative dentistry.
- Integrate the teaching of caries management into other dental disciplines
- Establish clinical competencies in whole-person assessment, behavior change science, preventive care, and caries management.
- Establish case/problem-based seminars on caries management.
- Revise clinical records to facilitate prevention, risk assessment, recording lesion activity, and non/minimally invasive caries management pathways.