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# Planning and Care for Children and Adolescents with Dental Enamel Defects



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Nicola Kilpatrick  
Editors

# Planning and Care for Children and Adolescents with Dental Enamel Defects

Etiology, Research and Contemporary  
Management

 Springer

*Editors*

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*This book is dedicated to our PhD supervisors, John Murray, John McCabe and Martin Curzon with advice from Colin Robinson and John Weatherell who inspired us both to constantly question, reflect and explore our clinical experiences. Together with our many colleagues, they have encouraged us to strive for excellence in both the management of and outcomes for children, adolescents and their families.*



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## Preface

The prevalence of developmental defects of enamel (DDE) is reportedly increasing worldwide. It is difficult to assess this accurately, as in the past the greater prevalence of dental caries may have had a significant impact on the diagnosis of DDE by masking its presence. Clinically, defects vary greatly in their appearance in terms of size, color, and shape. DDE may affect both primary and permanent dentitions and can be either generalized across one or both dentitions or localized to specific teeth. The structure of enamel in affected teeth differs, such that there may be a quantitative reduction in enamel (known as hypoplasia) or a qualitative defect (known as hypomineralization), though often defects comprise a combination of the two. Despite the growing burden associated with treating affected individuals, there remains a lack of understanding of the etiology of DDE and evidence of clinical outcomes to support management.

When clinicians are faced with a child who has hypomineralized and/or hypoplastic teeth, it can be difficult to plan care for many reasons. Often, the child is young and has had little or no experience of dentistry. Apart from the difficulties for the child, this creates stress for the parents and puts pressure on clinicians trying to decide on the best way to manage the young patient. Affected teeth are difficult to anesthetize, and treatment can be uncomfortable. It is also clear that individuals with teeth affected by DDE experience significantly more restorative procedures throughout childhood and adolescence and have higher levels of dental anxiety. Poor esthetics coupled with increased sensitivity may further exacerbate the child's anxiety and have a real impact on their quality of life. Parents report that children eat slowly or refuse some foods, although they often do not complain directly of pain. Children note that they cannot eat ice cream or that people, including teachers and peers, comment on their chalky or discolored anterior teeth.

The protein content in hypomineralized enamel is significantly higher than in otherwise healthy enamel, which in turn alters its structure and interferes with the adhesion of conventional resin-based dental restorative materials. When a clinician looks at affected teeth for the first time, they should be aware that the child is likely to require a lifetime of care, even if the teeth remain caries free. This can be an overwhelming prospect when considering the best approach to early management so as to prepare the individual for the longer-term definitive solutions, which often cannot be finally decided until the child is in late adolescence or early adulthood. When severe defects are localized to one or only a few posterior teeth, it may be

appropriate to extract these compromised teeth. However, it is important to consider the impact of such extractions on the developing occlusion in order to optimize definitive occlusal outcomes. Finally, there are financial considerations to be taken into account both immediately and in the long term, which also will impact on the management choices that families will be able to make.

With all this in mind, the aims of this book are to summarize the current understanding of DDE in the primary and permanent dentitions, to discuss its impact on children and adolescents, and to provide guidance on treatment planning and management. The prevalence and etiology of DDE are addressed in Chaps. 1, 2, and 3. Chapters 4 and 5 review the contemporary understanding of the genetic influences on DDE and the potential associations of DDE with systemic conditions and syndromes. Dental professionals can play an important role in the diagnosis of systemic conditions if they record patterns of defects and take careful histories of other related health signs and symptoms. Chapter 6 is devoted to presenting information on the structure and composition of defective enamel. This is to encourage clinicians to think about how affected teeth behave in the oral environment and consider the impact of this on restorative materials and treatment techniques. Affected teeth pose particular challenges in relation to resin bonding, and clinicians have to consider where to place restoration margins and whether/how to pretreat the enamel to improve adhesion.

Chapter 7 summarizes the current knowledge of the impact of DDE from the patient's perspective. There is emerging awareness of the impact of DDE on children's and adolescents' quality of life not only in terms of the psychosocial influences of altered appearance but also as a result of a young person's experience of complex and often repeated dental interventions. This chapter highlights the importance of giving careful consideration to planning not only the obvious clinical treatment needs but also the longer-term treatment needs in the context of the broader psychosocial demands and individual/family expectations.

In planning a definitive outcome, clinicians have to consider the implications of growth on the developing occlusion, particularly where teeth have a very poor prognosis and extractions are being considered. Chapter 8 reviews dental and occlusal development. While specialist orthodontic input is ideal, this chapter also acknowledges that this is not always possible and gives an overview of the aspects of occlusion that should be considered when making decisions surrounding the choice and timing of extractions. The first chapter looking at the management of DDE (Chap. 9) is devoted to managing sensitivity, improving enamel mineralization, and preventing dental caries and erosion in affected teeth. Two Chaps. (10 and 11) address the immediate and intermediate restorative management of primary and permanent teeth with DDE. This includes the management of permanent teeth through adolescence, while planning the permanent restoration options. All these chapters give options and recommendations that are supported, where available, with contemporary evidence. The final chapter (Chap. 12) offers an interesting glimpse into cutting-edge research, in which techniques to regenerate enamel and develop enamel-like restorative materials offer hope for the future. As access to research reporting becomes increasingly available to all clinicians, this chapter is a guide on what to continue to search for in the future.



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This book is intended to provide contemporary information on both DDE and its impact during childhood. Each of the chapters covering specific aspects of DDE has been written to stand alone. However, where appropriate, the reader is directed to further linked information in other chapters. Although guidance is offered on various management options from both preventive and restorative perspectives, it is not intended to suggest that these are the only options. Clinicians are encouraged to use the information to consider the best pathway for each individual patient after taking account of the child's and family's perspectives, the developing occlusion, the clinician's own skills, and the severity of the presenting anomaly.

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