

# 2.1a

## Paediatric Dentistry

### Treatment of primary and dentition

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#### Key points

- ◆ Prevention is the cornerstone of good management of dental caries in children
- ◆ History taking is fundamental to the execution of restorative care in the primary and mixed dentition.
- ◆ Communication skills are essential in obtaining a child's co-operation in completing treatment.
- ◆ Caries risk of a child patient provides markers for future preventive needs and restorative care.
- ◆ The recognition of dental caries and planning appropriate treatment related to disease activity and a child's age is key to restoring the primary and mixed dentition.
- ◆ The extent of dental caries will determine the cavity design and ultimate choice of restorative material.
- ◆ The selection and handling of dental materials is based on sound knowledge of their composition and physical properties.

#### Introduction

The 1993 survey of child dental health documented a reduction of 30 per cent in dental caries experience in the oldest children since the previous survey ten years earlier. This was not so for the five-year-olds with little improvement noted over the same time period (O'Brien 1995). Whilst considering the pattern of dental disease in children, there remains a significant proportion that is untreated. Hence the need to ensure that on graduation dentists have the basic skills to restore the primary and mixed dentition, and know when to appropriately refer a child for specialist advice and help with their management.

Fayle and colleagues (2001) have discussed the management of dental caries in the primary dentition on behalf of the British Society of Paediatric Dentistry (BSPD). Untreated dental caries in the deciduous dentition can lead to pain and infection,

which may be detrimental to the general health of children. This may include interference with nutrition, loss of sleep, behaviour disturbance, and poor aesthetics. The ability to restore the primary dentition is therefore a requirement of a graduate.

In considering the treatment of the primary and mixed dentitions, it is also important to recognize the need for good relationships between the child patients, their family, and the dentist, as outlined in law and ethics, encompassing good communication skills (Chapters 1.2 and 1.3). Behaviour management (Chapter 1.10) and pain control (Chapter 1.9) should also be taken into account when planning treatment for children. Restorative treatment should be delivered to the highest standard possible. The requirements for the delivery of dental care in paediatric dentistry are outlined in the GDC's *The First Five Years. a framework for undergraduate dental education* (GCD 2002) and expressed in full below:

**Paragraph 80** The study of child dental health should encompass the interrelationships between orthodontics and paediatric dentistry together with the general growth and development of the individual. It should be related to social and psychological factors and to the recognition, preventive treatment and operative management of the common disease processes.

**Paragraph 81** Paediatric dentistry is concerned with the understanding of normal growth and development and the promotion and maintenance of oral health for children. In paediatric dentistry students should have a continuous responsibility for the care of a number of children in order to assess their overall needs, the efficacy of preventive measures, their behaviour, and management and restorative treatment. Students should also learn to manage children requiring emergency care, carry out diagnostic procedures in such circumstances, formulate treatment plans and relate them to comprehensive dental care for children. They should be made aware of the special dental needs of children with disabilities and have experience in the recognition and management of developmental dental abnormalities.

Paediatric dentistry is also listed in the Subject Benchmark for Dentistry (QAA 2002) as follows:

Manage the oral health of children and adolescents and perform treatment for them in a manner that incorporates consideration for their expected growth and development, involving parents or guardians as required.

## Intended learning outcomes

Table 2.1a.1 contains the intended learning outcomes incorporating those outlined in the GDC's *The First Five Years*, Subject Benchmark Statement for Dentistry, *Intended Learning Outcomes for Undergraduate Training in Paediatric Dentistry* (Maguire *et al.*

**Table 2.1a.1** Intended learning outcomes for the restoration of the primary and mixed dentition

<b>Be competent at</b>	<b>Have knowledge of</b>	<b>Be familiar with</b>
Diagnosing active caries and planning appropriate non-operative care	Methods to assess quality of restorations	<b><i>Aesthetic management of non-vital permanent teeth</i></b>
Using rubber dam for the isolation of teeth	<b><i>Pre-formed stainless steel crown and pulp therapy in primary molars</i></b>	<b><i>Etch retained veneers</i></b>
Designing cavities in relation to tooth anatomy and the characteristics of the restorative material	<b><i>The management of trauma in both dentitions</i></b>	<b><i>The use of microabrasion techniques</i></b>
Undertaking approximal and incisal tip restorations		<b><i>Vital and non-vital bleaching</i></b>
Performing aesthetic restorations using adhesive systems		
Analysing failures to minimize future complications		
The selection and handling of dental materials for restorative procedures based on a sound knowledge of their composition and physical properties and taking into account patient risk factors		

2004) (as devised by the BSPD Teacher's Branch) and the *Undergraduate Teaching Programme in Europe: First draft of a 'Golden Standard' by European Academy of Paediatric Dentistry*. Those in ***bold italics*** illustrate the interaction between other aspects of child patient care that are also essential skills for the restorative treatment of the primary and mixed dentition.

Preventive care is the cornerstone to good management of dental caries in children. The basic concepts for prevention are discussed in Chapter 1.12.

The treatment of the primary and mixed dentition is described in the following sequence (Gordon 2001; Blinkhorn 2001; Kilpatrick 2001; Page 2001; Raadal *et al.* 2001; Dental Practice Board 1999a, b and c).

### *History taking*

- ◆ Be competent in obtaining, assessing and recording a medical, dental, family, social and, where appropriate, feeding, dietary, and developmental history from a child patient, parent or guardian.

History taking should include history of present complaint, past dental history, social and medical history – to assist in the overall management and treatment planning a judgement of the child's behaviour, the ability of the child to understand and co-operate, and the assessment of caries risk.

### *Clinical examination*

- ◆ Be competent in performing a clinical examination of the patient (relevant to age group) that encompasses head and neck, facial, intra-oral, general and behavioural aspects of a child patient.

Clinical examination is performed once a history and examination has been completed; this should include intra-oral and extra-oral examination and where appropriate special investigations such as radiographs and study models.

### *The location and extent of disease, the stage of dental development and malocclusion development*

- ◆ Be competent at diagnosing active caries and planning appropriate non-operative care and
- ◆ Be competent in identifying the type, location, extent and activity of dental caries.

The location and extent of disease, the stage of dental development and malocclusion development must be determined prior to making an informed choice about the extent of treatment in relation to the child's disease activity, age, and ability to cope with clinical procedures.

### *Treatment plans*

- ◆ Be competent in developing comprehensive and integrated treatment and preventive plans, taking into account diagnosis, social, medical and psychological influencing factors for a child.

Treatment plans may be purely preventive in nature, for example placement of fissure sealant on the immature permanent molars on eruption, or more invasive using a preventive resin restoration (BSPD 2000; SIGN 2000). The requirement could also be one or two surface restoration with or without pulp involvement, or the repair of a fractured incisal tip. Where dental extractions are planned the long-term implications need to be carefully considered.

### *Restoration of the deciduous dentition*

- ◆ Be competent at using rubber dam for the isolation of teeth
- ◆ Be competent at designing cavities in relation to tooth anatomy and the characteristics of the restorative material.

- ◆ Be competent at analysing failures to minimize future complications.
- ◆ Be competent in the selection and handling of dental materials for restorative procedures based on a sound knowledge of their composition and physical properties and taking into account patient risk factor.
- ◆ Have knowledge of methods to assess quality of restorations.
- ◆ Have knowledge of pre-formed stainless steel crown and pulp therapy in primary molar teeth.

Restoration of the deciduous dentition encompasses the recognition and determination of caries risk of the child patient; selection of the best method to restore the tooth including invasive and non-invasive procedures. The extent of dental caries determines the choice of restorative material. The hierarchy for the choice of restoration material for the deciduous dentition is that stainless steel crowns (SSC) are most suited to deciduous molars with more than two surfaces affected by dental caries (Roberts and Sheriff 1990), followed by amalgam, composite, compomer and glass ionomer (Welbury *et al.* 1991; Kilpatrick *et al.* 1995; Welbury *et al.* 2000). The adverse affects of amalgam must be borne in mind (Eley 1996). However, the BSPD considers that no restrictions should be placed on the use of amalgam to restore children's teeth at the present time and that rubber dam should be used where practicable to reduce mercury toxicity (Eley 1996).

#### *Restoration of immature permanent dentition*

- ◆ Be competent at using rubber dam for the isolation of teeth.
- ◆ Be competent at designing cavities in relation to tooth anatomy and the characteristics of the restorative material.
- ◆ Be competent at undertaking approximal and incisal tip restorations.
- ◆ Be competent at performing aesthetic restorations using adhesive systems.
- ◆ Be competent in the selection and handling of dental materials for restorative procedures based on a sound knowledge of their composition and physical properties and taking into account patient risk factor.
- ◆ Have knowledge of the management of trauma in both dentitions.
- ◆ Have knowledge of the role of sedation in the management of young patients.
- ◆ Be familiar with the aesthetic management of non-vital permanent teeth.
- ◆ Be familiar with etch retained veneers.
- ◆ Be familiar with the use of microabrasion techniques.
- ◆ Be familiar with vital and non-vital bleaching.

Restoration of immature permanent dentition involves the philosophy of prevention of dental caries using a fissure sealant and if initial dental caries is detected in the occlusal surface a more invasive approach may be necessary using a preventive resin restoration.

Each of these will be considered in turn and where appropriate cross-referenced.

## History taking including examination in paediatric dentistry

### *Standards*

The student should:

- ◆ Appreciate the differences between taking a history and planning treatment for children as compared to adults.
- ◆ Understand the need to obtain consent and establish how child/parent relationships may affect the delivery of dental care for children.
- ◆ Demonstrate the ability to perform a thorough examination of the child patient that encompasses where necessary facial, intra-oral, head and neck, general, and behavioural aspects.

### *History taking in paediatric dentistry*

Core clinical skills in the evaluation of the oral health of a child patient are not dissimilar to those described for taking a history of a child who is to undergo orthodontic treatment. History taking for children requiring dental treatment should have a greater emphasis in gaining the child's co-operation and getting to know each other.

See **Checklist 25** for history taking including examination in paediatric dentistry.

### *Underpinning knowledge*

The student should be:

- ◆ Competent in making an assessment of the child's behaviour, relationship with parents/carers, child's risk for dental disease, especially dental caries.
- ◆ Competent in ascertaining the reason for attendance including pain, trauma history, or other worries for example the shape, size, and colour of teeth.
  - Complaint
  - Past dental history including previous treatment received
  - Medical history
  - Social history
- ◆ Competent at carrying out an examination of the hard and soft tissues of the head and neck, and associated extra-oral and intra-oral tissues.
- ◆ Demonstrate an understanding of primary, secondary and tertiary prevention.
- ◆ Have knowledge of children's growth and developmental stages.
- ◆ Competent at prescribing, taking and processing accurately a radiographic examination which is appropriate for the needs of the child.
- ◆ Competent in assessing intra- and extra-oral radiographs.
- ◆ Competent at making a diagnostic statement.
- ◆ Competent at record keeping.

- ◆ Competent to formulate an appropriate treatment plan for the child patient taking into account the longevity of the teeth.
- ◆ Competent at obtaining informed consent for the treatment to be provided.
- ◆ Have knowledge of the growth and development of children.
- ◆ Have knowledge of dental materials suitable for the restoration of primary and young permanent teeth.

## Restoration of deciduous dentition

### *Core clinical skills in the restoration of the deciduous tooth*

1. Diagnosis of dental caries in a tooth using visual, radiographic or other detection methodology.
2. Outline treatment objectives and discussion with child and their parent as to procedures required.
3. Administer appropriate topical gel application and local anaesthetic to ensure pain-free restorative treatment.
4. Placement of rubber dam or use of equivalent moisture control.
5. Cavity preparation related to the extent of the carious lesion:
  - ◆ Access to carious lesion
  - ◆ Removal of dental caries, particularly at margins and walls of cavity
  - ◆ Preparation of cavity relates to the extent of the lesion and subsequent choice of restorative material and retention.
    - SSC – minimal preparation of the tooth after caries removal and GIC for maximum retention on a molar tooth
    - Amalgam – shape cavity for retention or dual cure composite bonding of amalgam to the tooth
    - Composite – preparation of enamel bevel at the occlusal margins, enamel and dentine bonding and use incremental build up in the proximal box to reduce polymerization contraction problem
    - GIC – resistance to displacement may be required and hence small occlusal dovetail inserted or retention grooves in dentine
    - Compomer – bonding for retention
  - ◆ Treatment of pulpal–dentine complex – calcium hydroxide, GIC or bonded composite resin.
  - ◆ Restoration of tooth with appropriate material and use of matrix band and wedges for approximal surface contour.
6. Completion of restoration, occlusion and margins checked, reminder of anaesthetized soft tissues, reinforcement of good behaviour.

### *Underpinning knowledge*

The student should be:

1. Competent at making an assessment of the caries risk of a child.
2. Competent at diagnosing active caries in the deciduous dentition.
3. Competent at giving a local anaesthetic to ensure pain-free dentistry for a child patient.
4. Competent in using rubber dam for the isolation of teeth.
5. Competent at carious tissue removal using rotary and hand instruments with consideration of the pulpal–dentine complex.
6. Competent in undertaking approximal restorations and designing cavities in relation to the tooth anatomy and the characteristics of the restorative material of choice.
7. Competent at making a choice of materials to restore the tooth in the most appropriate manner in view of the longevity of the tooth.
8. Have knowledge in carrying out extra-coronal restoration of primary teeth using preformed stainless steel crowns for molar teeth and bonded composite strip crowns for anterior teeth.
9. Have knowledge of the pulpal status from clinical signs and symptoms
  - ◆ **One surface:** All dental materials available may be utilized in the restoration of deciduous molars. The extent of the caries, age of the child, caries risk and child's co-operation will influence the final choice of material. Alternatives to amalgam (the most durable material) can be chosen. GIC with fluoride-releasing and adhesive properties is ideal for a one-surface cavity. However, GIC is not strong enough to be used in large restorations with significant occlusal load. The choice of composite resin, compomer or GIC materials is disadvantaged by being technique sensitive and requires scrupulous moisture control during bonding and placement of the material which can be difficult to achieve in paediatric dentistry (Chapter 1.16).
  - ◆ **Two surfaces:** A stainless steel crown should be used in preference for a molar tooth with more than one or two surfaces affected or if the tooth has had pulp therapy treatment. Alternative choices have lower survival rates over five years; amalgam 70–80 per cent, GIC between 60–75 per cent and composite may be as little as 40 per cent success rate. Adhesive restorative materials are constantly being developed to enhance their properties and to become more user friendly.

### *Treatment for primary teeth with symptoms of toothache or abscess*

This aspect of treatment for the primary and mixed dentition will be primarily discussed under pulp therapy for the primary dentition (Chapter 2.1b and Chapter 2.6).

The student should:

1. Be competent in the management of dental emergencies.
2. Be competent in placement of appropriate temporary dressing (with or without initiating pulp therapy treatment) to relieve pain.
3. Be competent at extraction of primary teeth using local anaesthesia.
4. Have knowledge to perform pulp treatment of vital and non-vital primary teeth
5. Have knowledge of non-surgical endodontic treatment of immature permanent teeth.
6. Have knowledge of the difference between reversible and irreversible pulpitis and the symptoms experienced by the patient.
7. Have knowledge of controlling advanced carious lesions by stepwise excavation and temporization with hard setting CaOH and sealed with a dressing (Mejare ).

## Immature permanent molar in the mixed dentition

### *Fissure sealants*

The student should:

1. Appreciate that different materials exist and the need to utilize the most effective material in providing a fissure sealant in the occlusal surfaces of the permanent dentition.
2. Demonstrate ability to place a fissure sealant:
  - ◆ Diagnose absence of dental caries
  - ◆ Prepare tooth surface for etch (30 per cent phosphoric acid) until enamel surface is frosty after washing and drying
  - ◆ Place fissure sealant of choice and set
  - ◆ Test for adhesion and integrity of fissure sealant.
3. Monitor margins and retention of fissure sealant to cover all parts of the fissure.

**Checklist 26** outlines the requirements for fissure sealant in first permanent molar.

### *Underpinning knowledge*

- ◆ Demonstrate the ability to perform accurate and appropriate clinical intra-oral examination.
- ◆ Demonstrate the ability to perform accurate and appropriate radiographic examination.
- ◆ Demonstrate the ability to assess radiographs.
- ◆ Demonstrate the understanding of the technique employed in placing a fissure sealant and using most effective and commonly available materials.
- ◆ Establish dental caries risk and implements a preventive regime.

*Core skills in the restoration of early permanent dentition: occlusal enamel carious lesion, stained fissure or widening of the fissures or precavitated lesion*

The student should have:

1. Discussion with child and parent prior to procedure undertaken
2. Established dental caries risk and implements a preventive regime
3. Obtained pain and anxiety control – i.e. topical gel application and local analgesia
4. Isolation using rubber dam or appropriate means
5. Access
6. Investigation of the fissure system
7. Remove incipient caries – with or without dentine involvement
8. Etch enamel surface in readiness for placement of composite resin and fissure sealant
9. Checked integrity of procedure, margins and occlusion

**Checklist 27** outlines the requirements the restoration of early permanent dentition: occlusal enamel carious lesion, stained fissure or widening of the fissures or precavitated lesion.

*If the carious lesion extends into dentine*

1. Complete until stage 6
2. Extend cavity to remove caries
3. Consider the dentine – pulp complex
4. Choice of dental material appropriate in relation to extent of caries
5. Lining CaOH, GIC or bonded composite resin
6. Prepare tooth surface for restoration:
  - ◆ etch enamel for 30 seconds, dentine for 15 seconds
  - ◆ apply bonding agent
  - ◆ place composite resin in increments and cure
  - ◆ place fissure sealant over restoration and cover every fissure before curing
  - ◆ or (remove unsupported enamel if using amalgam), place amalgam in increments and condense.
7. Check margin integrity and occlusion.

*Underpinning knowledge*

- ◆ Demonstrate the ability to identify the type, location, extent and activity of dental caries.
- ◆ Utilization of appropriate radiographs to aid diagnosis of dental caries.

## Checklist 25 History and examination of a child patient

Clinical examination	Yes	No
History		
Clear statement of problem		
Past medical history		
Past dental history:		
• Dental caries		
• Trauma		
• Treatment		
• Preventive		
• Restorative		
• Extractions		
• Orthodontic		
• Other		
Social history		
Examination:		
• Communicates with patient		
• Communicates with parent/carer		
Carries out examination:		
• Extra oral		
• Intra oral (hard and soft tissues)		
• Chart (recognition caries/teeth)*		
• Oral hygiene status		
• Malocclusion		
Describes findings clearly		
Special tests		
• Appropriate discussion and interprets		
– Radiographs		
– Other		
Provides summary diagnosis		
Treatment plan and management		
Aetiology of disease		
Provides aims of overall treatment plan		
Obtains informed consent		

\* Fail competency tests if fails to recognize caries or teeth!

## Checklist 26 Fissure sealant in first permanent molar

Task	Yes	No
Reasons for fissure sealant (BSPD Policy Document)		
• Patient		
• Mouth		
• Tooth		
Tooth preparation		
• Clean and dry		
• Etch, wash and dry (isolation is essential)		
• Choice material		
Placement of fissure sealant		
• Adheres		
• Position ~ to 1/2 cuspal incline		
• No ledges		
• No air blows		
• Occlusion		
Restoration		
• Materials use		
• Placement		
• Include unfilled resin		
Finish		
• Tooth surface and sealant – restoration flush		
• Occlusion		

- ◆ Demonstrate the ability to assess radiographs.
- ◆ Provide local analgesia to achieve comfort of child during treatment.
- ◆ Establish extent of dental caries lesion and removal of dental caries.
- ◆ Restore tooth to function using commonly available restorative materials.
- ◆ Demonstrate the ability to perform accurate and appropriate radiographic intra- and extra-oral examination.
- ◆ Understand the potential hazards of amalgam and the potential weakness of other plastic materials.

## Checklist 27 Restorative competency test

Task	Yes	No
Presentation		
Patient:		
• Presenting complaint		
• Medical/social/ dental history		
Tooth:		
• Diagnosis*		
• Rationale for restoring		
*To include: extent of carious lesion, pulp involvement and adjacent teeth		
Treatment:		
• Preparation		
– Local analgesia		
– Rubber dam/moisture control		
– Infection control		
• Cavity preparation		
• Caries free		
• Management of pulp/dentine complex		
• Retention and placement of restoration		
– Occlusal and approximal preparation – material choice		
– Matrix or choice SSC		
• Restoration		
– Rationale for material choice		
– Placement of filling material		
– Placement/cementation SSC		
– Finish/occlusion		
Patient management:		
• Organization		
• Communication/consent		

If caries management is inadequate then competency is failed and a fail grade is awarded.

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