

Foreword, v

Preface, vi

1 Dental Hard Tissue Pathologies, 1

1.1 Dental Caries, 1

1.1.1 What Is It?, 1

1.1.2 Terminology, 1

1.1.3 Caries: The Process and the Lesion, 2

1.1.3.1 The Caries Process: Dental Plaque Biofilm, 2

1.1.3.2 The Carious Lesion: Dental Hard Tissues, 3

1.1.4 Aetiology of the Caries Process, 3

1.1.5 Speed and Severity of the Caries Process, 5

1.1.5.1 Definitions, 7

1.1.6 The Carious Lesion, 7

1.1.6.1 Within Enamel, 8

1.1.6.2 At the Enamel–Dentine Junction (EDJ)/Amelo-dentinal Junction, 10

1.1.6.3 Within Dentine, 10

1.1.7 Carious Pulp Exposure, 12

1.1.8 Dentine–Pulp Complex Reactions, 12

1.1.8.1 Translucent Dentine, 12

1.1.8.2 Tertiary Dentine, 13

1.1.8.3 Pulp Inflammation, 14

1.2 Toothwear, 15

1.3 Dental Trauma, 16

1.3.1 Aetiology, 17

1.4 Developmental Defects, 17

1.5 Causes of Tooth Discolouration, 17

SECTION 1 Minimum Intervention

Oral Care (MIOC) –

Clinical Domain 1

2 MIOC Domain 1: Identifying Clinical Problems, 27

2.1 Introduction: Minimum Intervention Oral Care and Minimally Invasive Dentistry, 27

2.2 Detection/Identification, 32

2.3 Taking a Verbal History, 33

2.4 Physical Examination, 33

2.4.1 General Examination, 33

2.4.2 Oral Examination, 33

2.4.3 Dental Charting, 36

2.4.4 Tooth Notation, 36

2.5 Caries Detection, 36

2.5.1 Caries Detection Indices, 38

2.5.2 Susceptible Surfaces, 41

2.5.3 Investigations, 44

2.5.3.1 Radiographs, 44

2.5.3.2 Pulp Sensibility Tests, 45

2.5.3.3 Percussion Tests, 49

2.5.4 Lesion Activity, 49

2.5.5 Diet Analysis, 51

2.5.6 Caries Detection Technologies, 54

2.6 Toothwear: Clinical Detection, 55

2.6.1 Targeted Verbal History, 55

2.6.2 Clinical Presentations of Toothwear, 55

2.6.3 Summary of the Clinical Manifestations of Toothwear, 57

2.7 Dental Trauma: Clinical Detection, 59
2.8 Developmental Defects: Clinical Detection, 60
3 MIOC Domain 1: Diagnosis, Prognosis and Personalised Care Planning, 65
3.1 Introduction, 65
3.1.1 Definitions, 65
3.2 Diagnosing Dental Pain, 'Toothache', 66
3.2.1 Acute Pulpitis, 66
3.2.2 Acute Periapical Periodontitis, 66
3.2.3 Acute Periapical Abscess, 69
3.2.4 Acute Periodontal (Lateral) Abscess, 69
3.2.5 Chronic Pulpitis, 69
3.2.6 Chronic Periapical Periodontitis, 69
3.2.7 Exposed Dentine Sensitivity, 70
3.2.8 Interproximal Food-Packing, 70
3.2.9 Cracked Cusp/Tooth Syndrome, 72
3.3 Caries Risk/Susceptibility Assessment (CRSA), 72
3.4 Diagnosing Toothwear, 75
3.5 Diagnosing Dental Trauma and Developmental Defects, 76
3.6 Prognostic Indicators, 76
3.7 Formulating a Risk-Related, Personalised Care Plan, 76
3.7.1 Why Is a Personalised Care Plan (PCP) Necessary?, 76
3.7.2 Structuring a Personalised Care Plan, 77
SECTION 2 Minimum Intervention Oral Care (MIOC) – Clinical Domain 2
4 MIOC Domain 2: Disease Control and Lesion Prevention, 83
4.1 Introduction, 83
4.1.1 Disease Control, 83
4.1.2 Lesion Prevention, 83
4.2 Caries Control and Lesion Prevention, 83
4.2.1 Categorising Caries Activity and Risk/Susceptibility Status, 83
4.2.2 Behaviour Change/Modification: The COM-B Model, 84
4.2.3 Standard/Self Care: Low-Risk, Caries-Controlled, Disease-Inactive Patient, 87
4.2.3.1 <i>Plaque Biofilm Control, 87</i>
4.2.3.2 <i>Fluoride, 90</i>
4.2.3.3 <i>Diet, 90</i>
4.2.4 Active Care: High-Risk, Caries-Uncontrolled, Disease-Active Patient, 91
4.2.4.1 <i>Decontamination Procedures, 91</i>
4.2.4.2 <i>Antimicrobial Agents, 91</i>
4.2.4.3 <i>Remineralisation, 92</i>
4.3 Toothwear Control and Lesion Prevention, 99
4.3.1 Process, 99
4.3.2 Lesions, 99
SECTION 3 Minimum Intervention Oral Care (MIOC) – Clinical Domain 3
5 MIOC Domain 3: Minimally Invasive Operative Dentistry, 105

5.1 Clinical Management Guidelines, 106
5.2 The Dental Surgery, Clinic or Office, 107
5.2.1 Positioning the Clinician, Patient and Nurse, 107
5.2.2 Lighting, 108
5.2.3 Zoning, 108
5.3 Infection Prevention and Control/Personal Protective Equipment, 109
5.3.1 Decontamination and Sterilisation Procedures, 109
5.4 Patient Safety and Risk Management, 111
5.4.1 Management of Minor Injuries, 111
5.5 Dental Aesthetics, 112
5.5.1 Colour Perception, 113
5.5.2 Clinical Tips for Shade Selection, 114
5.5.3 MI Management of Tooth Discolouration, 116
5.6 Magnification, 118
5.6.1 Clinical Photography, 121
5.7 Moisture Control, 122
5.7.1 Why? 122
5.7.2 Techniques, 122
5.7.3 Rubber (Dental) Dam Placement: Practical Steps, 123
5.8 Instrumentation in Minimally Invasive Operative Dentistry, 128
5.8.1 Hand Instruments, 128
5.8.2 Rotary Instruments, 131
5.8.3 Using Hand/Rotary Instruments: Clinical Tips, 134
5.8.4 Dental Air-abrasion, 137
5.8.5 Chemo-mechanical Carious Tissue Removal, 137
5.8.6 Other Instrumentation Technologies, 138
5.9 "MI" Operative Management of the Cavitated Carious Lesion, 139
5.9.1 Rationale, 139
5.9.2 Minimally Invasive Dentistry (MID), 140
5.9.2.1 <i>Assessing Clinical Cavitation of a Carious Lesion, 141</i>
5.9.3 Enamel Preparation, 142
5.9.4 Carious Dentine Removal, 145
5.9.4.1 <i>Peripheral Caries Management (EDJ), 146</i>
5.9.4.2 <i>Caries Overlying the Pulp, 147</i>
5.9.4.3 <i>Discriminating Between the Histological Zones of Carious Dentine, 149</i>
5.9.4.4 <i>'Stepwise Excavation' and Atraumatic Restorative Technique, 149</i>
5.9.5 Cavity Modifications, 151
5.10 Pulp Protection, 151
5.10.1 Rationale, 151
5.10.2 Terminology, 153
5.10.3 Materials, 153
5.11 Dental Matrices, 155
5.11.1 Clinical Tips, 156

- 5.11.2 Silicone Matrices, Stents and Splints, 156
- 5.11.3 'Stamp' Matrix Technique, 157

5.12 Temporary/Provisional Restorations, 160

- 5.12.1 Definitions, 160
- 5.12.2 Clinical Tips, 160

5.13 Principles of Dental Occlusion, 160

- 5.13.1 Definitions, 160
- 5.13.2 Terminology, 161
- 5.13.3 Occlusal Registration Techniques, 161
- 5.13.4 Clinical Tips, 162

6 MIOC Domain 3: MI Operative Management of the Badly Broken Down Tooth, 166

6.1 Causes of Broken Down Teeth, 166

6.2 Clinical Assessment of Broken Down Teeth, 166

- 6.2.1 Why Restore the Broken Down (or any) Tooth?, 166
- 6.2.2 Is the Broken Down Tooth Restorable Clinically?, 167

6.3 Intra-coronal Core Restoration, 170

- 6.3.1 Direct Core Retention, 170
- 6.3.2 C-Factor, 170

6.4 Clinical Operative Tips, 171

6.5 Design Principles for Indirect Restorations, 172

- 6.5.1 Design Features, 173

7 MIOC Domain 3: Restorative Materials Used in Minimally Invasive Operative Dentistry, 176

7.1 Introduction, 177

7.2 Dental Resin Composites, 177

- 7.2.1 History, 177
- 7.2.2 Chemistry, 177
 - 7.2.2.1 Resin Matrix, 177
 - 7.2.2.2 Filler Particles, 178
 - 7.2.2.3 Other Chemical Constituents, 180
 - 7.2.2.4 Polymerisation Reaction, 181
- 7.2.3 The Tooth-Resin Composite Interface, 182
 - 7.2.3.1 The Resin Composite-Enamel Interface, 183
 - 7.2.3.2 Resin Composite - Dentine Interface: Dentine Bonding Agents/Dental Adhesives, 184
- 7.2.4 Classification of Dental Adhesives, 186
 - 7.2.4.1 Type 1: Three-Bottle or Three-Step Bonding Systems, 186
 - 7.2.4.2 Type 2: Two-Bottle or Two-Step, 'Total Etch' or 'Etch and Rinse' Adhesives, 187
 - 7.2.4.3 Type 3: Weaker Self-Etching Primers, 187
 - 7.2.4.4 Types 4 and 5: Self-Etching All-in-One/Universal Systems, 189
- 7.2.5 Clinical Issues With Dentine Bonding Agents/Dental Adhesives, 189
- 7.2.6 Developments, 190
 - 7.2.6.1 Reducing Shrinkage Stress and Strain, 190
 - 7.2.6.2 Dentine Bonding Agents, 190
 - 7.2.6.3 'Self-Adhesive Composite', 190

7.3 Glass-Ionomer Cement, 190

7.3.1 History, 190

7.3.2 Chemistry, 190

7.3.3 The Tooth-GIC Interface, 191

7.3.3.1 Enamel, 191

7.3.3.2 Dentine-Collagen, 191

7.3.3.3 Dentine-Tubules, 191

7.3.3.4 Surface Conditioning, 191

7.3.4 GIC Surface Protection, 191

7.3.5 Clinical Uses of GIC Relating to Its Properties, 194

7.3.6 Developments, 195

7.4 Resin-Modified Glass-Ionomer Cement and Polyacid-Modified Resin Composite (Compomer), 195

7.4.1 Chemistry, 196

7.4.1.1 RM-GICs, 196

7.4.1.2 Polyacid-Modified Composites, 196

7.4.2 Clinical Indications, 196

7.5 Dental Amalgam, 197

7.5.1 Chemistry, 197

7.5.2 Physical Properties, 198

7.5.3 Bonded and Sealed Amalgams, 198

7.5.3.1 Bonded Amalgams, 199

7.5.3.2 Sealed Amalgams, 199

7.5.4 Contemporary Indications for the Use of Dental Amalgam, 199

7.6 Temporary and Provisional (Intermediate) Restorative Materials, 199

7.6.1 Characteristics, 199

7.6.2 Chemistry, 200

7.7 Calcium Silicate Cements, 200

7.7.1 History, 200

7.7.2 Chemistry and Interactions With the Tooth, 200

7.7.3 Clinical Applications, 201

7.8 Materials and Techniques for Restoring the Endodontically Treated Tooth, 203

7.8.1 Root Canal Posts, 203

7.8.2 Root Canal Post Cementation, 203

8 MIOC Domain 3: Minimally Invasive Operative Dentistry (MID), a Step-by-Step Clinical Guide, 206

8.1 Introduction, 206

8.1.1 Cavity/Restoration Classification, 206

8.1.2 Restoration Procedures, 207

8.2 Preventive Fissure Sealant, 208

8.3 Therapeutic Sealant Restoration/Preventive Resin Restoration: Type 3 Adhesive, 211

8.4 Posterior Occlusal Resin Composite Restoration (Class I): Type 3 Adhesive, 216

8.5 Posterior Proximal Restoration (Class II), 221

8.5.1 Type 2 Adhesive, 'Moist Bonding', 221

8.5.2 Type 3 Adhesive, 225

8.6 Class III Anterior Restoration: Type 2 Adhesive, 232

8.7 Anterior Incisal Edge/Labial Veneer Composite (Class IV): Type 3 Adhesive (With Enamel Pre-etch), 235

8.8 Buccal Cervical Resin Composite

Restorations (Class V): Type 2 Adhesive, 240

8.9 Posterior 'Bonded' Amalgam

Restoration, 243

8.10 'Nayyar Core' Restoration, 246

8.11 Direct Fibre-Post/Resin Composite Core

Restoration, 247

8.12 Dentine Bonding Agents/Adhesives: A Stepby-

Step Practical Guide for Use, 248

8.13 Checking the Final Restoration, 249

8.14 Patient Instructions, 249

SECTION 4 Minimum Intervention

Oral Care (MIOC) –

Clinical Domain 4

9 MIOC Domain 4: Clinical Re-assessment,

Recall and Maintenance of the Tooth-Restoration

Complex, 253

9.1 Active Surveillance of the Patient/Course of
Disease, 253

9.1.1 Risk-related Re-assessment, 253

9.1.2 Re-assessment Checklist, 254

9.1.3 Monitoring Toothwear, 254

9.2 Restoration Failure, 256

9.2.1 Aetiology, 256

9.2.2 Choice of Restorative Material, 257

9.2.3 How May Restorations Be Assessed?, 259

9.2.4 How Long Should Restorations Last?, 259

9.3 Tooth Failure, 264

9.4 Managing the Failing Tooth-Restoration

Complex: The '5Rs', 264

9.4.1 Dental Amalgam, 267

9.4.2 Resin Composites/GIC, 270

10 MIOC Implementation: Personalised Care
Management Pathways, 273

10.1 MIOC Framework: Summary, 273

10.1.1 Phased Courses of Treatment, 273

10.2 Care Management Pathways: Clinical
Scenarios, 277

10.2.1 How Would You Manage the
Following High-Risk Adult?, 278

10.2.2 How Would You Manage the
Following High-Risk Child?, 282

10.2.3 How Would You Manage the Following
High-Risk Older Adult Patient?, 285

10.2.4 How Would You Manage the Following
Low-Risk Adult Patient?, 288

Index, 290