


Fundamentals of Periodontal Instrumentation & Advanced Root Instrumentation

Enhanced Eighth Edition



Jill S. Gehrig
Rebecca Sroda
Darlene Saccuzzo

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Quick Find Guide

1	Ergonomics and Periodontal Instrumentation
2	Clinician Position in Relation to the Treatment Area
3	Instrument Grasp
4	Use of Dental Mouth Mirror
5	Finger Rests in the Anterior Sextants
6	Finger Rests in Mandibular Posterior Sextants
7	Finger Rests in Maxillary Posterior Sextants
8	Instrument Design and Classification
9	Technique Essentials: Movement and Orientation to Tooth Surface
10	Technique Essentials: Adaptation
11	Technique Essentials: Instrumentation Strokes
12	Periodontal Probes and Basic Probing Technique
13	Explorers
14	Technique Essentials: Supragingival Calculus Removal
15	Sickle Scalers
16	Technique Essentials: Subgingival Calculus Removal
17	Universal Curets
18	Advanced Probing Techniques
19	Area-Specific Curets
20	Specialized Periodontal Instruments
21	Advanced Techniques for Root Instrumentation
22	Fictitious Patient Cases: Communication and Planning for Success
23	Concepts for Instrument Sharpening
24	Instrument Sharpening Techniques
25	Pain Control During Periodontal Instrumentation
26	Powered Instrument Design and Function
27	Air Polishing for Biofilm Management
	Appendix: Problem Identification: Difficulties in Instrumentation
Online @ thePoint	1B. Getting Ready for Instrumentation: Mathematical Principles & Anatomical Descriptors 20B. Dental Implants 21B. Alternate Clock Positions 26B. Cosmetic Polishing Procedures 27B. Set-Up of Air Polishing Devices Glossary

Fundamentals of Periodontal Instrumentation & Advanced Root Instrumentation

EiGHt H EDit iOn

Jill S. Gehrig, RDH, MA

Dean Emeritus, Division of Allied Health & Public Service Education
Asheville-Buncombe Technical Community College
Asheville, North Carolina

Rebecca Sroda, RDH, MS

Dean, Health Sciences
South Florida State College
Avon Park, Florida

Darlene Saccuzzo, CDA, RDH, BASDH

Professor, Dental Education
South Florida State College
Avon Park, Florida



Philadelphia • Baltimore • New York • London
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Acquisitions Editor: Jonathan Joyce
Product Development Editor: John Larkin
Editorial Assistant: Tish Rogers
Marketing Manager: Leah Thomson
Production Project Manager: David Saltzberg
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Contributors

Christine Dominick, CDA, RDH, MEd
Associate Professor
Forsyth School of Dental Hygiene
Massachusetts College of Pharmacy and
Health Sciences
Boston, Massachusetts

Richard Foster, DMD
Dental Director
Guilford Technical Community College
Jamestown, North Carolina

Cynthia Biron Leisica, RDH, EMT, MS
President, DH Meth-Ed, Inc.
Dental Hygiene Methodology
Tallahassee, Florida

Sharon Logue, RDH, MPH
Virginia Department of Health
Dental Health Program
Richmond, Virginia

Robin B. Matlof, RDH, BSDH, JD
Professor, Dental Hygiene Program
Mount Ida College
Newton, Massachusetts

Kimberly nason, MSDH
Instructor, Dental Education Program
South Florida State College
Avon Park, Florida

Lydia t. Pierce, LPT
Physical Medicine and Rehabilitation
Asheville, North Carolina

Bobby A. Sconyers, BA, CDA
Professor, Dental Education
South Florida State College
Avon Park, Florida

Cherie M. Stevens, PhD
Professor, Computer Science
South Florida State College
Avon Park, Florida

Donald E. Willmann, DDS, MS
Professor Emeritus, Department of
Periodontics
University of Texas Health Science Center
at San Antonio
San Antonio, Texas

Reviewers

Denise Avrutik
LynnAnn Bryan
Michelle Ezzell
Jane Gray
Connie Grossman

Joyce Hudson
Susan Jenkins
Mark Kacerik
Michelle Klenk
Connie Preiser

Pamela Quinn
Shawna Rohner
Rebecca Smith
Dawn Smith
Debbie Zuern

Preface for Course Instructors

Fundamentals of Periodontal Instrumentation & Advanced Root Instrumentation, Eighth Edition is an instructional guide to periodontal instrumentation that takes students from the basic skills—patient positioning, intraoral finger rests, and basic instrumentation—all the way to advanced techniques—assessment of periodontal patients and instrumentation of the root branches of multirrooted teeth, root concavities, and furcation areas. The foremost instructional goal of *Fundamentals* is to make it easy for students to learn and faculty to teach instrumentation. The eighth edition retains the features that have made it the market-leading textbook on periodontal instrumentation and adds new features and content organization designed to facilitate learning and teaching.

ONLINE INSTRUCTOR TEACHING RESOURCES

The online Faculty Resource section has a collection of instructional aids for use in teaching instrumentation. These resources are located online at thePoint website (<http://thePoint.lww.com/GehrigFundamentals8e>).

- 1. PowerPoint Slides.** The PowerPoint slides were designed so as to be user-friendly for wide variety of software versions and equipment.
 - The PowerPoint presentations may be customized by saving the slides to your computer hard drive and using the formatting features of your slide presentation software.
 - Special effects, such as progressive disclosure, may be added to the slide presentations using the custom animation features of your slide presentation software. In addition, individual slides may be deleted and new instructor-created slides added to the presentations.
- 2. Test Bank.** The test bank questions can be used for quizzes, combined to make up unit tests, or combined to create midterm and final examinations.
- 3. Instructor Guide.** The instructor guide includes:
 - Suggestions for leading classroom discussions.
 - A list of phrases that facilitate the teaching of instrumentation.
 - Teaching tips for instruction, as well as, sources for periodontal typodonts.
 - Guidelines for introduction of alternate and advanced techniques.
- 4. Module Evaluation Forms.** Evaluation forms for instructor grading are now located online in two formats.
 - Evaluations for Computerized Grading. These forms are designed to allow the instructor to enter grades and comments directly on a computer.
 - Evaluations for Paper Grading. These forms are designed to be printed out and used for “paper and pen” manual grading. Paper forms include evaluation forms for each module.

COntEnt ORGAniZAtiOn

From an instructional viewpoint, it is important to note that *each major instrument classification is addressed in a stand-alone module*—sickle scalers, universal curets, and area-specific curets. Each stand-alone module provides complete step-by-step instruction in the use of an instrument classification. For example, the module on universal curets provides complete instruction on the use of universal curets. This chapter does not rely on the student having studied the previous module on sickle scalers before beginning the universal curet module. This stand-alone module structure means that it is not necessary to cover the instrument modules in any particular order or even to include all of the modules. If sickle scalers, for example, are not part of the school's instrument kit, this module does not need to be included in the course outline.

tExt BOOK FEAtURES

- 1. Module outlines.** Each chapter begins with a module outline that provides an overview of content and makes it easier to locate material within the module. The outline provides the reader with an organizational framework with which to approach new material.
- 2. Learning objectives** assist students in recognizing and studying important concepts in each chapter.
- 3. Step-by-step format.** The clear, step-by-step self-instructional format allows the learner to work independently—fostering student autonomy and decision-making skills. The learner is free to work at his or her own pace spending more time on a skill that he or she finds difficult and moving on when a skill comes easily. The self-instructional format relieves the instructor from the task of endlessly repeating basic information, and frees him or her to demonstrate instrumentation techniques, observe student practice, and facilitate the process of skill acquisition.
- 4. Key terms** are listed at the start of each module. One of the most challenging tasks for any student is learning a whole new dental vocabulary and gaining the confidence to use new terms with accuracy and ease. The key terms list assists students in this task by identifying important terminology and facilitating the study and review of terminology in each instructional module.
- 5. Study aids**—boxes, tables, and flow charts—visually highlight and reinforce important content and permit quick reference during technique practice and at-home review.
- 6. Critical thinking activities**—in the *Practical Focus* sections of the book—encourage students to apply concepts to clinical situations, facilitate classroom discussion, and promote the development of student problem-solving skills.
- 7. Case-based patient experiences** allow students to apply instrumentation concepts to patient cases.
- 8. The glossary of instrumentation terms** provides quick access to instrumentation terminology.
- 9. Student self-evaluation checklists** guide practice, promote self-assessment skills, and provide benchmarks for faculty evaluation of skill attainment. Use of the student self-evaluation portion of the evaluation forms should be encouraged. The self-evaluation process helps students to develop the ability to assess their own level of competence rather than relying on instructor confirmation of skill attainment.

ONLINE CONTENT

In addition to the Student and Instructor Resources, the following resources are located online at thePoint website (<http://thePoint.lww.com/GehrigFundamentals8e>).

- 1B. Getting Ready for Instrumentation: Mathematical Principles & Anatomical Descriptors
- 20B. Instrumentation of Dental Implants
- 21B. Alternate Clock Positions
- 26B. Cosmetic Polishing Procedures
- 27B. Set-Up of Hu-Friedy/EMS Air Flow Polishing Devices

I appreciate the enthusiastic comments and suggestions from educators and students about previous editions of *Fundamentals*, and welcome continued input. Mastering the psychomotor skill of periodontal instrumentation is a very challenging process. It is my sincere hope that this textbook will help students to acquire the psychomotor skills that—combined with clinical experience—will lead to excellence in periodontal instrumentation.

Jill S. Gehrig, RDH, MA

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It is gratifying to be members of a profession that includes so many individuals who strive for excellence in teaching. We are most grateful to all of the outstanding educators who shared their comments and suggestions for improving this edition. We thank all who generously gave their time, ideas, and resources, and gratefully acknowledge the special contributions of the following individuals:

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Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

Contents

Module 1 **ERGOOn OMiCS An D PERiODOOn t ALin St RUMEn t At iOn** **1**

Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

Ergonomic Risk Factors Associated with Periodontal Instrumentation 3

Foundational Skills for Periodontal Instrumentation 9

Ergonomic Dos and Don'ts for Seated Posture 11

Application of Ergonomic Principles: Seated Posture 14

Application of Ergonomic Principles: Positioning the Patient 19

Application of Ergonomic Principles: Adjusting the Overhead Light and
Instrument Tray 23

Application of Ergonomic Principles: Adjusting the Patient to Facilitate
Clinician Posture 25

Ancillary Equipment 28

Skill Application 36

Module 2 **CLin iCiAn POSit iOn in RELAt iOn t O t HE t REAt MEn t AREA** **39**

Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

Clock Positions for Instrumentation 41

Positioning for the RIGHT-Handed Clinician 43

Positioning for the LEFT-Handed Clinician 54

Modified Positioning: Working from a Standing Position 65

Skill Application 66

Module 3 **in St RUMEn t GRASP** **69**

Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

Grasp for Periodontal Instrumentation 71

Grasp Variations 76

Predisposing Conditions for Hand Injuries 78

Exercises for Improved Hand Strength 82

Skill Application 86

- Module 4** **USE OF t HE DEnt ALMOUt H MiRROR 89**
 Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo
 Fundamentals of Mirror Use 91
 Is Achieving Direct Vision Really Best? 96
 Technique Practice: RIGHT-Handed Clinician 98
 Technique Practice: LEFT-Handed Clinician 103
 Skill Application 109
- Module 5** **Fin GER REST S in t HE An t ERiORSExt An t S 110**
 Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo
 The Intraoral Fulcrum 112
 Wrist Position for Instrumentation 114
 Technique Practice: RIGHT-Handed Clinician 118
 Technique Practice: LEFT-Handed Clinician 131
 Skill Application 145
- Module 6** **Fin GER REST S in MAn DiBULAR POS t ERiORSExt An t S 147**
 Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo
 Building Blocks for Posterior Sextants 149
 Technique Practice: RIGHT-Handed Clinician 151
 Technique Practice: LEFT-Handed Clinician 158
 Skill Application 166
- Module 7** **Fin GER REST S in MAXiLLARy POS t ERiORSExt An t S 169**
 Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo
 Building Blocks for Posterior Sextants 171
 Technique Practice: RIGHT-Handed Clinician 173
 Technique Practice: LEFT-Handed Clinician 180
 Preventive Strategies: Stretches 187
 Skill Application 190
- Module 8** **in St RUMEn t DESiGn An D CLASSiFiCA t iOn 193**
 Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo
 Design Characteristics of Instrument Handle 195
 Design Characteristics of Instrument Shank 198
 Design Characteristics of Instrument Working-End 202
 Introduction to Instrument Classification 207
 Skill Application 210
- Module 9** **t ECHn iQUE ESSEnt iALS: MOv EMEn t An D ORiEn t At iOn
 t O t OOt H SURFACE 213**
 Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo
 Learning Periodontal Instrumentation 215
 Moving the Instrument's Working-End 219
 Rolling the Instrument Handle 223

Pivoting on the Fulcrum 224
Orientation of Instrument to Tooth Surface 225
Skill Application 231

Module 10 **t ECHn iQUE ESSEn t iALS: ADAPt At iOn 232**

Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

Adaptation of the Working-End 234
Ergonomics of the Handle Roll for Adaptation 237
Selecting the Correct Working-End 240
Skill Application 243

Module 11 **t ECHn iQUE ESSEn t iALS: in St RUMEn t At iOn St ROKES 246**

Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

The Instrumentation Stroke 248
Use of Pressure During Instrumentation 253
Skill Application 258

Module 12 **PERiODOnt AL PROBES An D BASiC PROBin G
t ECHn iQUE 260**

Jill S. Gehrig, Robin Matloff, Rebecca Sroda, and Darlene Saccuzzo

The Periodontal Probe 262
Assessing Tissue Health 266
Reading and Recording Depth Measurements 269
Probing Technique 272
Informed Consent for Periodontal Instrumentation 281
Skill Application 284

Module 13 **EXPLORERS 286**

Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

Explorers 288
Technique Practice—Anterior Teeth 293
Technique Practice—Posterior Teeth 300
Technique Alerts 307
Detection of Dental Calculus Deposits 309
Detection of Dental Caries 314
Skill Application 318

Module 14 **t ECHn iQUE ESSEn t iALS: SUPRAGin Giv AL CALCULUS
REMOv AL 321**

Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

Supragingival Calculus Deposits 323
Relationship of the Instrument Face to the Tooth Surface 324
Application of Force for Calculus Removal 327
Stroke Pattern for Supragingival Calculus Removal 329
Skill Application 332

- Module 15** **SICKLE SCALERS 333**
 Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo
- Sickle Scalers 335
 - Calculus Removal Concepts 338
 - Technique Practice—Anterior Teeth 341
 - Maintaining Adaptation to Proximal Surfaces 345
 - Technique Practice—Posterior Teeth 349
 - Technique Practice—Primary Teeth 356
 - Skill Application 359
- Module 16** **TECHNIQUE ESSENTIALS: SUBGINGIVAL CALCULUS REMOVAL 362**
 Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo
- The Sense of Touch for Subgingival Instrumentation 364
 - Inserting a Curet Beneath the Gingival Margin 366
 - The Theory Behind Subgingival Instrumentation 372
 - Systematic Pattern for Subgingival Calculus Removal 375
 - Production of a Calculus Removal Stroke 378
 - Skill Application 384
- Module 17** **UNIVERSAL CURETS 385**
 Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo
- Universal Curets 387
 - Calculus Removal Concepts 390
 - Technique Practice—Posterior Teeth 392
 - Technique Alert—Lower Shank Position 403
 - Technique Practice—Anterior Teeth 405
 - Technique Alert—Horizontal Strokes 410
 - Skill Application 412
- Module 18** **ADVANCED PROBING TECHNIQUES 415**
 Jill S. Gehrig, Rebecca Sroda, Darlene Saccuzzo and Christine Dominick
- The Periodontal Attachment System 417
 - Assessments with Calibrated Probes 420
 - Assessments that Require Calculations 427
 - Assessments with Furcation Probes 432
 - Skill Application 444
- Module 19** **AREA-SPECIFIC CURETS 450**
 Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo
- Area-Specific Curets 452
 - Technique Practice—Anterior Teeth 459
 - Technique Practice—Posterior Teeth 463
 - Instrumentation Techniques on Root Surfaces 474
 - Production of a Root Debridement Stroke 477

Design Overview: Scalers and Curets 479
Skill Application 481

Module 20 **SPECIALIZED PERIODONTAL ALINSTRUMENTS 487**

Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

Periodontal Files 489
Modified Langer Curets 497
Modified Gracey Curets for Advanced Root Instrumentation 499
Quétin, O’Hehir, DeMarco Curets and Diamond-Coated Instruments 507
Subgingival Dental Endoscope 513
Skill Application 516

Module 21 **ADVANCED TECHNIQUES FOR ROOT INSTRUMENTATION 518**

Jill S. Gehrig, Cynthia Biron Leisica, Rebecca Sroda, and Darlene Saccuzzo

Anatomical Features that Complicate Instrumentation of Root Surfaces 521
Introduction to Root Instrumentation 529
Advanced Intraoral Techniques for Root Instrumentation 533
Advanced Extraoral Fulcruming Techniques 536
Technique Practice: Extraoral Finger Rests for Right-Handed Clinicians 542
Technique Practice: Horizontal Strokes for Right-Handed Clinicians 549
Technique Practice: Extraoral Finger Rests for Left-Handed Clinicians 552
Technique Practice: Horizontal Strokes for
Left-Handed Clinicians 559
Skill Application 563

Module 22 **FICTITIOUS PATIENT CASES: COMMUNICATION AND
PLANNING FOR SUCCESS 564**

Jill S. Gehrig, Rebecca Sroda, Darlene Saccuzzo

Understanding and Explaining Instrumentation 566
Planning for Calculus Removal 571
Practical Focus—Fictitious Patient Cases 574

Module 23 **CONCEPTS FOR INSTRUMENT SHARPENING 592**

Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

Introduction to Sharpening Concepts 594
Preserving Working-End Design 599
Planning for Instrument Maintenance 604
Sharpening Armamentarium 605
Skill Application 609

Module 24 **INSTRUMENT SHARPENING TECHNIQUES 610**

Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

Removing Metal to Restore a Sharp Cutting Edge 612
The Moving *Instrument* Technique 616
The Moving *Stone* Technique 624
Evaluating Sharpness 636

Sharpening a Periodontal File 637
Skill Application 639

Module 25 **Pain Control During Periodontal Instrumentation in the Office 640**

Donald E. Willmann

Pain Control During Dental Hygiene Care 642
Strategies to Allay the Fear of Pain During Periodontal Instrumentation 644
Using Local Anesthesia for Pain Control During Periodontal Instrumentation 647

Module 26 **Powered Instrumentation Design and Function 657**

Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

Introduction to Powered Instrumentation 660
Powered Working-End Design 676
Adaptation—Orientation of Working-End to Tooth 682
Transverse Working-End Orientation for Calculus Removal from Coronal Surfaces and Slightly Below the Gingival Margin 685
Vertical Working-End Orientation for Use in Periodontal Pockets 689
Instrumentation Challenges 691
Technique Hints for Powered Instrumentation 695
Set-Up of an Ultrasonic Unit 699
Skill Application 702

Module 27 **Air Polishing for Biofilm Management and Stain Removal 709**

Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

The Significance of Biofilm Management 711
Methods of Biofilm Management 712
Clinical Evidence for Subgingival Air Polishing 720
Supragingival Polishing: Using a Standard Nozzle and Conventional Sodium Bicarbonate Powder 721
Subgingival Polishing Using a Standard Metal Nozzle and Glycine-Based Powder 723
Subgingival Polishing Using a Flexible Plastic Tip and Glycine-Based Powder 726
Posttreatment Precautions and Instructions 732
Skill Application 733

Appendix **Problem Identification: Difficulties in the Office 737**

Jill S. Gehrig

Online Content (<http://thepoint.lww.com/GehrigFundamentals8e>)

**Module 1B GET t in G READy FOR in St RUMEn t At iOn : MAt HEMAt iCAL
PRin CiPLES An D An At OMiC DESCRiPt ORS**

Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

Module 20B DEBRiDEMEn t OF DEn t ALiMPLAn t S

Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

Module 21B AI t ERn At E CLOCK POSit iOn S

Cynthia Biron Leisica

Module 26B COSMEt iC POLiSHin G PROCEDURES

Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

Module 27B SEt -UP OF AiR POLiSHin G DEv iCES

Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

St UDEn t An D in St RUCt OR RESOURCES

Sharon Logue, Rebecca Sroda, and Jill S. Gehrig, Rebecca Sroda, and Darlene Saccuzzo

Glossary

1

Ergonomics and Periodontal Instrumentation

Module Overview

This module introduces the principles of positioning for periodontal instrumentation. Correct positioning techniques help to (1) prevent clinician discomfort and injury, (2) permit a clear view of the tooth being worked on, (3) allow easy access to the teeth during instrumentation, and (4) facilitate efficient treatment of the patient. **Prior to beginning this module, readers should review the online resource: Getting Ready for Instrumentation: Mathematical Principles and Anatomical Descriptors.**

Module Outline

Section 1

Ergonomic Risk Factors Associated with Periodontal Instrumentation

3

What is Ergonomics and Why Should Hygienists Care?
Ergonomic Hazards for Dental Hygienists
Musculoskeletal Problems Common in Dental Hygienists

Section 2

Foundational Skills for Periodontal Instrumentation

9

Section 3

Ergonomic Dos and Don'ts for Seated Posture

11

Neutral Position for the Clinician

Section 4

Application of Ergonomic Principles: Seated Posture

14

[Skill Building. Neutral Seated Position for the Clinician, p. 14](#)
[Skill Building. The Masking Tape Trick, p. 17](#)
Important Elements of the Seated Position

Section 5

Application of Ergonomic Principles: Positioning the Patient

19

Supine and Semi-Supine Patient Position
Patient Head Position
Patient Head Adjustment for Optimal Visibility

Section 6

Application of Ergonomic Principles: Adjusting the Overhead Light and Instrument Tray

23

Positioning the Overhead Dental Light
Positioning the Instrument Tray

1

Section 7

Application of Ergonomic Principles: Adjusting the Patient to Facilitate Clinician Posture 25

Skill Building. Establishing the Height of the Patient Chair, p. 27

Section 8

Ancillary Equipment 28

Dental Headlights: Coaxial Illumination

Magnification Loupes

Section 9

Skill Application 36

Practical Focus: Selecting a Clinician Stool

Online Module Skill Evaluations

Student Self-Evaluation Module 1: Position



Access the online module, Getting Ready for Instrumentation: Mathematical Principles and Anatomical Descriptors.

This module can be viewed at <http://thepoint.lww.com/GehrigFundamentals8e>

Key Terms

ergonomics

Musculoskeletal

disorder

Posture

Neutral posture

Static posture

Force

Repetitive task

Supine position

Semi-supine position

Chin-up position

Chin-down position

Coaxial illumination

sources

dental headlights

Magnification loupes

Working distance

Angle of declination

depth of field

Field of view

Blind zone

Learning Objectives

- define the term ergonomics and discuss how ergonomic principles are helpful in the practice of dental hygiene.
- define the term musculoskeletal disorder (MSD) and discuss the significance of MSDs in the practice of dental hygiene.
- Name four ergonomic hazards for dental hygienists.
- develop an understanding and appreciation for ergonomic guidelines to minimize the exposure of dental hygienists to musculoskeletal stress.
- Identify musculoskeletal disorders commonly experienced by dental health professionals, their causes and prevention.
- discuss and demonstrate the elements of neutral seated posture for the clinician.
- demonstrate correct patient position relative to the clinician and positioning of dental equipment so that it enhances neutral clinician posture.
- State the reason why it is important that the top of the patient's head is even with top edge of the chair headrest. demonstrate how to correctly position a short individual and a child in the dental chair so that (1) the patient is comfortable and (2) the clinician has good vision and access to the oral cavity.
- In the preclinical or clinical setting, self-evaluate to identify the use of incorrect ergonomic principles and demonstrate how to correct the problem(s).

Section 1

Ergonomic Risk Factors Associated with Periodontal Instrumentation

WHAT IS ERGONOMICS AND WHY SHOULD HYGIENISTS CARE?

1. **Ergonomics** is an applied science concerned with the ‘fit’ between people and their technological tools and environments (1).
 - A. In application, ergonomics is a discipline focused on making products and tasks comfortable and efficient for the user.
 1. A primary ergonomic principle is that equipment—such as computer keyboards and workstations—should be designed to fit the user instead of forcing the user to fit the equipment.
 2. Ergonomics is the science of making things efficient. Efficiency is quite simply making something easier to do.
 - B. **Poor Ergonomic Working Conditions and Working Practices.** When the fit between an individual and his or her tools and working environment is less than optimal studies show that worker comfort, productivity, and workplace safety all suffer (1). For dental hygienists the work environment includes the dental office layout, dental equipment, and instruments.
2. **Musculoskeletal Stresses and the Dental Professional.** The dental literature indicates that both dentists and hygienists are exposed to ergonomic risk factors that often lead to discomfort, pain, and even disability.
 - A. A **musculoskeletal disorder (MSD)** is a condition where parts of the musculoskeletal system—muscles, tendons, nerves—are injured over time.
 1. MSDs occur when too much stress is exerted on a body part resulting in pain. When a body part is overused repeatedly the constant stress causes damage.
 2. Almost all occupations require workers to use their arms and hands. Therefore, most MSDs affect the hands, wrists, elbows, neck, and shoulders.
 - B. **Prevalence of Musculoskeletal Problems in Dental Professionals**
 1. Many studies have investigated the prevalence of MSDs among dental professionals. A systemic review on this topic found that the prevalence of MSDs ranged as high as 64% to 93% (2).
 2. Despite this high prevalence, there is a lack of evidence regarding the efficacy of preventive measure for MSDs for the dental hygiene profession (3). A complete understanding of the progression of MSDs in dental hygienists is still far from being realized, due to the lack of longitudinal studies and standardized research techniques (3–5).
 - C. **Causes of Musculoskeletal Pain in Dental Professionals**
 1. The literature indicates that the causes of MSDs among periodontists and dental hygienists include excessive use of small hand muscles, forceful repetitive motions while maintaining muscles in same position during application of force, tight grips, and a fixed work position (maintaining the body in one position for extended periods) (2–13).
 2. The result is injury to the muscles, nerves, and tendon sheaths of the back, shoulders, neck, arms, elbows, wrists, and hands that can cause loss of strength, impairment of motor control, tingling, numbness, or pain.

4 Fundamentals of Periodontal Instrumentation & Advanced Root Instrumentation

3. Given the high incidence of musculoskeletal pain, it is important for clinicians to understand the causes of MSDs and to take actions to prevent them.

D. Ergonomic Guidelines in Dentistry

1. It is important that dental hygiene students complete instructional modules on ergonomic principles during their education and training (3,5).
2. Research shows that among practicing hygienists, education on patient and clinician positioning can help reduce the risk of MSDs (4,14,15).
3. It is possible to define ergonomic guidelines to minimize exposure of dental healthcare providers to musculoskeletal stress.

ERGONOMIC HAZARDS FOR DENTAL HYGIENISTS

Four significant ergonomic hazards during periodontal instrumentation are (1) awkward clinician posture, static (fixed) working position, the force placed on a body part, and (4) repetitive movements. Figure 1-1 summarizes these hazards that can lead to musculoskeletal injury.

1. **Awkward Postures.** **Posture** is a term for the position of various parts of the body during an activity.
 - A. For most joints, ideal or **neutral posture** means that the joint is being used near the middle of its full range of motion.
 - B. The further a joint moves away from neutral posture, the more strain is placed on the muscles, tendons, and ligaments around the joint (37). For example, if an individual stands with his or her arms outstretched in front of the body, the elbow and shoulder joints are at their range of motion. If the individual pulls or lifts repeatedly in this outstretched position—versus held close to the body—there is a high risk of injury.
 - C. The literature confirms the presence of awkward postures specifically in the neck, shoulders, back, wrist, and hand for dental hygienists. Awkward postures often are adopted due to improper adjustment of the clinician’s chair, improper patient position in relation to the clinician, and poor work techniques.
 - D. When dental hygienists use their bodies in awkward positions, the muscles must generate higher forces to accomplish a task than when muscles are used in a neutral position (38).
 - E. A common awkward posture in dental hygienists is wrist flexion, which results in stress to neurovascular structures and ligaments. Poor wrist positioning can diminish grip strength (39). Figure 1-2 shows the reduction in strength that occurs as the wrist deviates further away from its neutral posture (37).

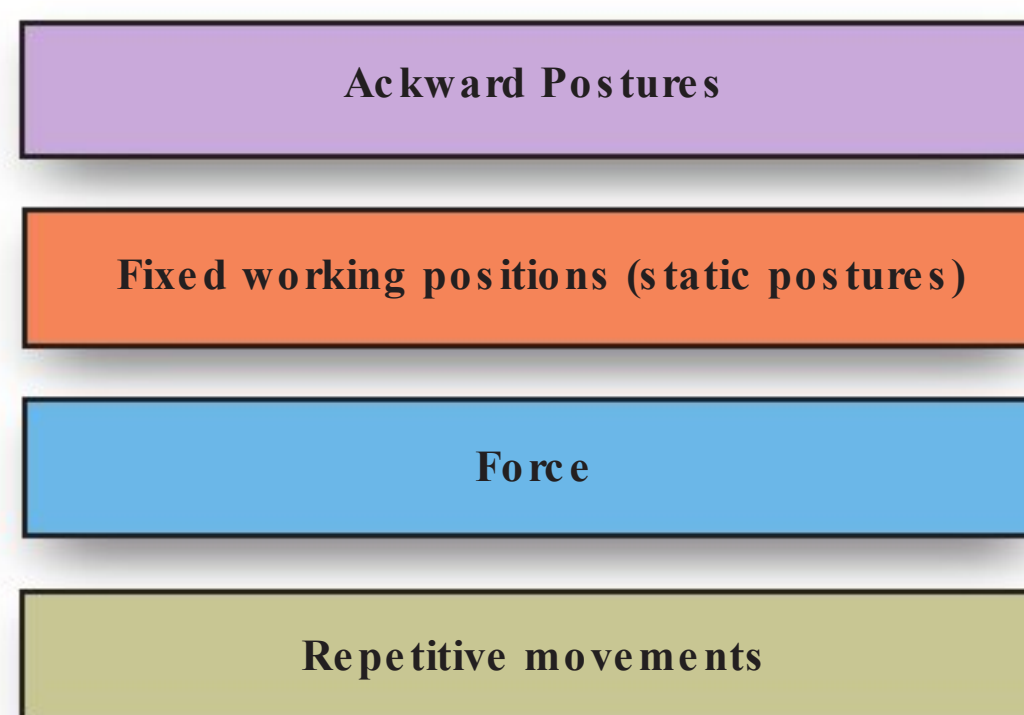


Figure 1-1. Ergonomic Hazards for Dental Hygienists. The dental hygienist has a high risk of musculoskeletal injury when awkward postures, static postures, and repetitive motions are combined with forceful movements (42–45).

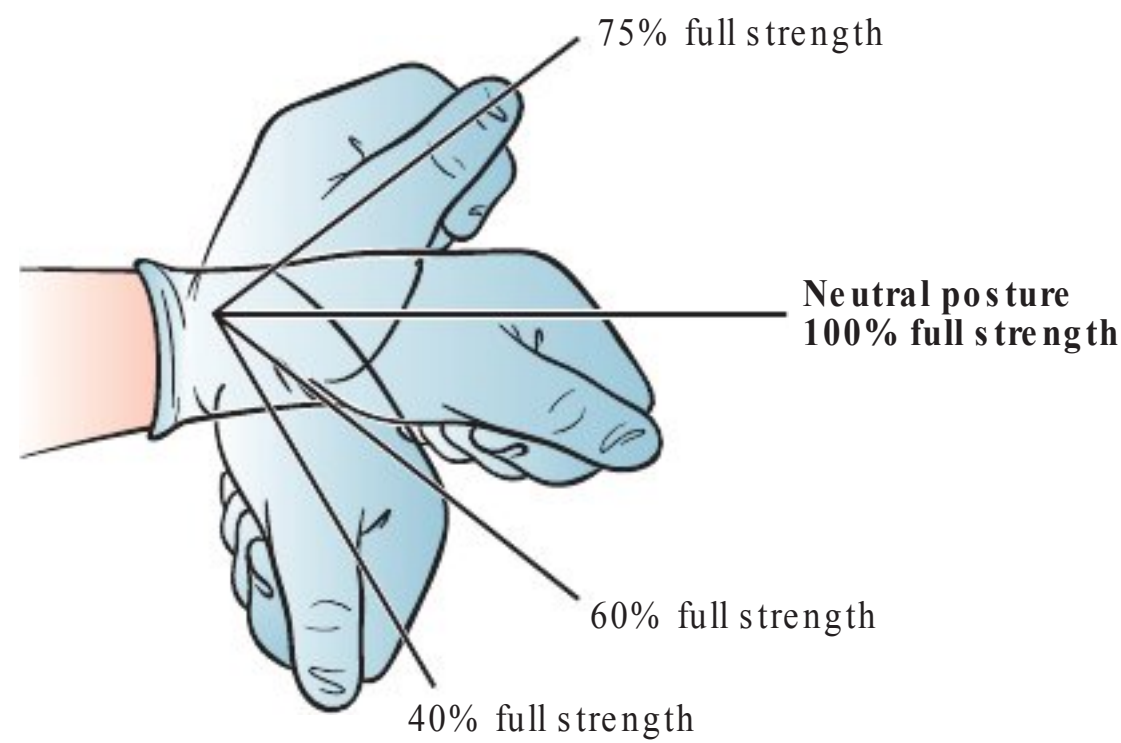


Figure 1-2. Effect of Poor Positioning on Wrist Strength. This illustration shows the reduction in strength that occurs as the wrist deviates away from its neutral position (37).

2. Static Postures

- A. A **static posture** is defined as a fixed working position (maintaining the body in one position for an extended period of time) (1). The human body was not designed to maintain the same body position—prolonged static posture—hour after hour, day after day. In a static position, tensed muscles compress the blood vessels and reduce blood flow decreasing the oxygen and energy supply to the muscles. Waste products from the muscles accumulate causing muscle fatigue and eventually pain (1).
- B. Dental clinicians have been observed statically holding postures that require greater than 50% of the body's musculature to contract (37).
- C. Static gripping of instrument handles for durations exceeding 20 minutes is common during periodontal instrumentation (40).

3. Force

- A. **Force** refers to the amount of effort created by the muscles, as well as, the amount of pressure placed on a body part.
- B. Holding a small instrument for a prolonged period of time is an example of a gripping task requiring high force application. This task is commonly performed with a pinch grip where the fingers are on one side of the object and the thumb is on the other. This form of gripping is undesirable, as it requires a much greater force application than holding an object in the palm of the hand.
- C. Researchers suggest that excessive use of a pinch grip is the greatest contributing risk factor in the development of MSDs among dental hygienists (40,41).

4. Repetitive Movements

- A. Silverstein (42), in an article in the British Journal of Industrial Medicine, defined a **repetitive task** as a task that involves the same fundamental movement for more than 50% of the work cycle. Periodontal instrumentation would certainly be categorized as a repetitive task under this definition.
- B. The human body was not designed to engage in fine hand movements hour after hour, day after day. The risk of developing an MSD increases when the same or similar parts of the body are used continuously, with few breaks or changes for rest (37).
- C. Periodontal instrumentation requires excessive upper-body immobility while the tendons and muscles of the forearms, hands, and fingers overwork. Three critical components to consider with repetitive motions include:
 1. Frequency: how many times an action is repeated; such as how many instruments are gripped by one hand throughout the day.
 2. Duration: how long an action is performed; such as the length of time sitting in a static posture during the workday.
 3. Recovery time: periods of rest that break a repetitive cycle, such as time spent doing muscle stretches between patients.

MUSCULOSKELETAL PROBLEMS COMMON IN DENTAL HYGIENISTS

MSDs commonly experienced by dental hygienists and periodontists are illustrated in Figures 1-3 to 1-10.

Figure 1-3. Thoracic Outlet Syndrome

1. Definition

A painful disorder of the fingers, hand, and/or wrist due to the compression of the brachial nerve plexus and vessels between the neck and shoulder

2. Causes

Tilting the head forward, hunching the shoulders forward, and continuously reaching overhead

3. Symptoms

Numbness, tingling, and/or pain in the fingers, hand, or wrist

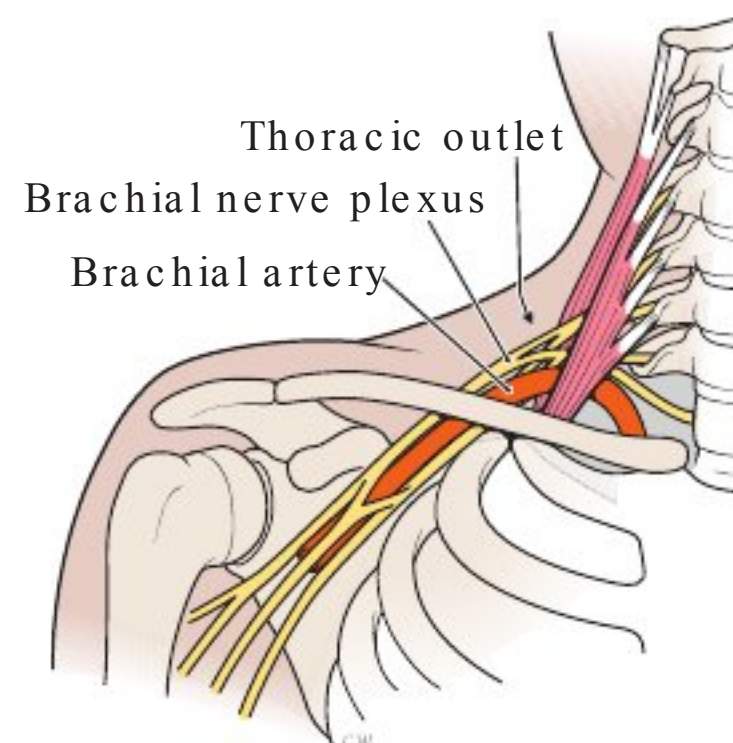


Figure 1-4. Rotator Cuf Tendinitis

1. Definition

A painful inflammation of the muscle tendons in the shoulder region

2. Causes

Holding the elbow above waist level and holding the upper arm away from the body

3. Symptoms

Severe pain and impaired function of the shoulder joint

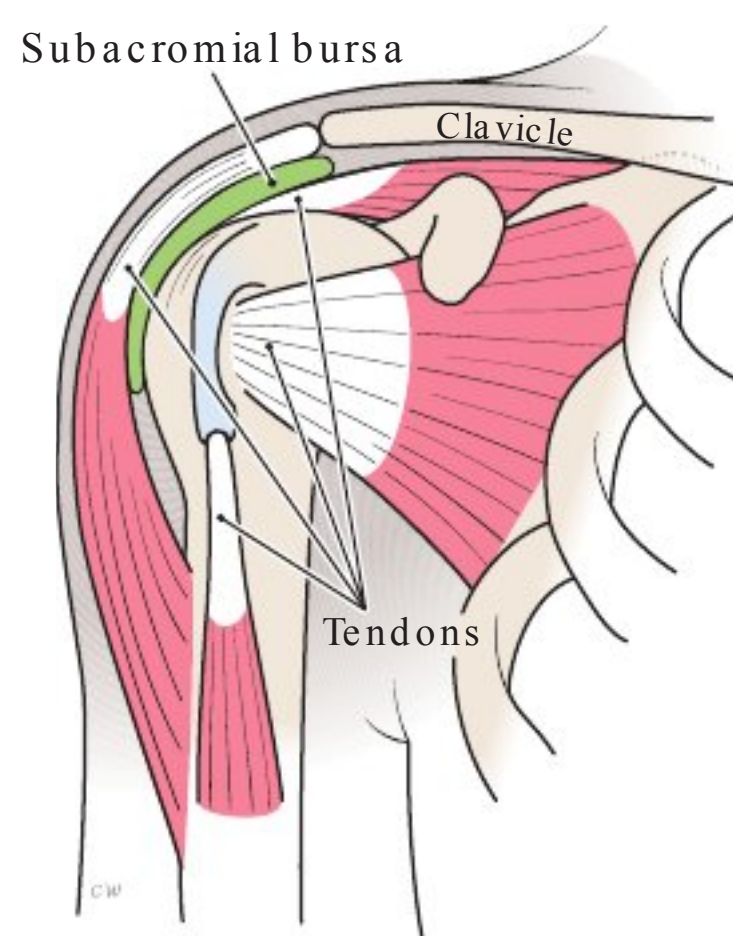


Figure 1-5. Pronator Syndrome

1. Definition

A painful disorder of the wrist and hand caused by compression of the median nerve between the two heads of the pronator teres muscle

2. Causes

Holding the lower arm away from the body

3. Symptoms

Similar to those of carpal tunnel syndrome

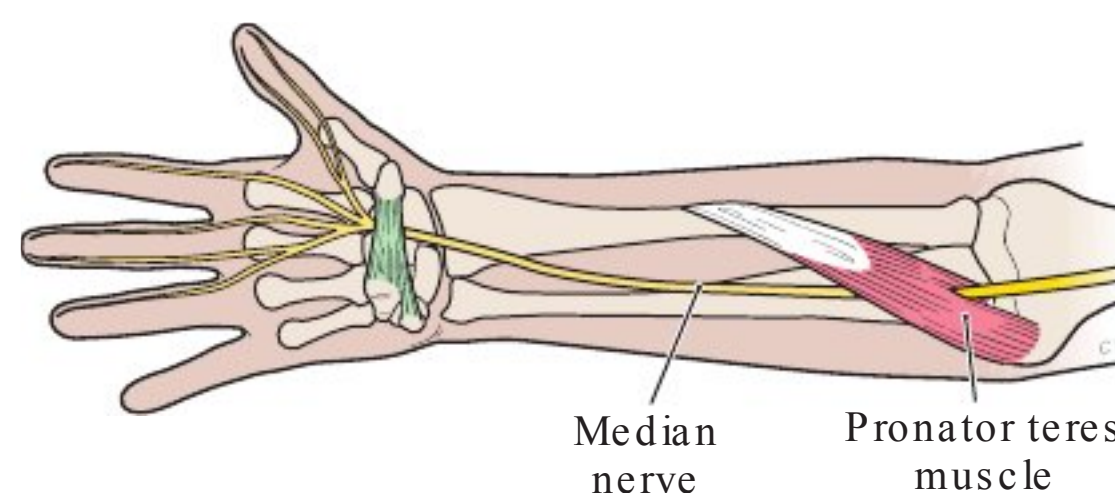


Figure 1-6. Extensor Wad Strain**1. Definition**

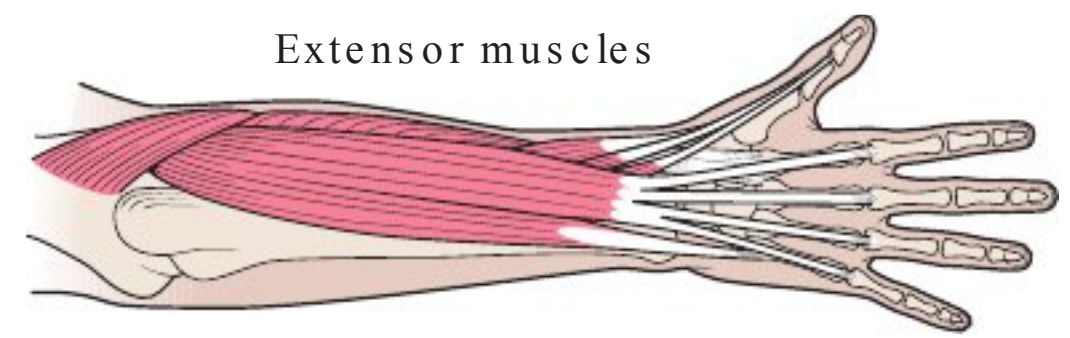
A painful disorder of the fingers due to injury of the extensor muscles of the thumb and fingers

2. Causes

Extending the fingers independently of each other

3. Symptoms

Numbness, pain, and loss of strength in the fingers

**Figure 1-7. Carpal Tunnel Syndrome (CTS)****1. Definition**

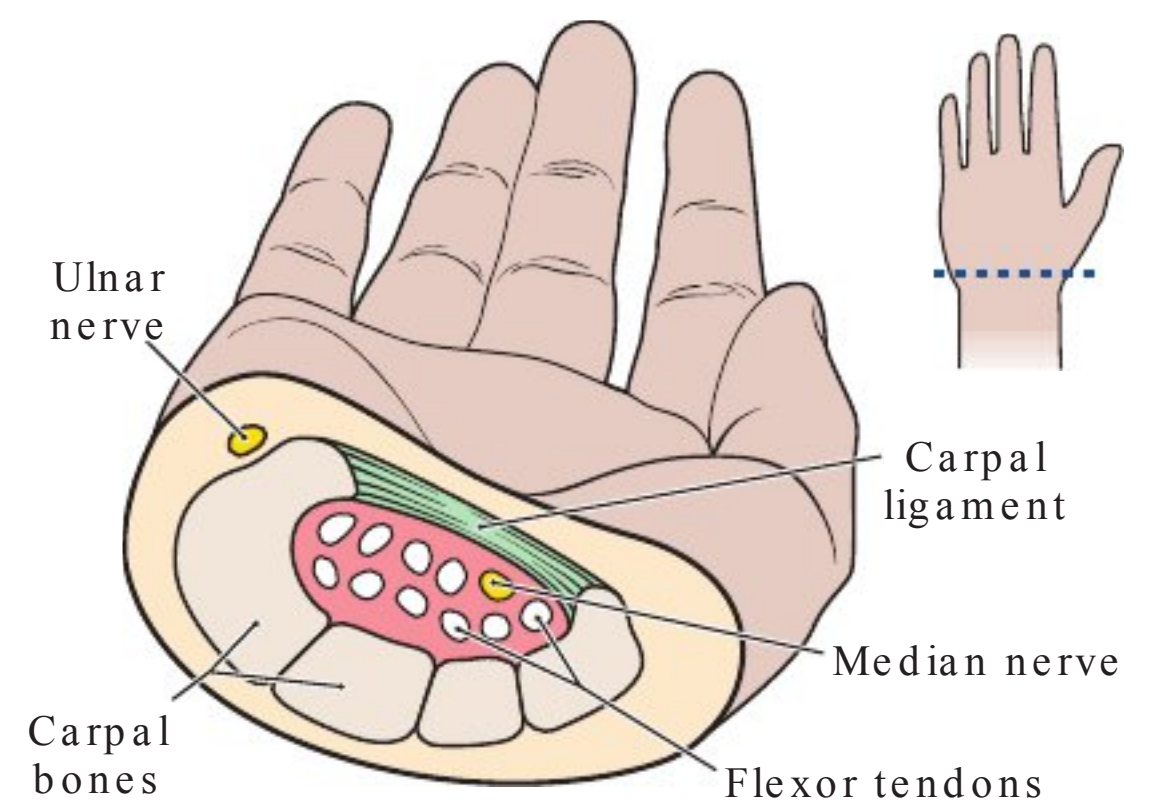
A painful disorder of the wrist and hand caused by compression of the median nerve within the carpal tunnel of the wrist

2. Causes

The nerve fibers of the median nerve originate in the spinal cord in the neck; therefore, poor posture can cause symptoms of CTS. Other causes include repeatedly bending the hand up, down, or from side-to-side at the wrist and continuously pinch-gripping an instrument without resting the muscles

3. Symptoms

Numbness, pain, tingling in the thumb, index, and middle fingers

**Figure 1-8. Ulnar Nerve Entrapment****1. Definition**

A painful disorder of the lower arm and wrist caused by compression of the ulnar nerve of the arm as it passes through the wrist

2. Causes

Bending the hand up, down, or from side-to-side at the wrist and holding the little finger a full span away from the hand

3. Symptoms

Numbness, tingling, and/or loss of strength in the lower arm or wrist

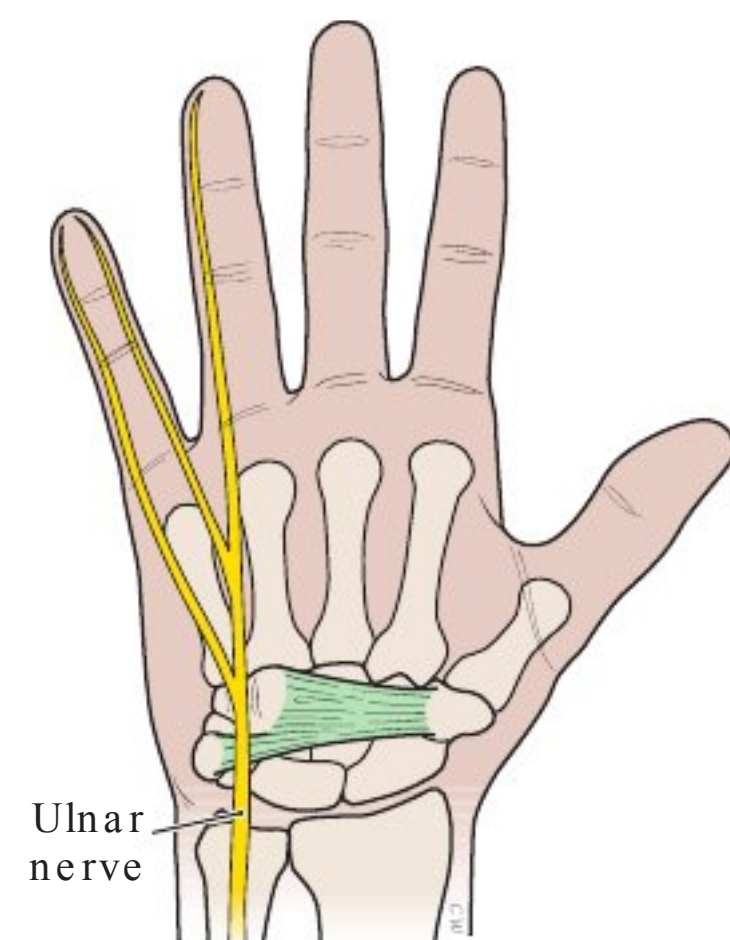


Figure 1-9. Tenosynovitis

1. Definition

A painful inflammation of the tendons on the side of the wrist and at the base of the thumb

2. Causes

Hand twisting, forceful gripping, bending the hand back or to the side

3. Symptoms

Pain on the side of the wrist and the base of the thumb; sometimes movement of the wrist yields a crackling noise

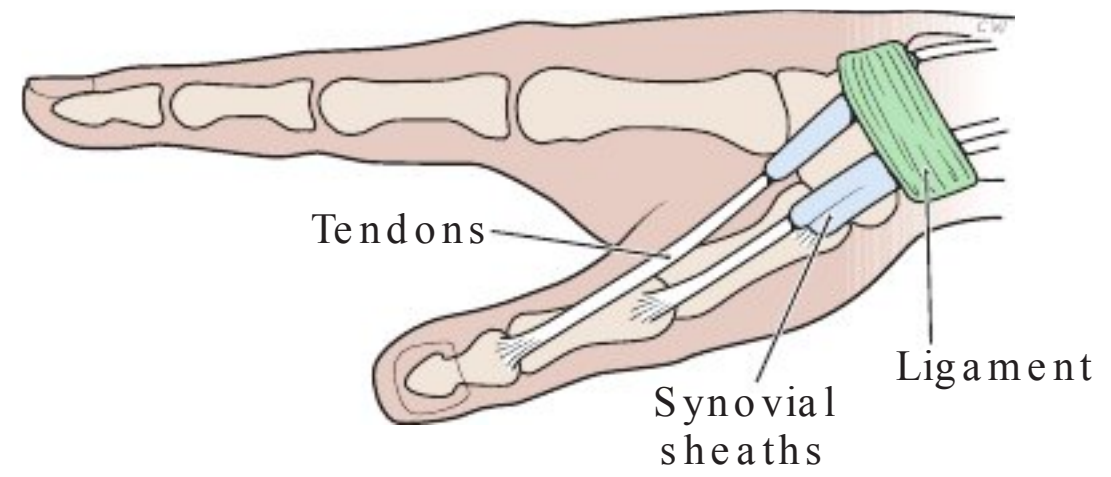


Figure 1-10. Tendinitis

1. Definition

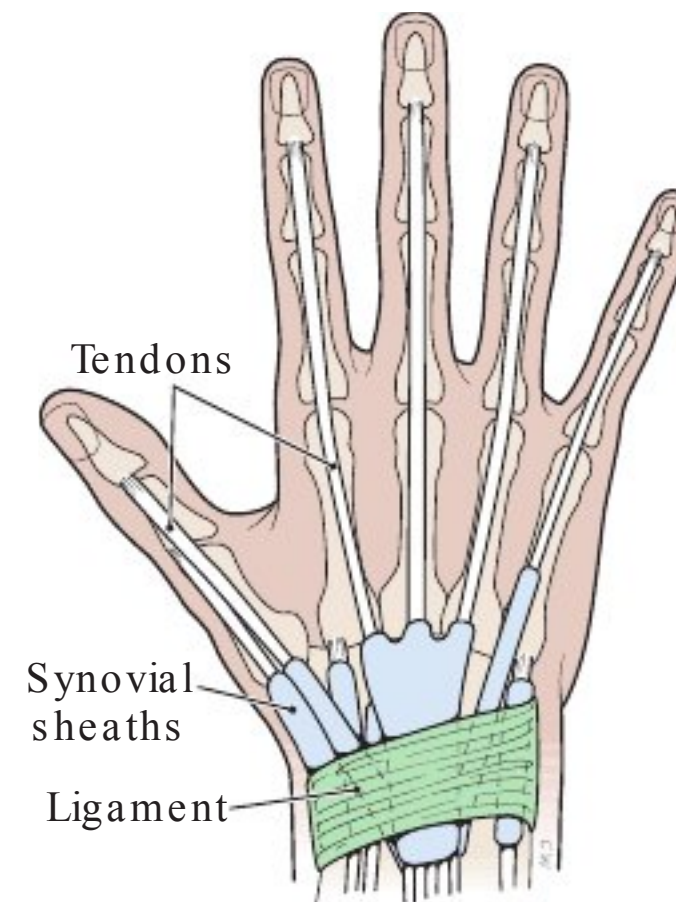
A painful inflammation of the tendons of the wrist resulting from strain

2. Causes

Repeatedly extending the hand up or down at the wrist

3. Symptoms

Pain in the wrist, especially on the outer edges of the hand, rather than through the center of the wrist



Section 2

Foundational Skills for Periodontal Instrumentation

Periodontal instrumentation is a complex psychomotor skill that involves the precise execution of many individual component skills. Swinging a golf club is an everyday example of a complex psychomotor skill that involves many component skills, for example, proper stance, grip on the club handle, position of the golfer's head, and movement to swing the golf club.

- 1. Foundational Building Blocks of Periodontal Instrumentation.** Many building blocks—individual skill components—are involved in periodontal instrumentation. These building blocks are discussed below and illustrated in Figure 1-11.
 - A. Building Block 1: Position.** The building block of “positioning” entails the proper use of equipment, as well as, positioning the patient and clinician.
 - B. Building Block 2: Instrument Grasp.** This building block involves the way in which the clinician holds a periodontal instrument.
 - C. Building Block 3: Mirror Use.** A dental mirror allows a clinician to view tooth surfaces or other oral structures that are obscured from direct viewing.
 - D. Building Block 4: Finger Rests.** This building block entails the manner in which the clinician stabilizes his or her hand in the oral cavity during periodontal instrumentation.
 - E. Building Block 5: Stroke Production.** This building block refers to the manner in which the working-end of a periodontal instrument is moved against the tooth surface. Stroke production is a complex skill that involves several smaller component skills—activation, adaptation, and angulation—that are discussed later in this book.

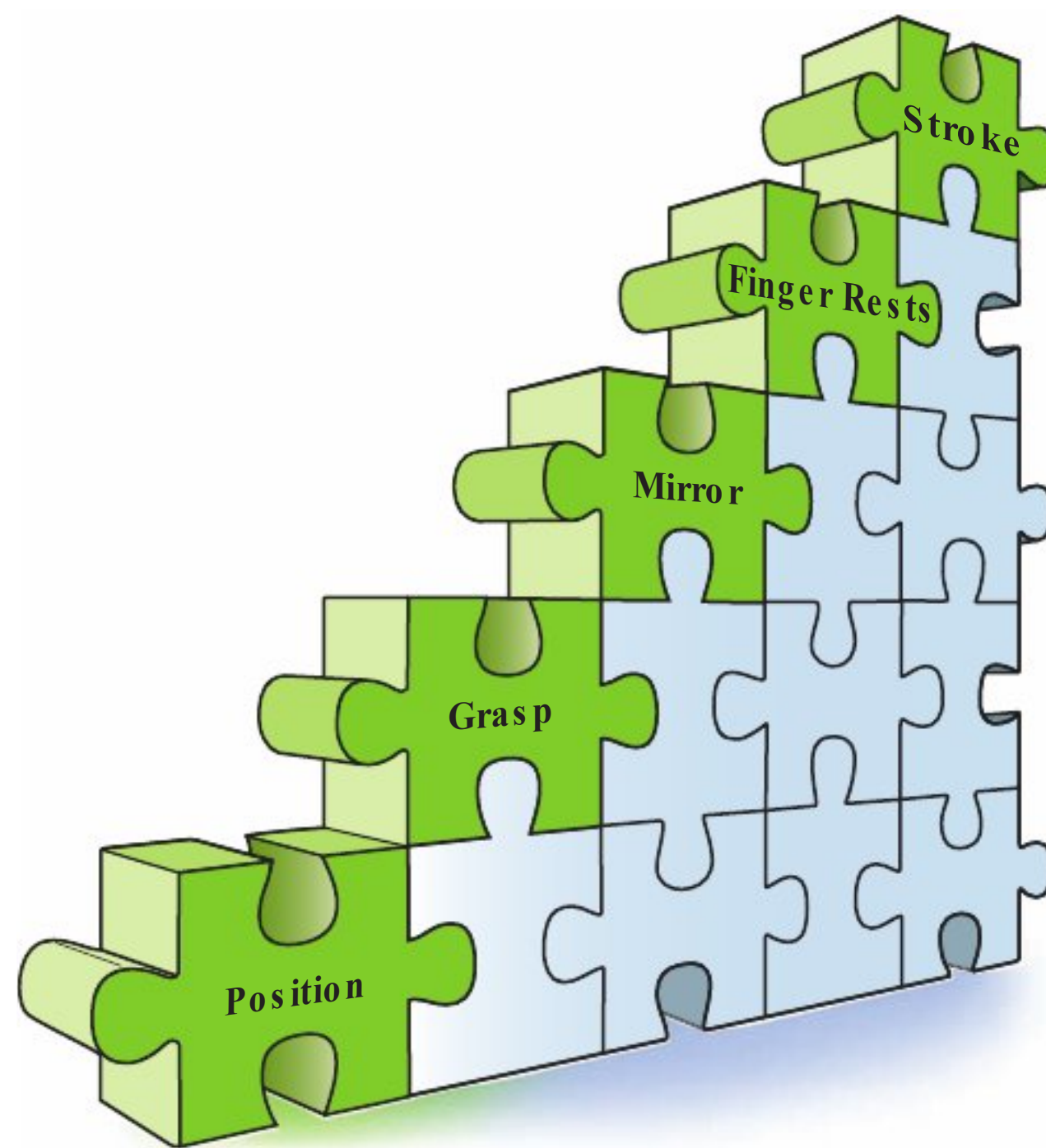


Figure 1-11. Building Blocks for Periodontal Instrumentation. Successful periodontal instrumentation requires the mastery of the individual skill components of position, grasp, mirror use, finger rests, and stroke production.

2. Significance of the Building Blocks for Periodontal Instrumentation

A. Precise Performance.

1. Precise, accurate performance of the building blocks is essential if periodontal instrumentation is to be effective, efficient, safe for the patient, and comfortable for the clinician.
2. Research on psychomotor skill acquisition indicates that a high level of mastery in the performance of skill building blocks is essential to successful mastery of periodontal instrumentation.
 - a. The building block skills are the foundation that “supports” successful periodontal instrumentation.
 - b. These skills should be mastered one-by-one.
 - c. Each skill should be overlearned until it can be performed easily and without hesitation. It is impossible to devote too much time to the practice of these building block skills.
 - d. If the building block skills are mastered, then the use of any periodontal instrument will be relatively easy to learn. The building block skills are the same no matter which periodontal instrument is used.

B. Faulty Performance. Incorrect performance of even one of the building blocks means that at the very least periodontal instrumentation will be inefficient. Most likely faulty performance results in ineffective calculus removal, unnecessary discomfort for the patient, and musculoskeletal stress to the clinician.

3. Sequencing of Building Block Skills

- A. The modules (chapters) in this book are sequenced to allow beginning clinicians to practice the building blocks to periodontal instrumentation one-by-one.
- B. Each building block should be practiced until it is easy to perform from memory before attempting the next building block in the skill sequence.



BUILDING BLOCK SKILLS. The puzzle piece shown here appears throughout the book to alert clinicians to the individual skill components of periodontal instrumentation.

Section 3

Ergonomic Dos and Don'ts for Seated Posture

NEUTRAL POSITION FOR THE CLINICIAN

1. Ergonomic Do's and Don'ts

A. Ergonomic Don'ts

1. When a dental hygienist alters his or her body position or equipment in a manner that is uncomfortable or painful just to “get the job done,” musculoskeletal stress is the result.
2. A mindset that it is acceptable to assume an uncomfortable position “just for 15 minutes while performing periodontal instrumentation on these two teeth” is destined to lead to MSDs.
3. Pain and injury results when the body's natural spinal curves are not maintained in a seated position.

B. Ergonomic Do's

1. For a healthy and productive career, first, the dental hygienist assumes a neutral, balanced body position and then alters the patient's chair and dental equipment to complete periodontal instrumentation.
2. Good posture requires the seated dental hygienist to use a neutral spine position that maintains the natural curves of the spine (Fig. 1-12).

2. Neutral Body Position

A. Spine Basics: The Curves of a Healthy Back

1. The spine is made up of three segments: the cervical, thoracic, and lumbar sections.
2. The spine has three natural curves that form an S-shape (46). When the three natural curves are properly aligned, the ears, shoulders, and hips are in a straight line.
 - a. When viewed from the side, the cervical and lumbar segments have a slight inward curve (lordosis).
 - b. When viewed from the side, the thoracic segment of the spine has a gentle outward curve (kyphosis).

B. Neutral Body Position for the Clinician. Figures 1-13 to 1-19 illustrate the characteristics of neutral body position for the clinician.

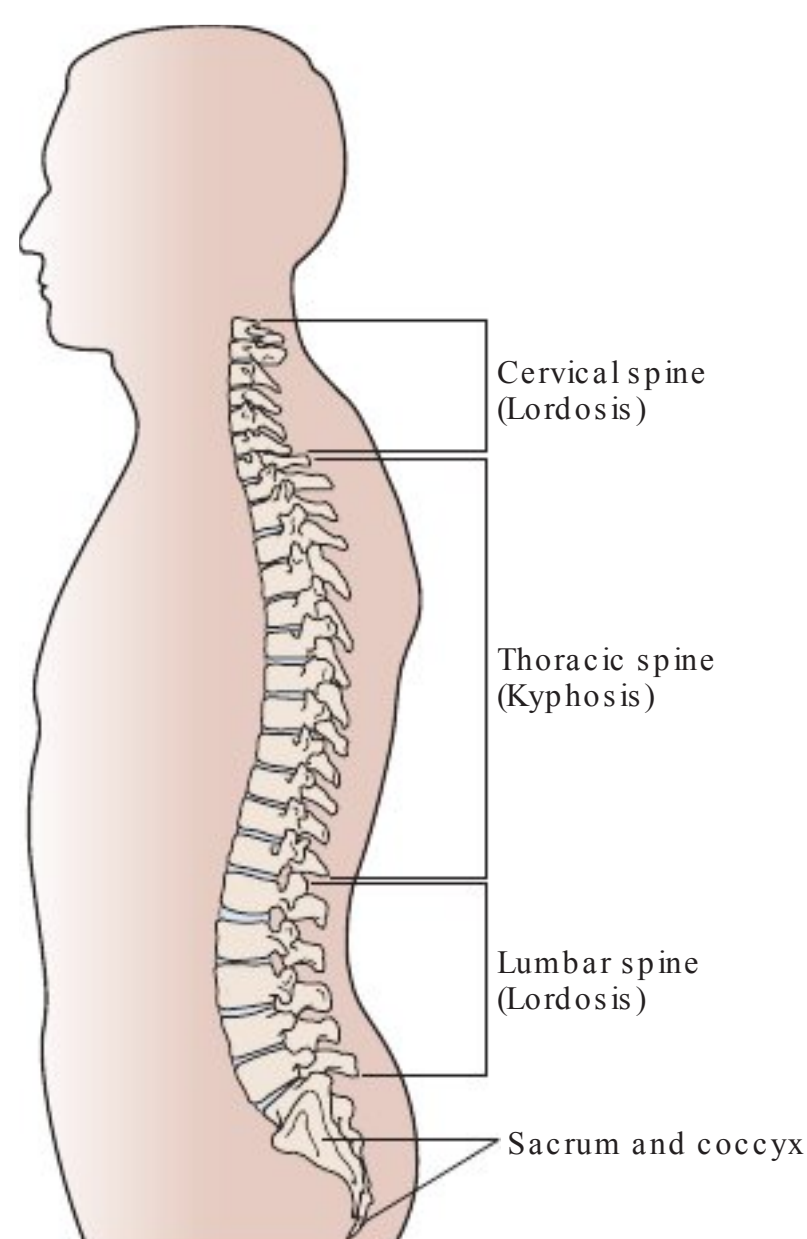


Figure 1-12. Three Curves of a Healthy Back. The spine has three natural curves: cervical, thoracic, and lumbar curves. The cervical and lumbar segments have a gentle inward curve. The thoracic segment has a slight outward curve.

Figure 1-13. Neutral Neck Position

Goal:

- Head tilt of 0 to 20 degrees
- The line from eyes to the treatment area should be as near to vertical as possible

Avoid:

- Head tipped too far forward
- Head tilted to one side

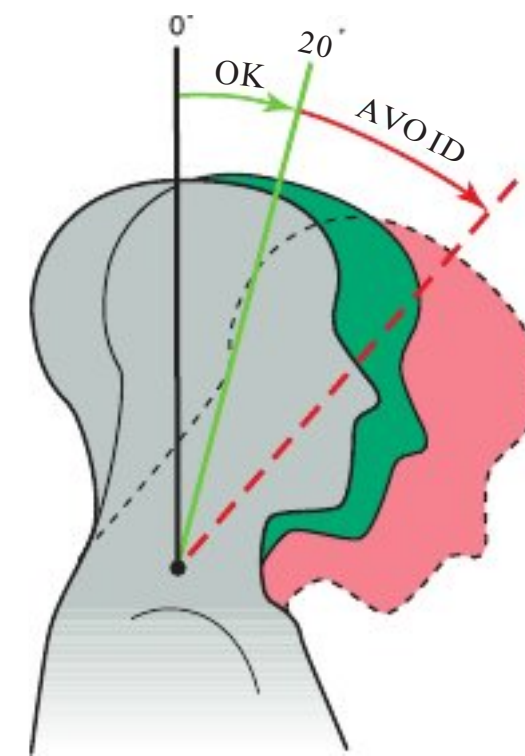


Figure 1-14. Neutral Back Position

Goal:

- Lean forward slightly from the hips (hinge at hips)
- Trunk flexion of 0 to 20 degrees

Avoid:

- Over flexion of the spine (curved back)

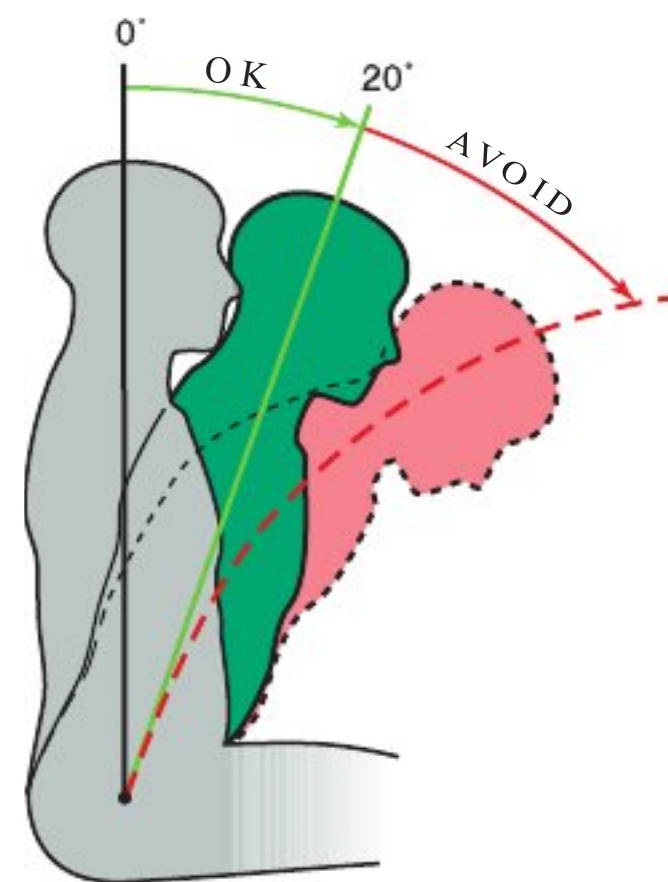


Figure 1-15. Neutral Torso Position

Goal:

- Torso in line with long axis of the body

Avoid:

- Leaning torso to one side
- Twisting the torso

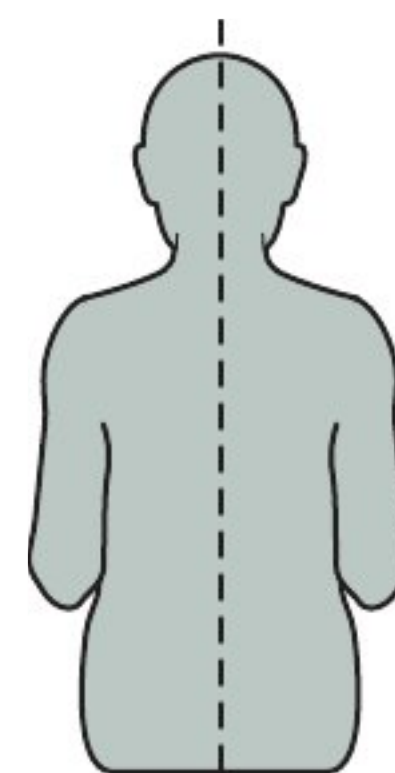


Figure 1-16. Neutral Shoulder Position

Goal:

- Shoulders in horizontal line
- Weight evenly balanced when seated

Avoid:

- Shoulders lifted up toward ears
- Shoulders hunched forward
- Sitting with weight on one hip

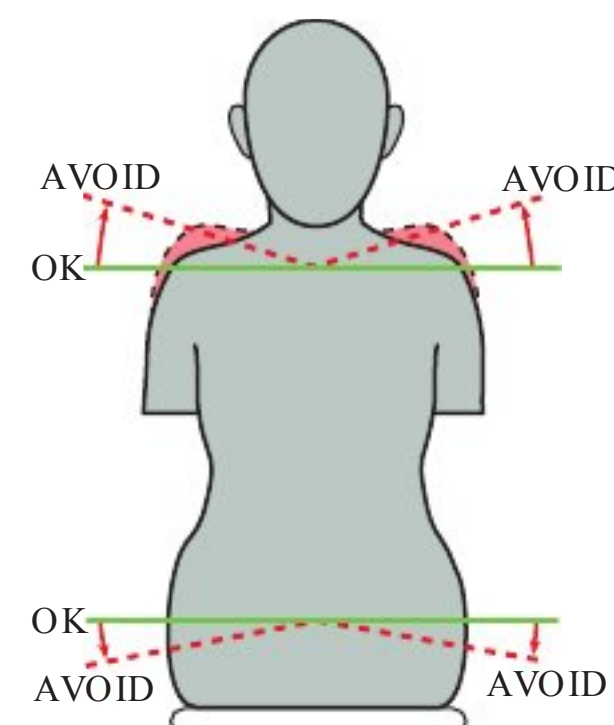
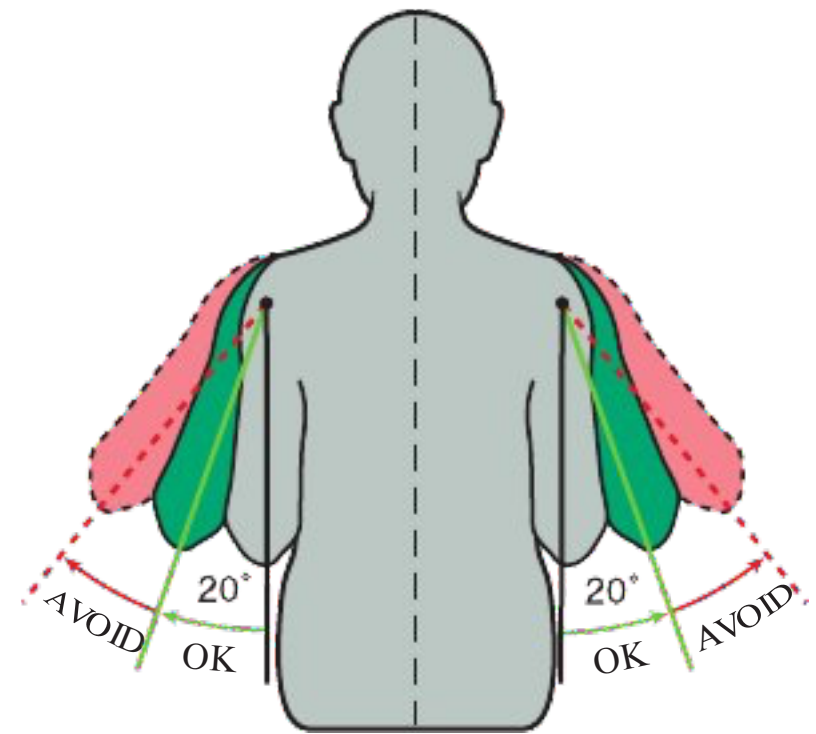


Figure 1-17. Neutral Upper Arm Position**Goal:**

- Upper arms hang parallel to the long axis of torso
- Elbows at waist level held slightly away from body

Avoid:

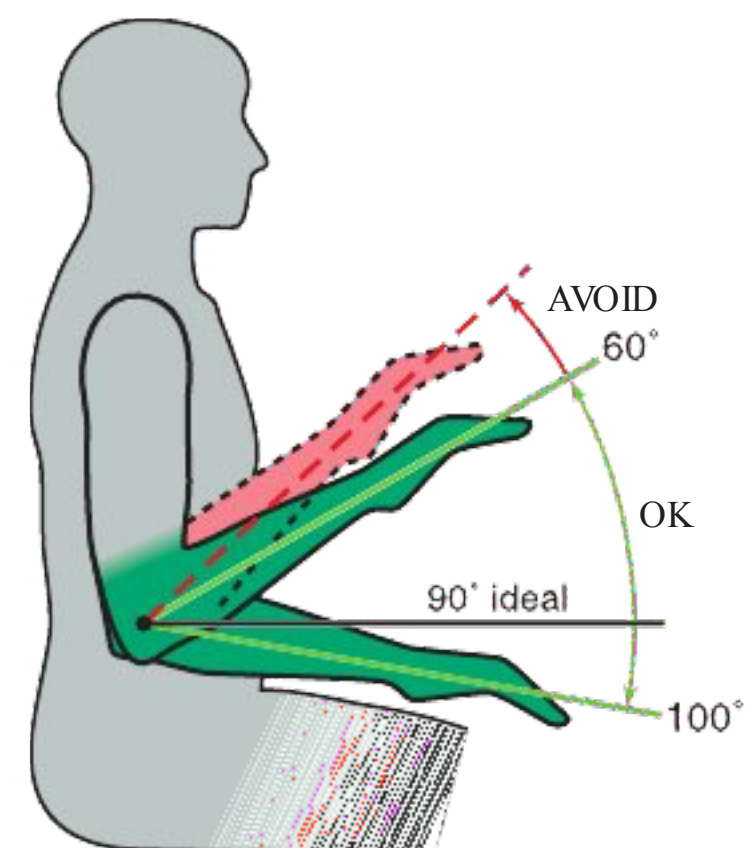
- Greater than 20 degrees of elbow abduction away from the body
- Elbows held above waist level

**Figure 1-18. Neutral Forearm Position****Goal:**

- Held parallel to the floor
- Raised or lowered, if necessary, by pivoting at the elbow joint

Avoid:

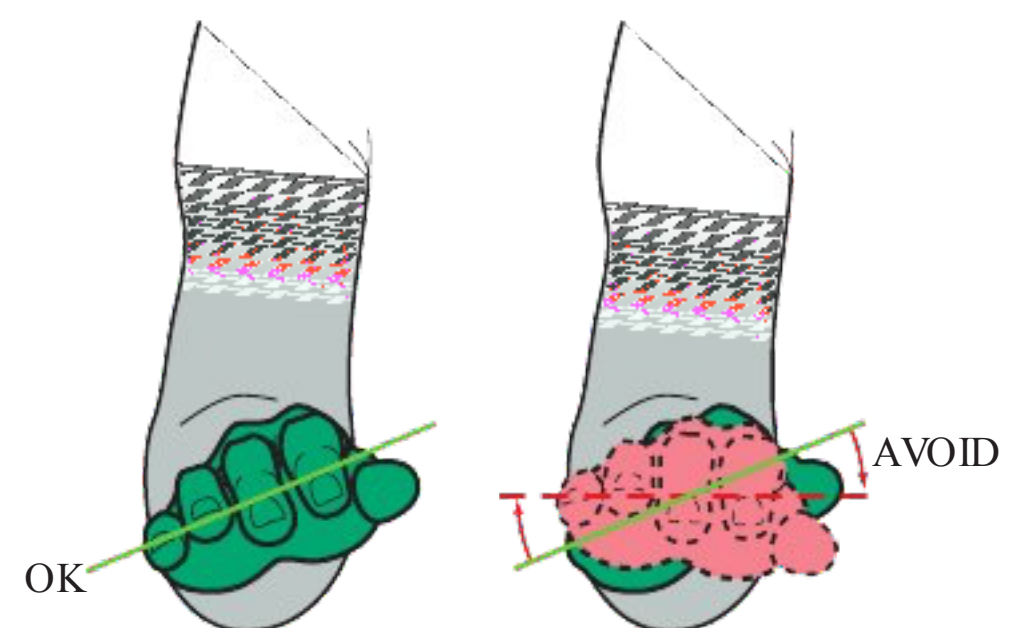
- Angle between forearm and upper arm of less than 60 degrees

**Figure 1-19. Neutral Hand Position****Goal:**

- Little finger-side of palm is slightly lower than thumb-side of palm
- Wrist aligned with forearm

Avoid:

- Thumb-side of palm rotated down so that palm is parallel to floor
- Hand and wrist bent up or down



Section 4

Application of Ergonomic Principles: Seated Posture

Ergonomic principles can reduce the risk of developing an MSD by reducing muscle forces during periodontal instrumentation. Attention to the principles for neutral seated clinician posture can minimize the amount of physical stress that occurs during instrumentation.

**SKILL BUILDING**

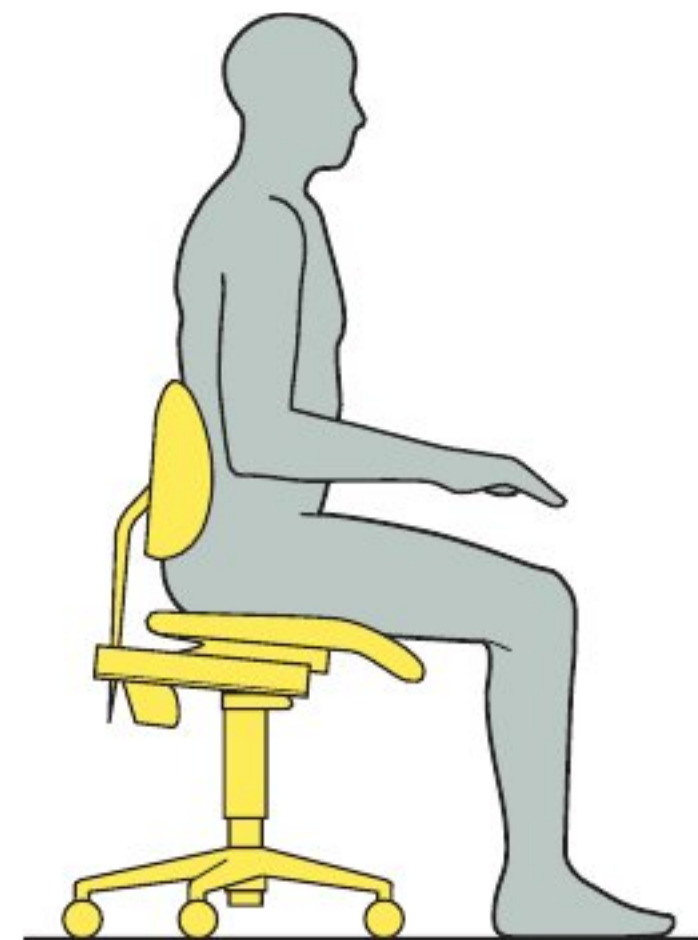
Neutral Seated Posture for the Clinician

Directions: Practice the neutral clinician posture by following the steps 1 to 9 as illustrated in Figures 1-20 to 1-28.

The ideal seated position for the clinician is called the **neutral seated position**. Adjust the clinician stool first. A common mistake clinicians make is positioning the patient first and then adjusting the clinician stool to accommodate the patient.

Figure 1-20. Step 1.

- Position the buttocks all the way back in the chair. Distribute the body's weight evenly on both hips.

**Figure 1-21. Step 2.**

- Adjust seat height so the feet rest flat on the floor. Establish a “wide base of support” with feet on floor at least shoulder-width apart and in front of the hips (19).
- Legs should not dangle or be crossed at the knees or ankles. Dangling legs or crossing them puts pressure on the back of the thighs and restricts blood flow.

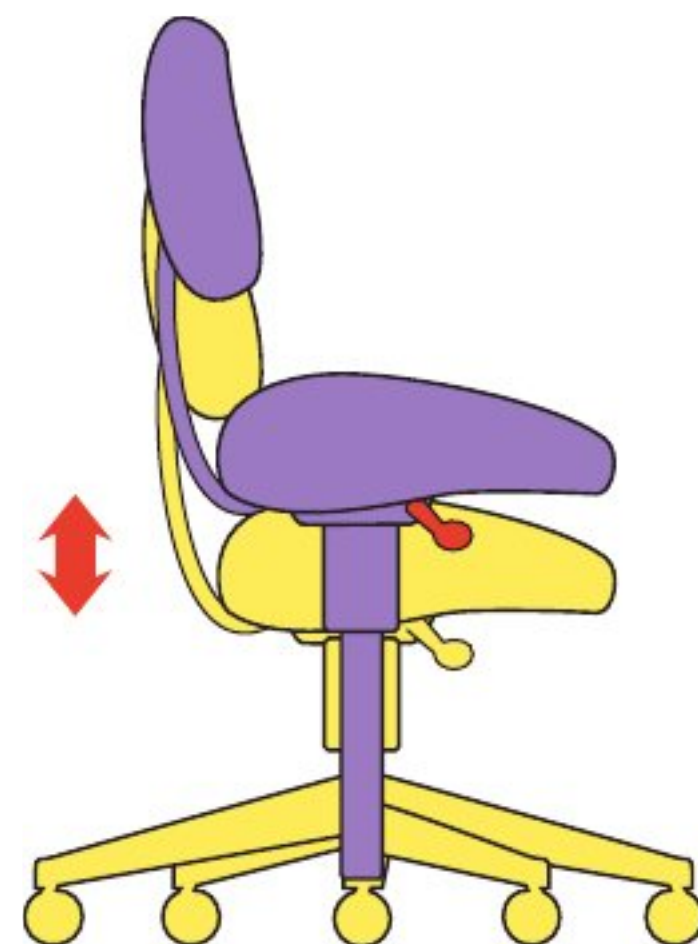


Figure 1-22. Step 3.

- Adjust the seat tilt so that the back is about an inch higher than the front (hips slightly higher than the knees) (16,17,19,20,22–24).
- The seat tilt helps to maintain the natural lower curve of the spine and relaxes the bend of the knees. The seat tilt should only be about 5 degrees; overtilting it can cause too much low back curve.
- **Note:** Chairs without a tilt feature can be retrofitted with an ergonomic wedge-shaped cushion.

**Figure 1-23. Step 4.**

- With buttocks seated all the way back in the chair, adjust the lumbar depth by moving the backrest closer or farther from the seat pan until the backrest nestles against the lower back.
- The unsupported lower back tends to straighten rather than maintain a healthy curve (21,24).

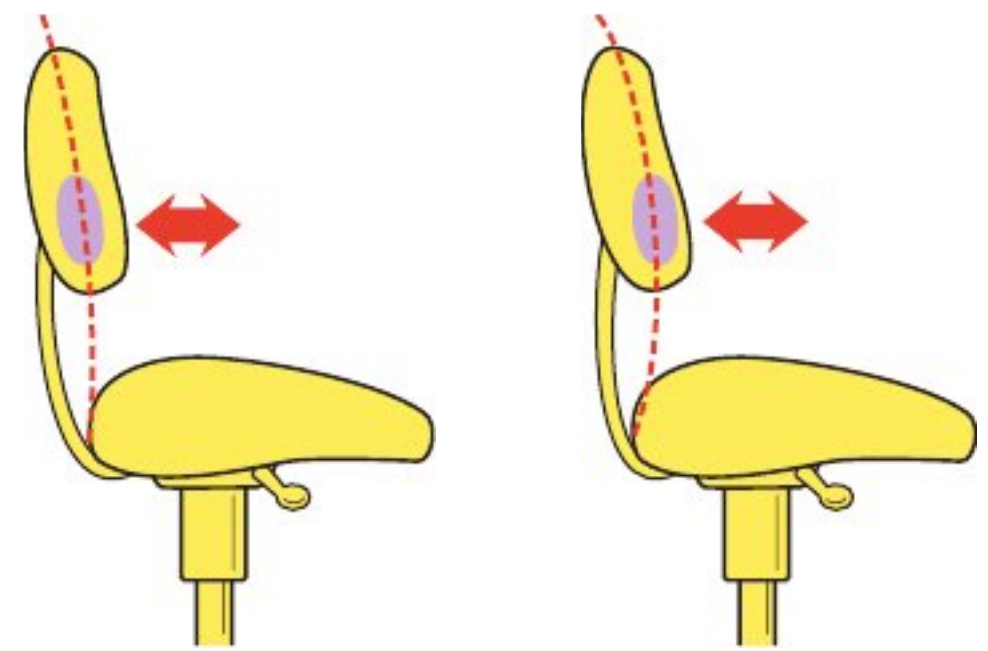
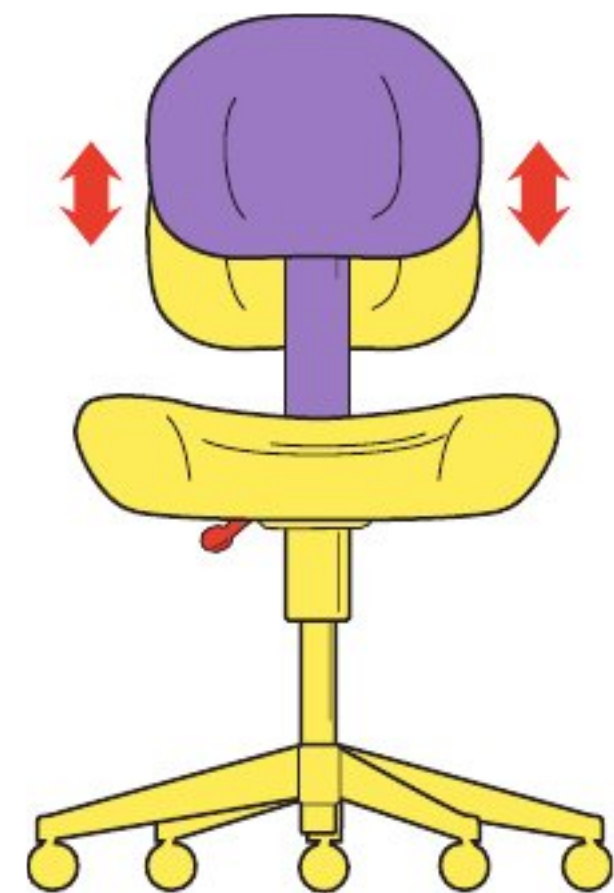
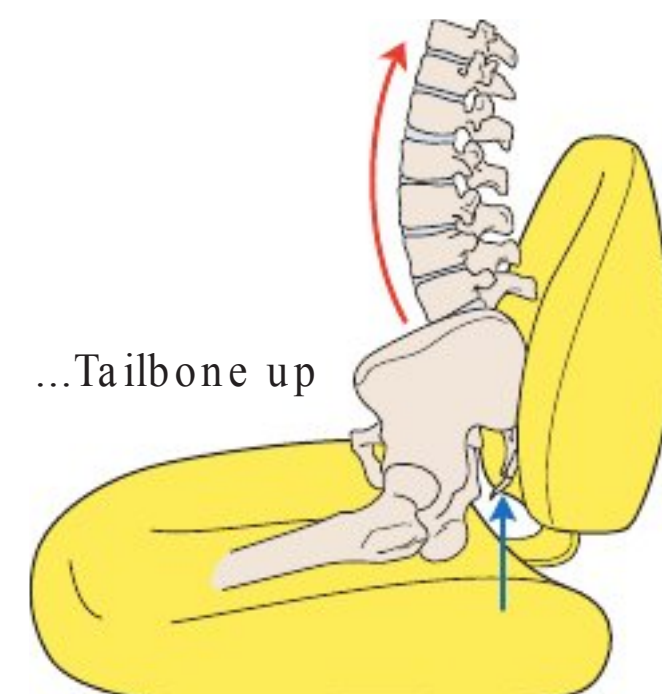


Figure 1-24. Step 5. Adjust the lumbar height by moving the backrest up or down until it nestles in the natural lumbar curve of the lower back. This helps to support the natural curve of the spine (21).

**Figure 1-25. Step 6.**

- Raise the tailbone up to establish correct spinal curves. All three normal back curves should be present while sitting.
- Studies of the seated body show that the position of the pelvis determines the shape of the spine (23).



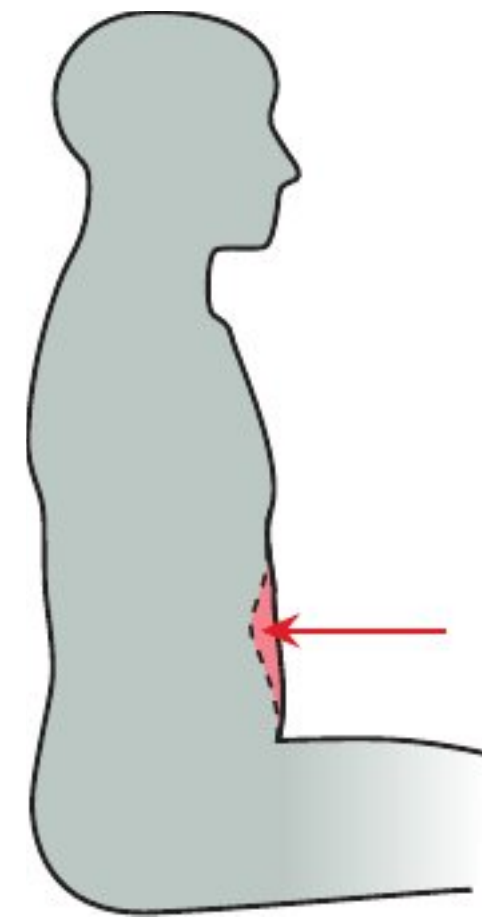


Figure 1-26. Step 7.

- Stabilize the low back curve by pulling the stomach muscles toward the spine (25).

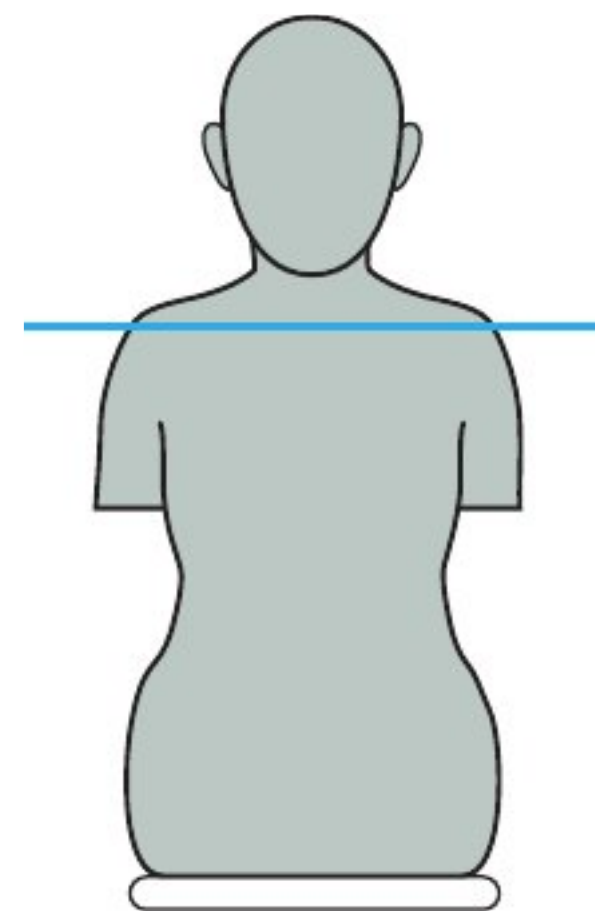


Figure 1-27. Step 8.

- Relax your shoulders so that they are down and back (16).
- If your stool has armrests, adjust the height of each arm so the arms are supported. This helps take the weight off the shoulders.

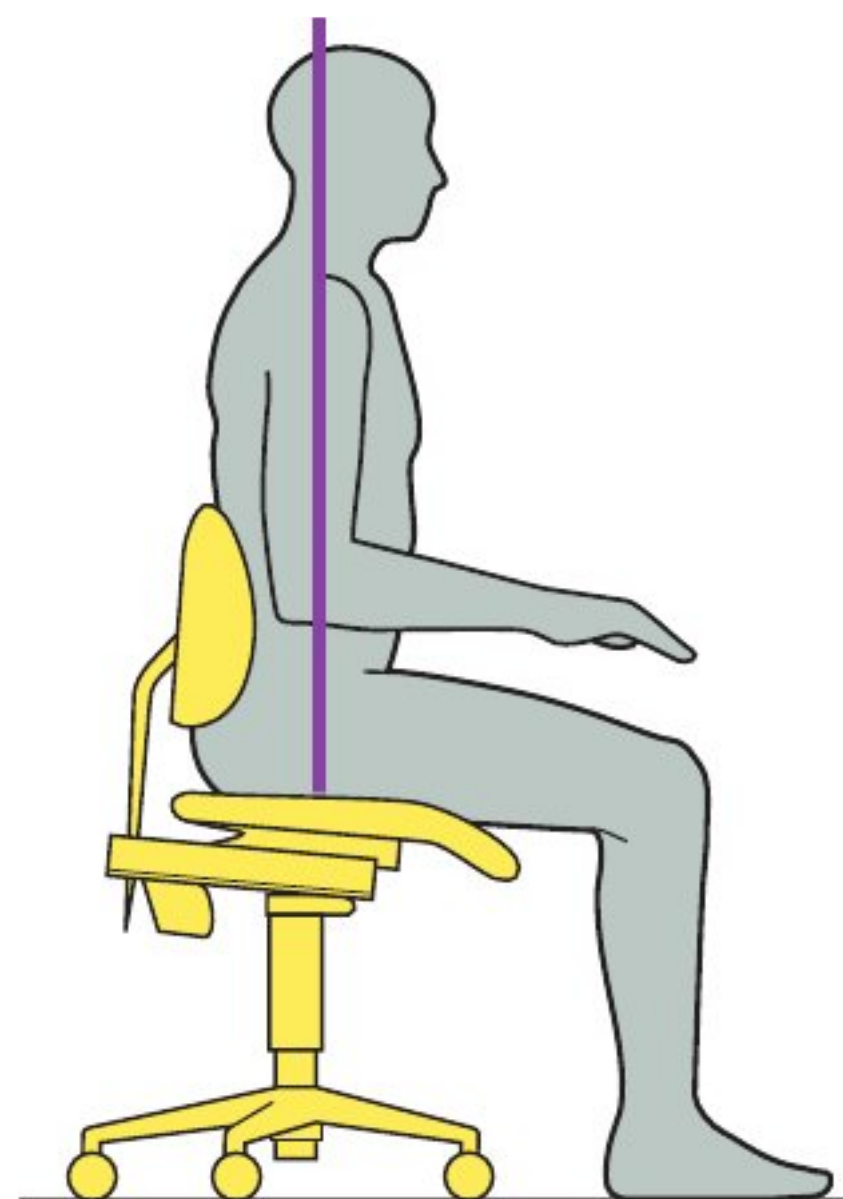


Figure 1-28. Step 9.

- Position the upper arms parallel to the long axis of the torso with elbows held near the body.
- Maintain a trunk position such that an imaginary straight line can be drawn connecting from the ear, shoulder, and hips (19).



SKILL BUILDING

The Masking Tape Trick

An easy way to monitor back position while practicing instrumentation in a preclinical setting is to use the “masking tape trick.” While sitting with your back in a neutral position, have a friend apply a strip of masking tape down the center of your back, along your spinal column. Figure 1-29 shows how the masking tape will appear when a clinician is seated in neutral position. If a clinician bends forward, out of neutral position, the masking tape breaks as shown in Figure 1-30.

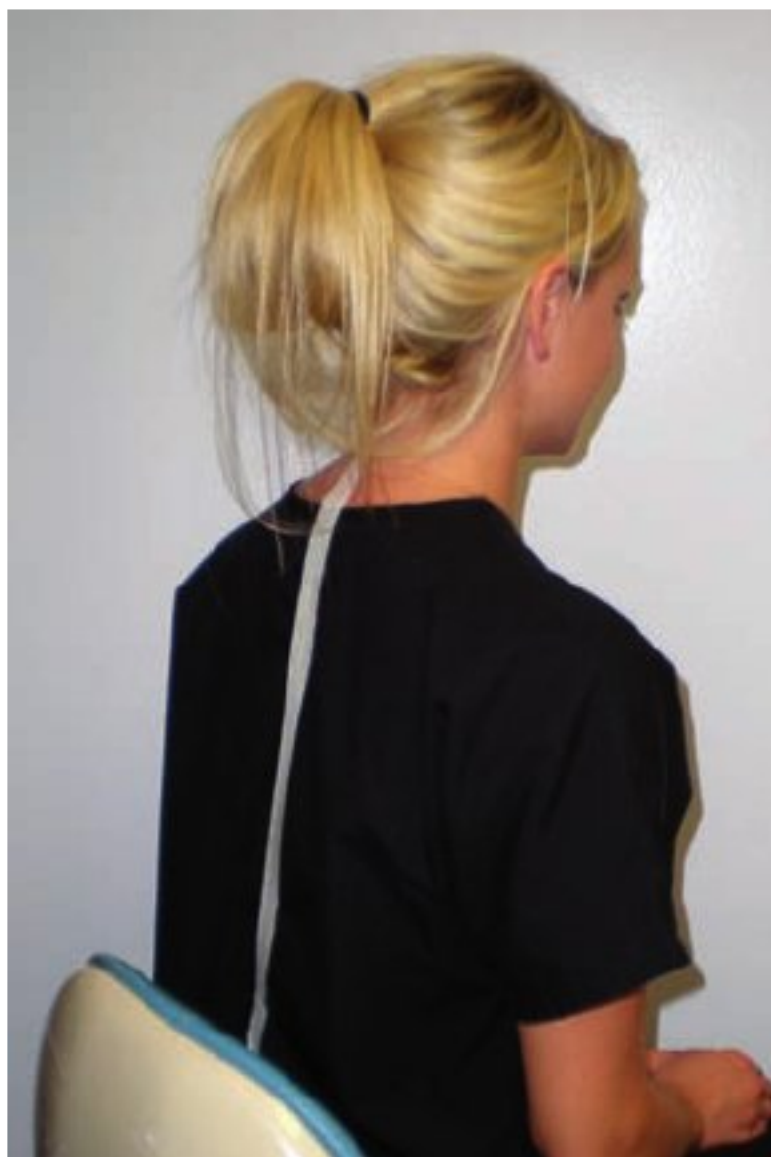


Figure 1-29. Correct Position—Neutral Back Position. Maintain a neutral back position while practicing positioning or periodontal instrumentation and the strip of masking tape remains intact and straight. (Photo courtesy of d.r. Richard Foster, Guilford Technical Community College, Jamestown, NC.)

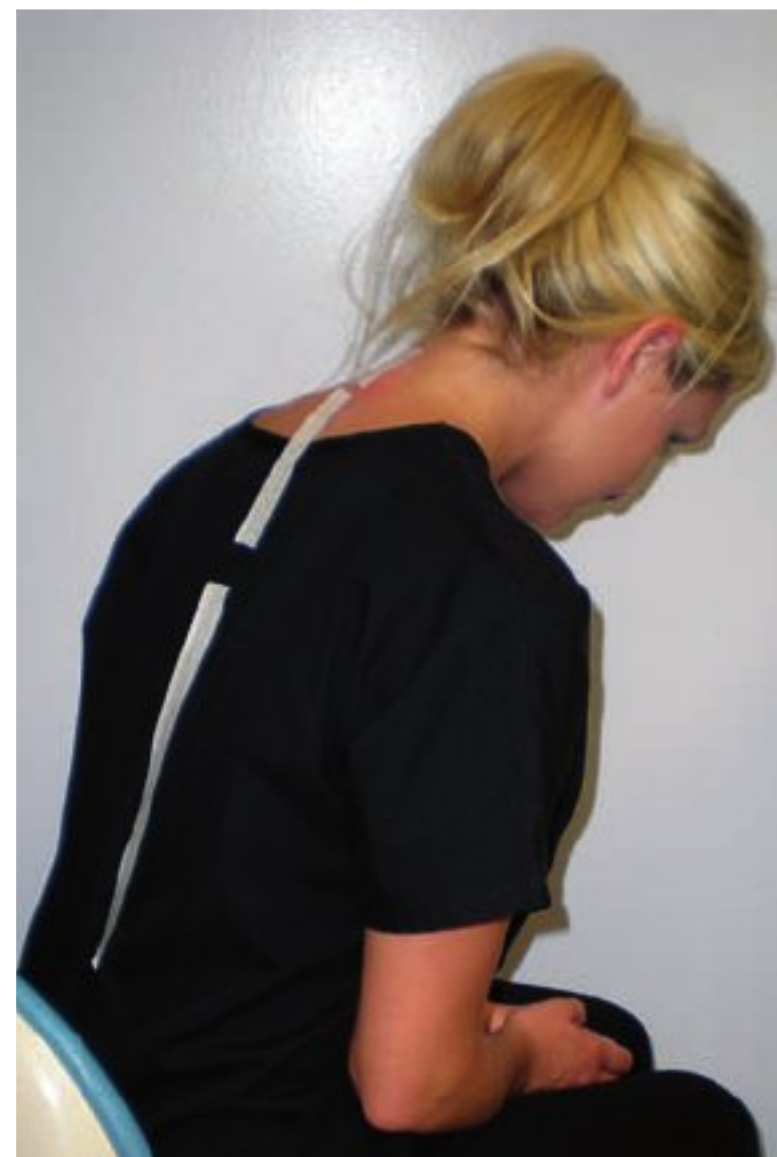


Figure 1-30. Incorrect Position—Rounded Back Position. The masking tape strip will tear if you bend over, rounding your back while practicing positioning or periodontal instrumentation. Torn masking tape will alert you to problems with your seated position. (Photo courtesy of d.r. Richard Foster, Guilford Technical Community College, Jamestown, NC.)

IMPORTANT ELEMENTS OF THE SEATED POSITION

Figures 1-31 and 1-32 depict important elements of the seated clinician position.

Figure 1-31. Correct Feet Position. The feet should be positioned to create a “wide base of support” for the seated clinician. That is, the feet should be flat on the floor about a shoulder’s width apart for ideal balance while seated.



Figure 1-32. Incorrect Feet Position for Seated Clinician

A. Narrow Base of Support. A narrow base of support with the feet together or tucked under the chair interferes with the clinician’s balance and can limit his or her range of motion during instrumentation.

B. Crossed Legs. Crossing the legs at the knees or ankles restricts blood flow to the legs and feet. In addition, this position places more weight on one side of the hip and interferes with the clinician’s balance during periodontal instrumentation. (Photos courtesy of dr. Richard Foster, Guilford Technical Community College, Jamestown, NC.)

Section 5

Application of Ergonomic Principles: Positioning the Patient

SUPINE AND SEMI-SUPINE PATIENT POSITION

The recommended patient position for dental treatment is with the patient lying on his or her back. For maxillary treatment areas, the back of the dental chair is nearly parallel to the floor in a **supine position** (Table 1-1, Fig. 1-33). For mandibular treatment areas, the back of the dental chair is slightly upright in a **semi-supine position** (Table 1-2, Fig. 1-34).

TABLE 1-1. POSITION FOR MAXILLARY TREATMENT AREAS

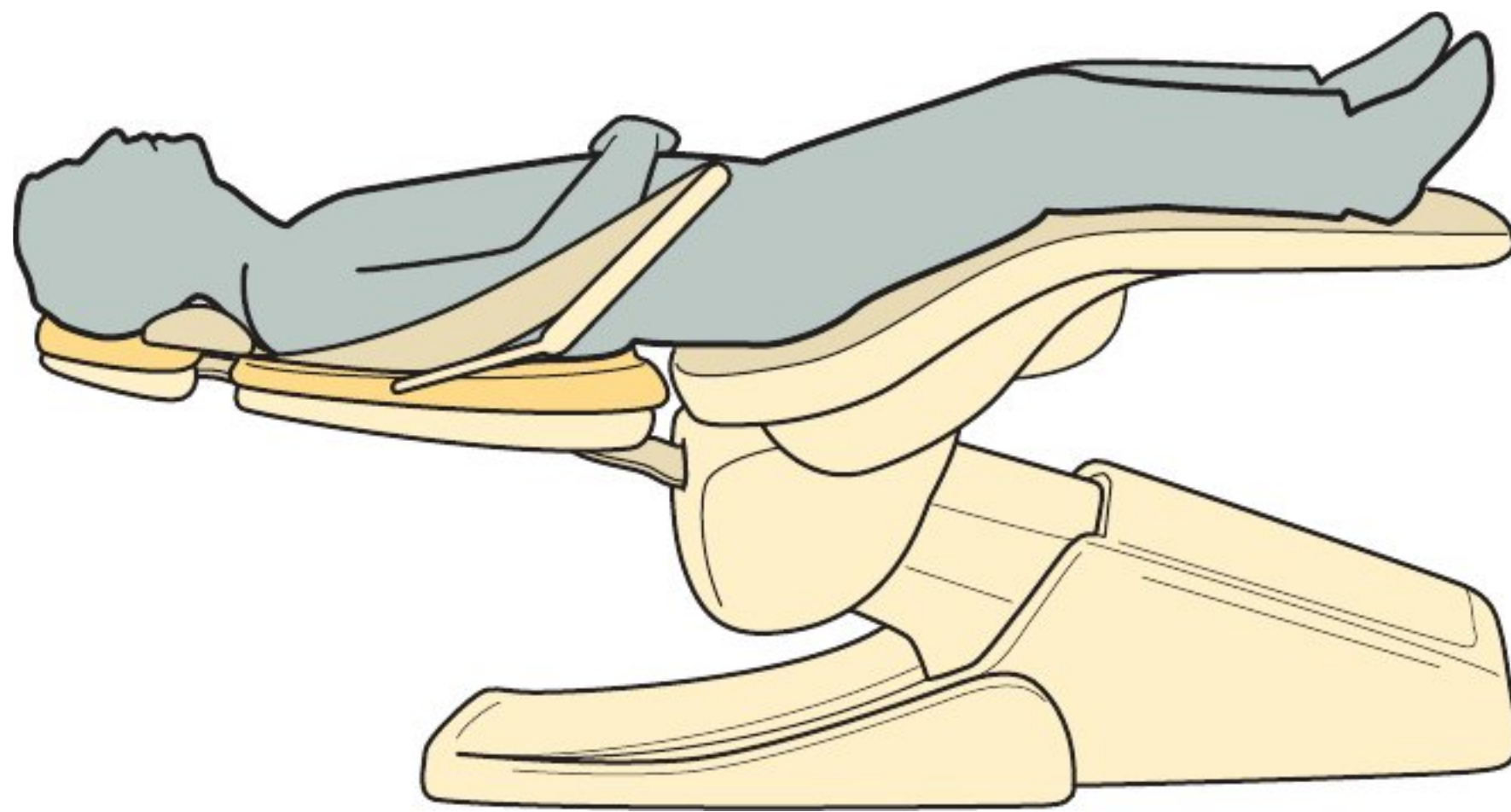
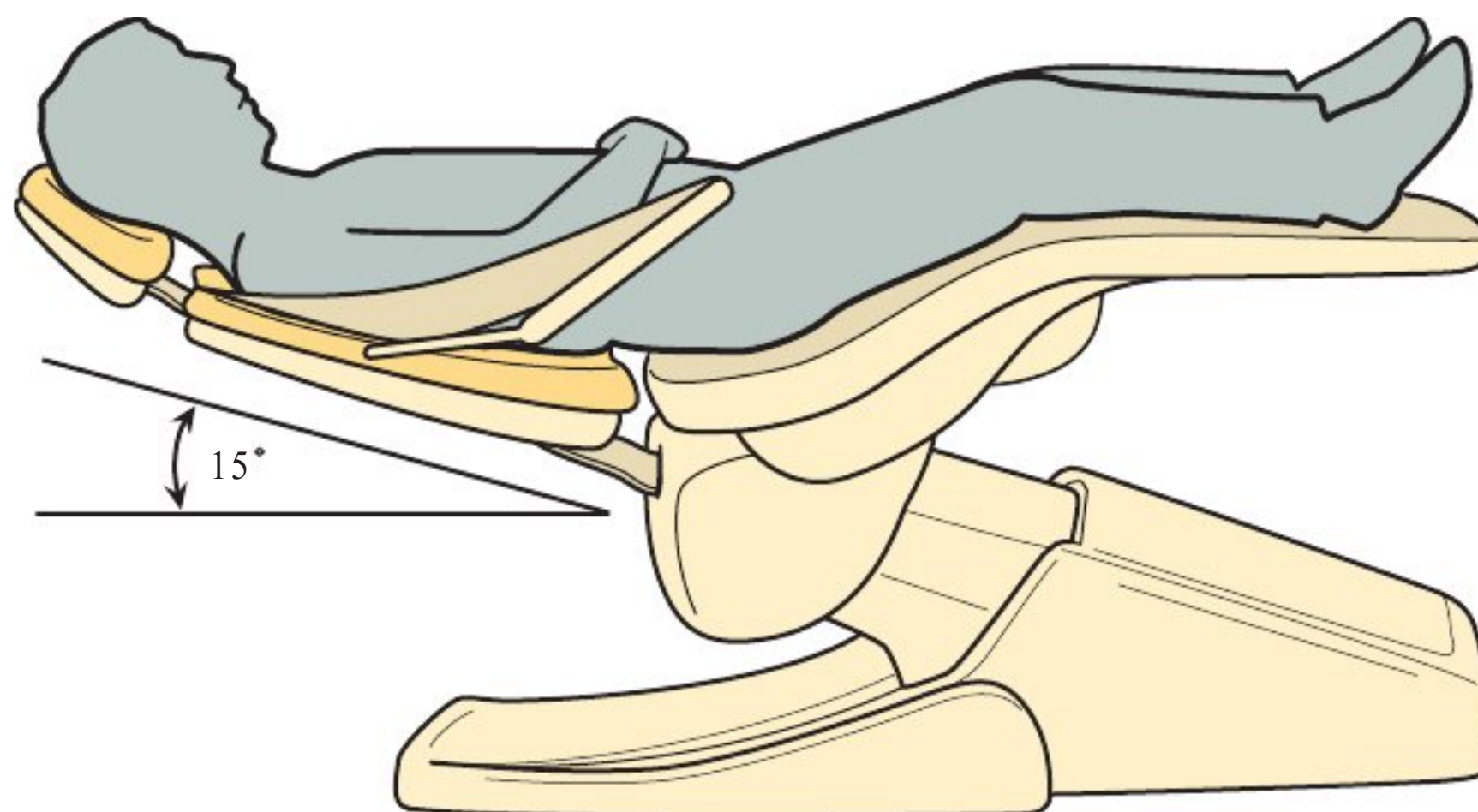


Figure 1-33. Patient Position for the Maxillary Arch.

Body	The patient's feet should be even with or slightly higher than the tip of his or her nose.
Chair Back	The chair back should be nearly parallel to the floor for maxillary treatment areas.
Head	The top of the patient's head should be even with the upper edge of the headrest. If necessary, ask the patient to slide up in the chair to assume this position.
Headrest	Adjust the headrest so that the patient's head is in a chin-up position , with the patient's nose and chin level. Patient head position is discussed in more detail later in this chapter.

TABLE 1-2. POSITION FOR MANDIBULAR TREATMENT AREAS**Figure 1-34. Patient Position for the Mandibular Arch.**

Body	The patient's feet should be even with or slightly higher than the tip of his or her nose.
Chair Back	The chair back should be slightly raised above the parallel position at a 15- to 20-degree angle to the floor (24)
Head	The top of the patient's head should be even with the upper edge of the headrest. If necessary, ask the patient to slide up in the chair to assume this position.
Headrest	Raise the headrest slightly so that the patient's head is in a chin-down position , with the patient's chin lower than the nose. Patient head position is discussed in greater detail later in this chapter.

PATIENT HEAD POSITION

The patient's head position is an important factor in determining whether the clinician can see and access the teeth in a treatment area.

- Unfortunately, a clinician may ignore this important aspect of patient positioning, contorting his or her body into an uncomfortable position instead of asking the patient to change head positions. Working in this manner not only causes stress on the musculoskeletal system, but also makes it difficult to see the treatment area.
- Remember that the patient is only in the chair for a limited period of time while the clinician spends hours at chairside day after day. The patient should be asked to adjust his or her head position to provide the clinician with the best view of the treatment area.
- The patient's head should be positioned at the upper edge of the headrest. This position permits maximal visibility and access to the oral cavity. Figure 1-35A and B depicts correct patient head position for an adult and a young child. Incorrect head position is shown in Figure 1-36.

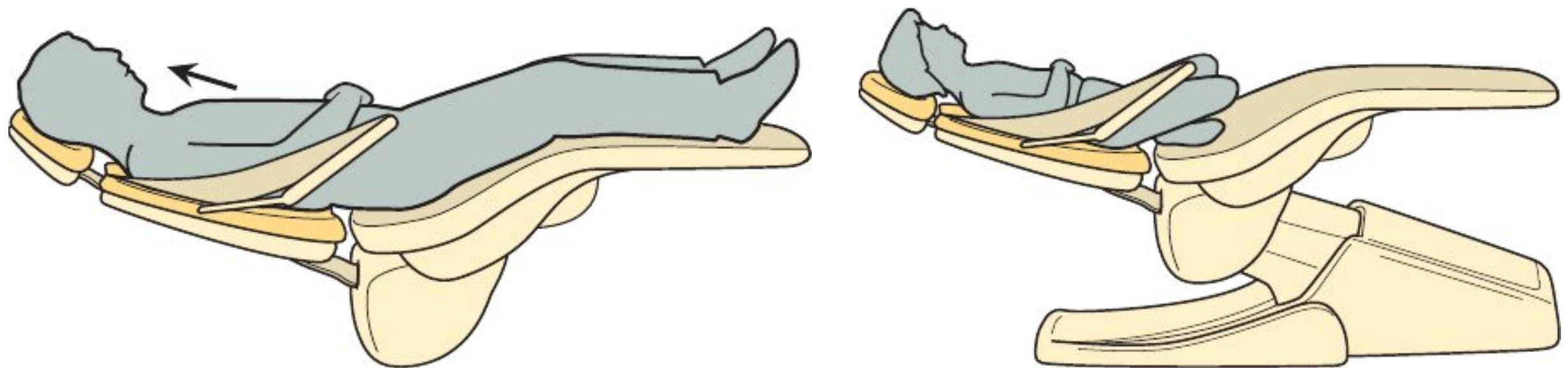


Figure 1-35. Correct Position.

A. Adult Patient. Once the patient chair is in a supine or semi-supine position, ask the patient to slide up until his or her head is even with the top edge of the headrest.

B. Young Child. Asking a young child to bend the knees and cross the legs may be helpful in keeping him or her from sliding down in the chair.

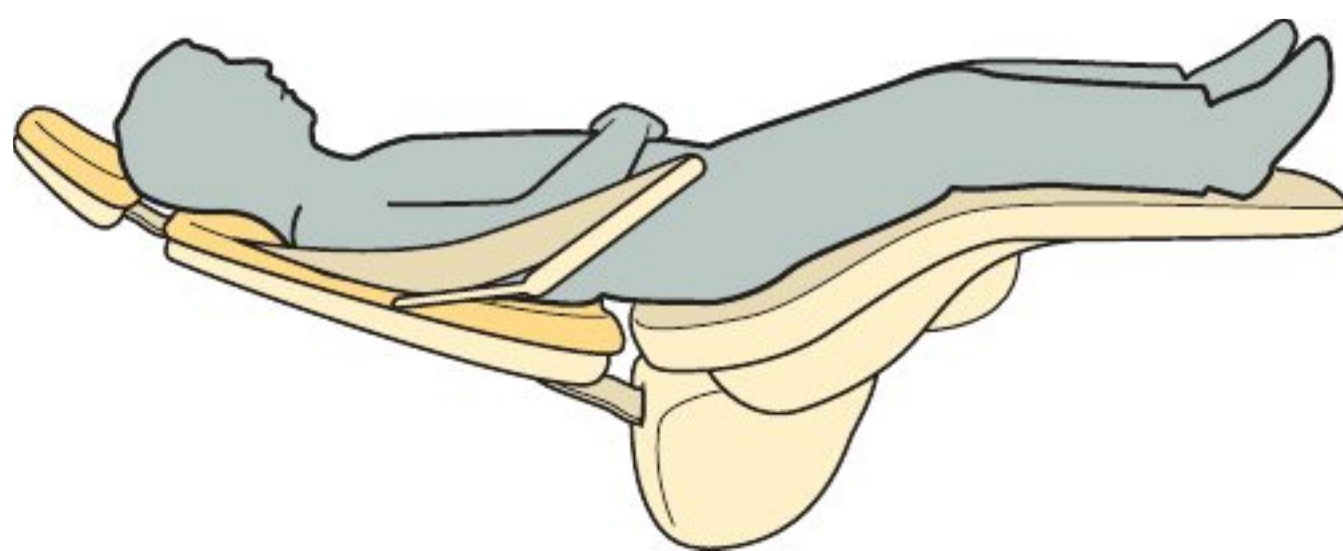


Figure 1-36. Incorrect Position. The patient may slide down in the chair when the patient chair is reclined. If patient's head is not even with the upper edge of the headrest, access and visibility of the oral cavity is restricted.

PATIENT HEAD ADJUSTMENT FOR OPTIMAL VISIBILITY

Once the patient is comfortably lying in a reclined position, the next objective is to ask the patient to adjust his or her head position to attain an optimal view of the treatment area. The patient can (1) tilt the head up or down, (2) rotate the head toward or away from the clinician, and (3) bend the head to the side (Figs. 1-37 to 1-40). Articulating (adjustable) headrests facilitate adjustment of the patient's head. Cervical rolls can be used with nonarticulating headrests to maintain patient head position.

Figure 1-37. Patient Head Tilt for Maxillary Arch.

- Angle the headrest up into the back of the patient's head (occipital area) so that the nose and chin are approximately level (48).
- The upper arch needs to be angled backward past the vertical plane.
- This patient head position is known as the **chin-up position**.

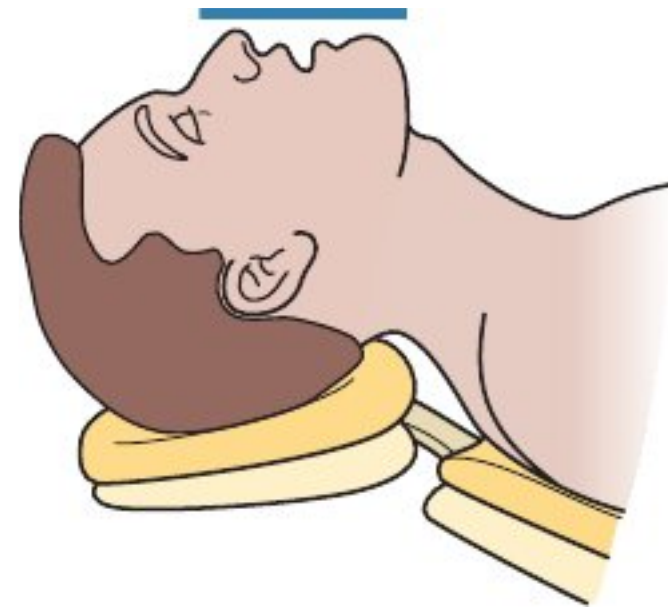


Figure 1-38. Patient Head Tilt for Mandibular Arch.

- Angle the headrest forward and down, so that the chin is lower than nose level (48).
- The occlusal or incisal surfaces of the treatment area should approximately parallel to the floor.
- This patient head position is known as the **chin-down position**.

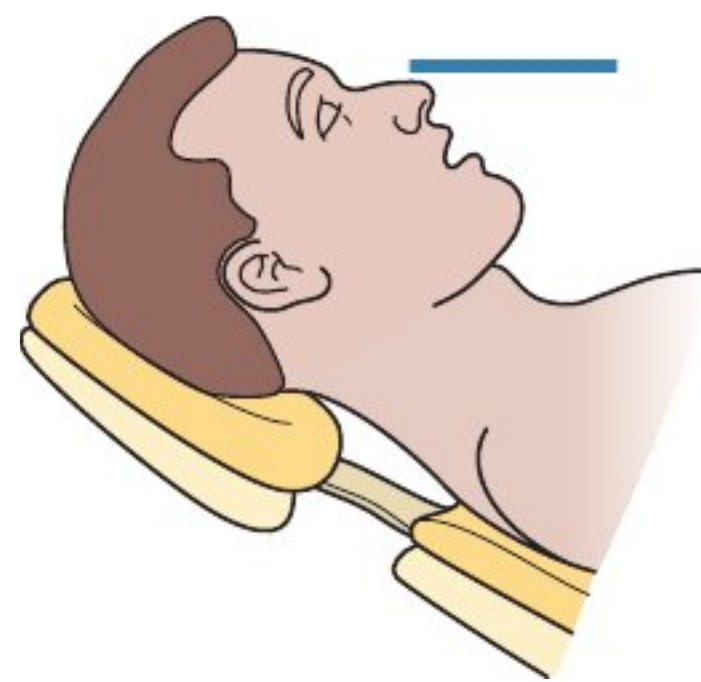


Figure 1-39. Patient Head Rotation for Both Arches.

- Ask the patient to rotate his or her head for easy access to the treatment area.
- Positions include turning toward the clinician, looking straight ahead, and turning slightly away from the clinician.

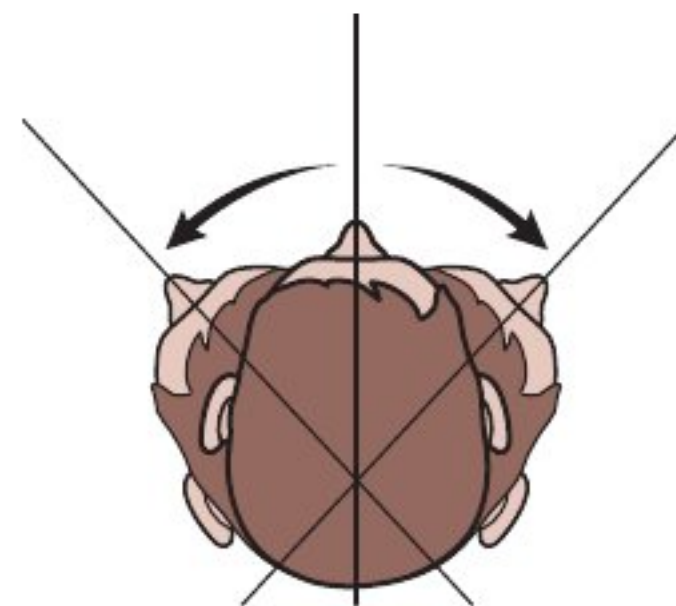


Figure 1-40. Bending the Head to the Side.

- If the patient chair has a flat, nonarticulated headrest, it is helpful to ask the patient to side-bend the head toward the clinician and then turn his or her head for the treatment area.
- This technique can position the oral cavity 2 to 3 in closer to the clinician and enhance viewing of the treatment area.



Section 6

Application of Ergonomic Principles: Adjusting the Overhead Light and Instrument Tray

POSITIONING THE OVERHEAD DENTAL LIGHT

Ideally, the overhead dental light is positioned so that the light beam is parallel to the clinician's line of sight (22,24,49).

- For mandibular treatment areas, the overhead dental light is positioned so that the light beam is approximately perpendicular to the floor (Fig. 1-41).
- For maxillary treatment areas, it usually is not possible to direct the light beam identically to the clinician's line of sight. For maxillary areas, it often is necessary to move the dental light above the patient's neck and angle the light beam into the mouth (Fig. 1-42). It is significant to note that dental hygienists whose overhead dental lights are positioned farther away from their sight lines (toward the patient's waist) are more likely to experience lower back pain (22,24,49).
- It is necessary to make tiny adjustments to the light throughout periodontal instrumentation—seldom is the light positioned for an arch and left in the identical position until moving to the opposite arch. As the clinician works around a dental arch and as the patient looks toward or away from the clinician, the dental light requires minor adjustments.

Figure 1-41. Light Position for Mandibular Arch.

- For the mandibular treatment areas, the overhead dental unit light is positioned directly over the oral cavity.
- Position the light at **arm's length within** comfortable reach. Avoid positioning the light close to the patient's head.
- The patient is in a chin-down head position.
- The light beam is directed approximately perpendicular to the floor.

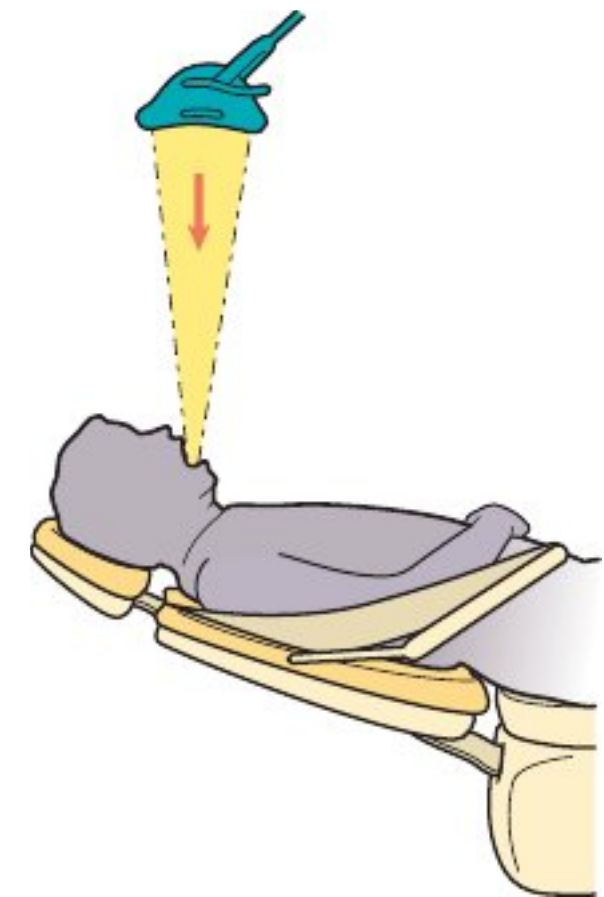
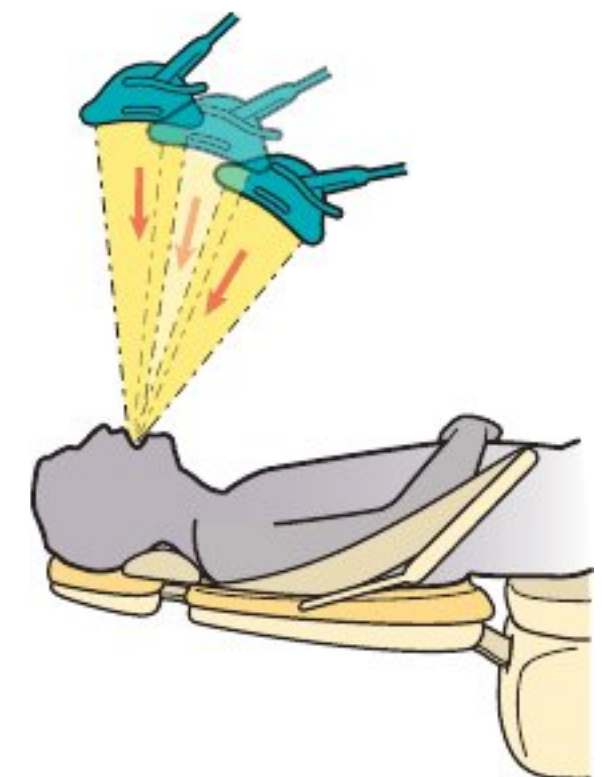


Figure 1-42. Light Position for Maxillary Arch.

- The maxillary treatment areas, the position of the overhead dental unit light ranges from being directly over the oral cavity to a position over the patient's neck.
- Position the light **at arm's length** within comfortable reach.
- Ideally, the light beam always would be perpendicular to the floor, but this is not always possible using an overhead dental light. This is why a coaxial illumination source is ideal. Coaxial illumination is discussed later in this chapter.
- The patient is in a chin-up position.
- The direction of the light beam ranges from perpendicular to the floor to a 60- to 90-degree angle to the floor.



POSITIONING THE INSTRUMENT TRAY

The instrument tray should be positioned within easy reach of the clinician's dominant hand as shown in Figure 1-43. Incorrect positioning of the instrument tray as depicted in Figure 1-44 places unnecessary stress on the clinician.

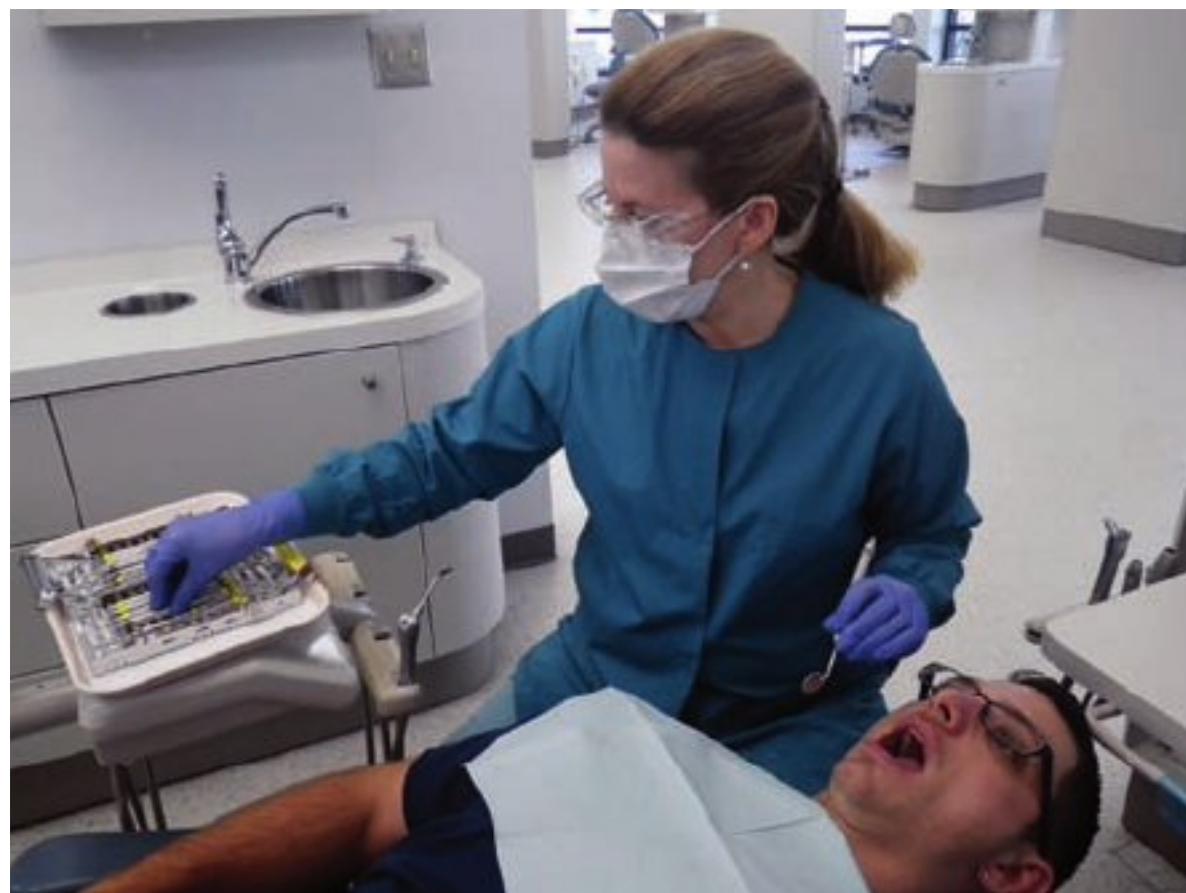


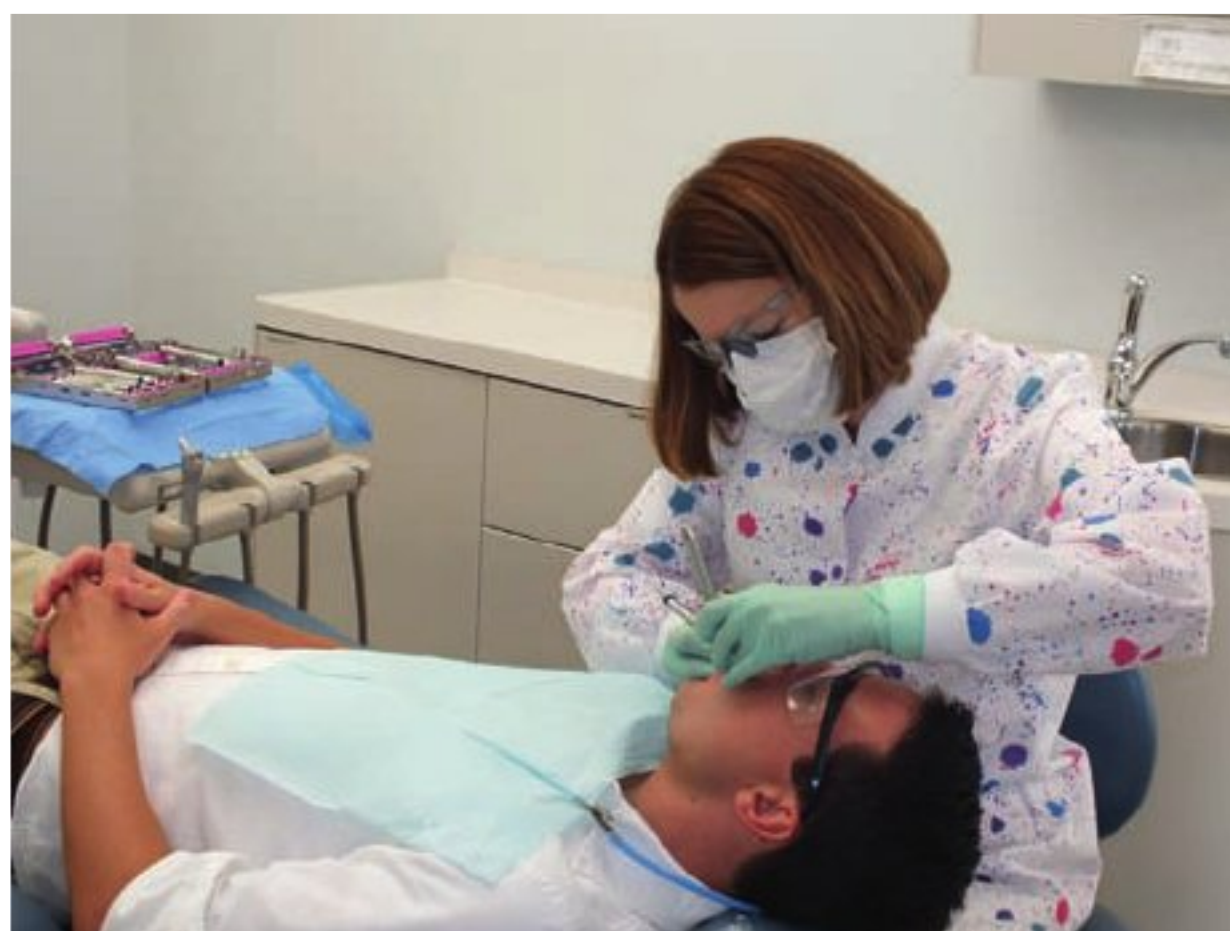
Figure 1-43. Correct Positioning of the Instrument Tray.

A. Front/Side Delivery. Instrument tray positioned correctly for front or side delivery within easy reach of the clinician's dominant hand.

B. Rear Delivery. Instrument tray positioned correctly for rear delivery within easy reach of the clinician's dominant hand.

Figure 1-44. Incorrect Positioning of Instrument Tray. A combination of positioning errors is demonstrated in this photo.

- The patient's oral cavity is positioned too high at midsternum level, instead of at the clinician's waist-level.
- The bracket table is positioned too far from the clinician. She would have to stretch to reach the instrument.



Section 7

Application of Ergonomic Principles: Adjusting the Patient to Facilitate Clinician Posture

A major component in avoiding fatigue and injury is proper positioning of the patient and dental equipment in relation to the seated clinician.

- While working, the clinician must be able to gain access to the patient's mouth and the dental unit without bending, stretching, or holding his or her elbows above waist level.
- The neutral seated position is established first, and then everything else—the patient chair, the patient's head, the dental unit light, and other dental equipment are adjusted to facilitate maintenance of the neutral seated position.
- Box 1-1 (Fig. 1-45) provides an overview of the relationship of the patient chair to the seated clinician while Figures 1-46 and 1-47 demonstrate correct and incorrect positioning.

Box 1-1

Overview: Patient Chair Position Relative to the Seated Clinician

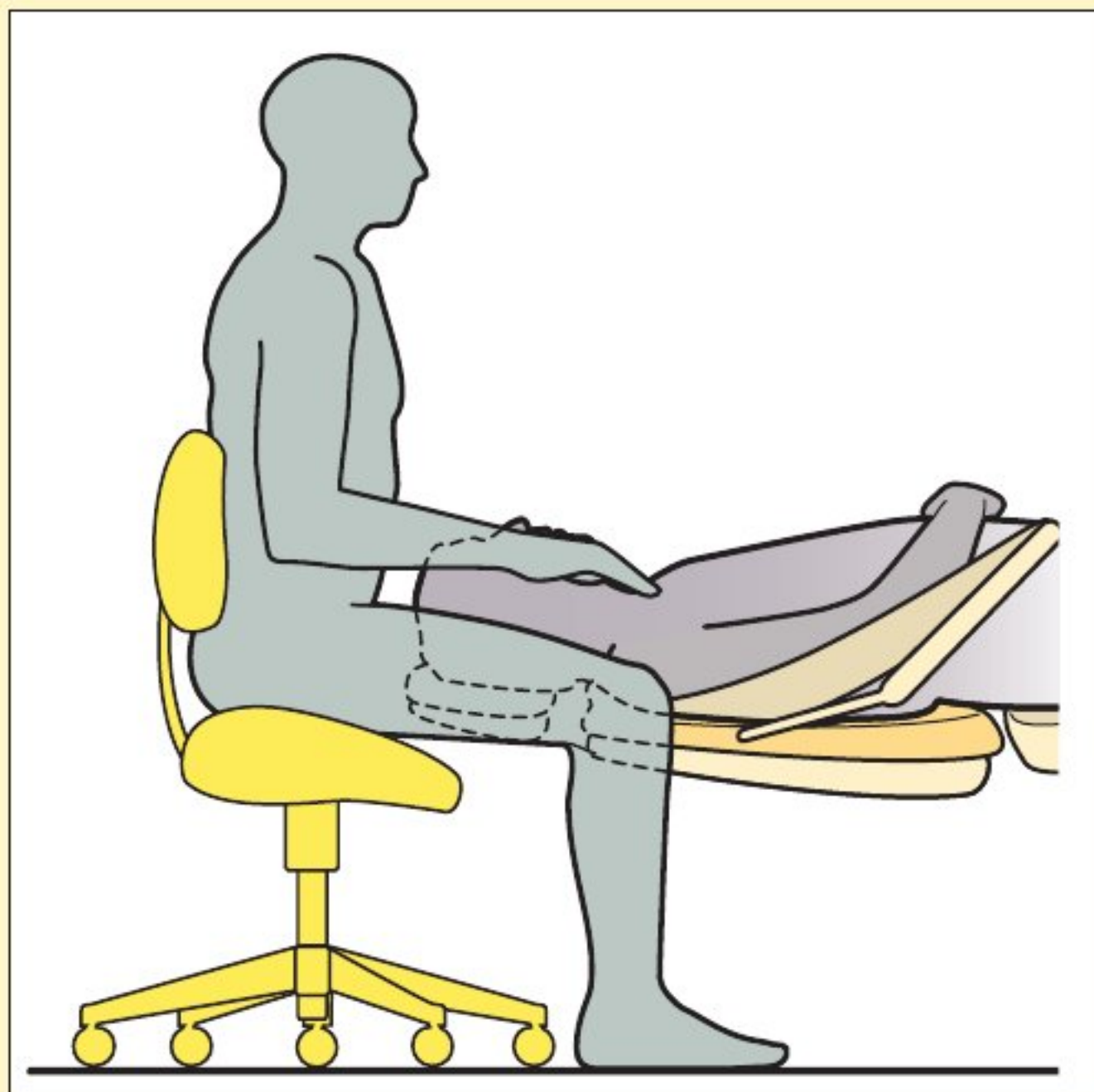


Figure 1-45

- Clinician assumes a neutral seated position.
- The clinician establishes a “wide base of support” with feet on floor at least shoulder-width apart and in front of the hips.
- The patient chair is lowered until the tip of the patient's nose is below the clinician's waist.
- The clinician should position his or her stool close to the patient to enhance vision of the treatment area and to minimize forward bending.
- Whenever possible, the clinician should straddle the headrest to facilitate neutral position.

Figure 1-46. Correct Positioning. Here the patient chair and patient's head are positioned at the correct height in relation to the clinician. Note that the clinician holds her upper arms parallel to her torso, her arms are not raised, and her shoulders are relaxed.

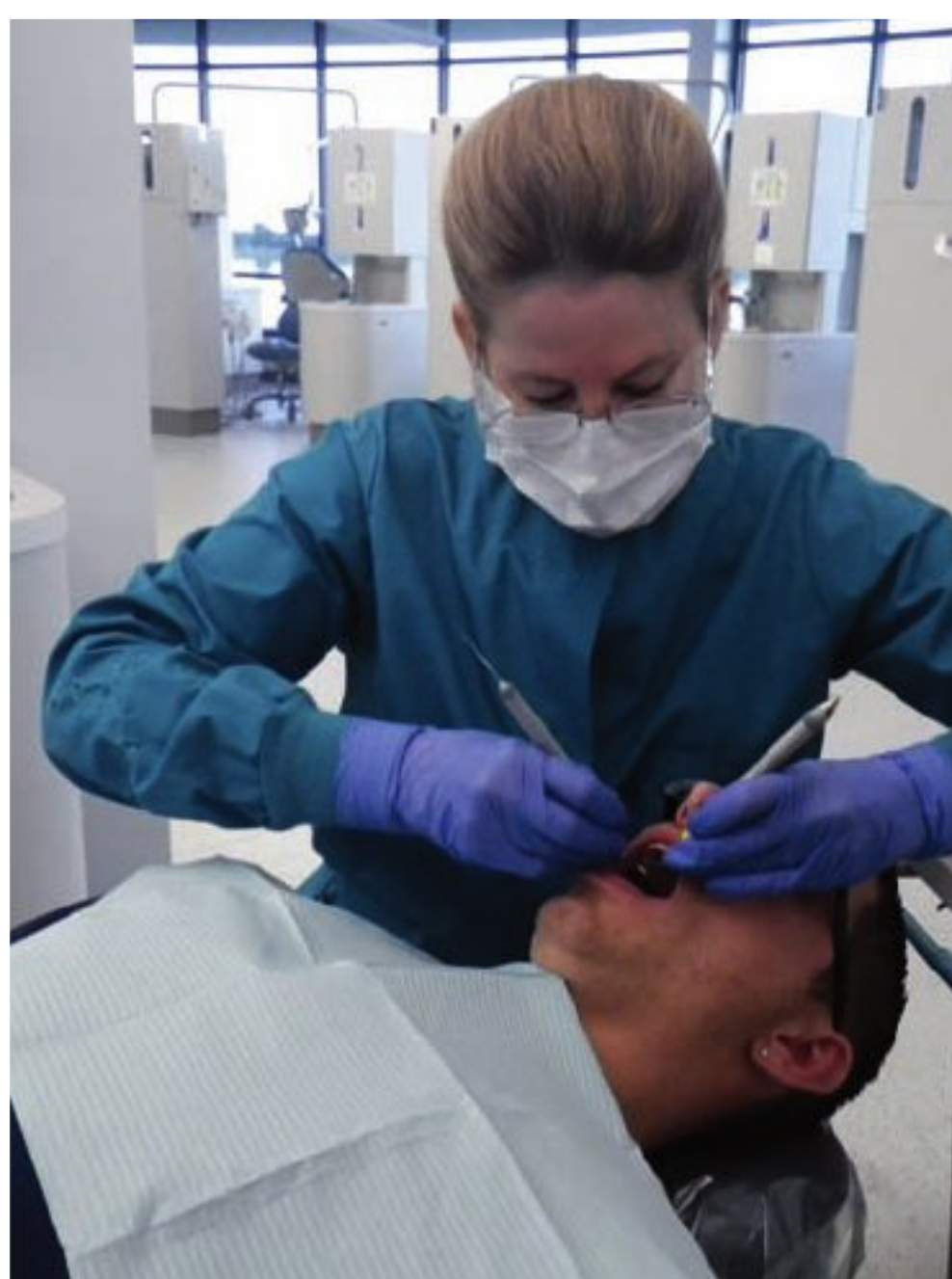
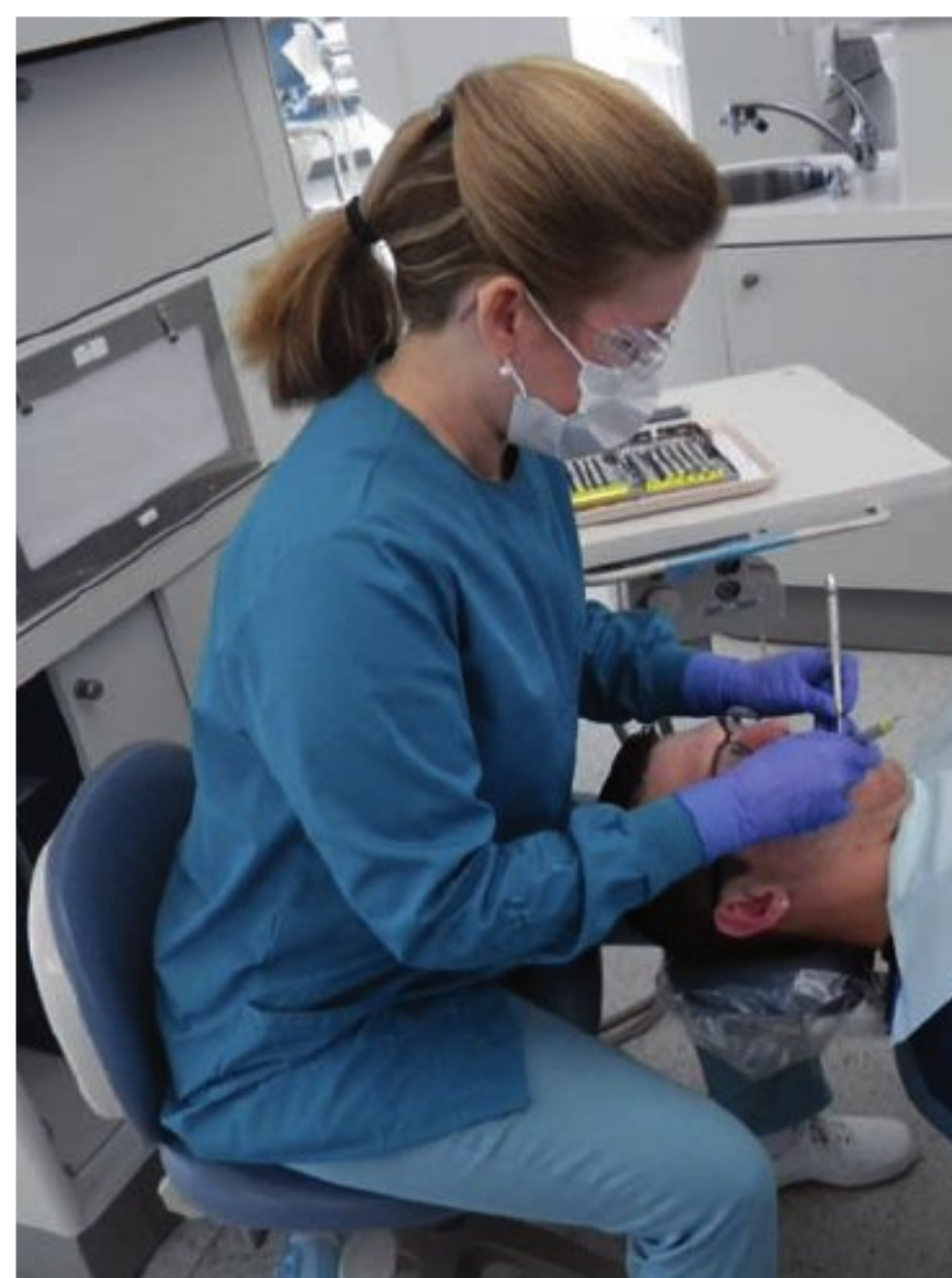


Figure 1-47. Incorrect Positioning—Patient Too High.

- A.** Note how this clinician must hold her elbows up in a stressful position in order to reach the mouth because she has positioned the patient's chair too high. This error is often due to the misconception that the clinician sees better if the patient is closer to the clinician's eyes. Actually, the reverse is true; the clinician has improved vision of the mouth when the patient is in a lower position.
- B.** In this example, the patient is positioned too high for the clinician. As a result, the clinician's chair is raised so the clinician can reach the mouth. The high chair position causes her to rest her feet on the rungs of the chair because she cannot touch the floor with the soles of her shoes.



SKILL BUILDING

Establishing the Height of the Patient Chair

Directions: Follow steps 1 to 5 below to practice establishing the correct height of the patient chair in relation to the seated clinician (Fig. 1-48).

1. Assume a neutral seated position. Sit next to the patient with the forearms crossed at your waist with your hand at the side at waist, not at your midsection (Fig. 1-48).
2. Position the patient chair for the treatment area (maxillary: supine; mandibular: semi-supine).
3. Position the patient's head for the treatment area (chin-up or chin-down).
4. The patient's open mouth should be below the point of the clinician's elbow.
5. In this position, the clinician will be able to reach the treatment area without raising his or her elbows above waist level.

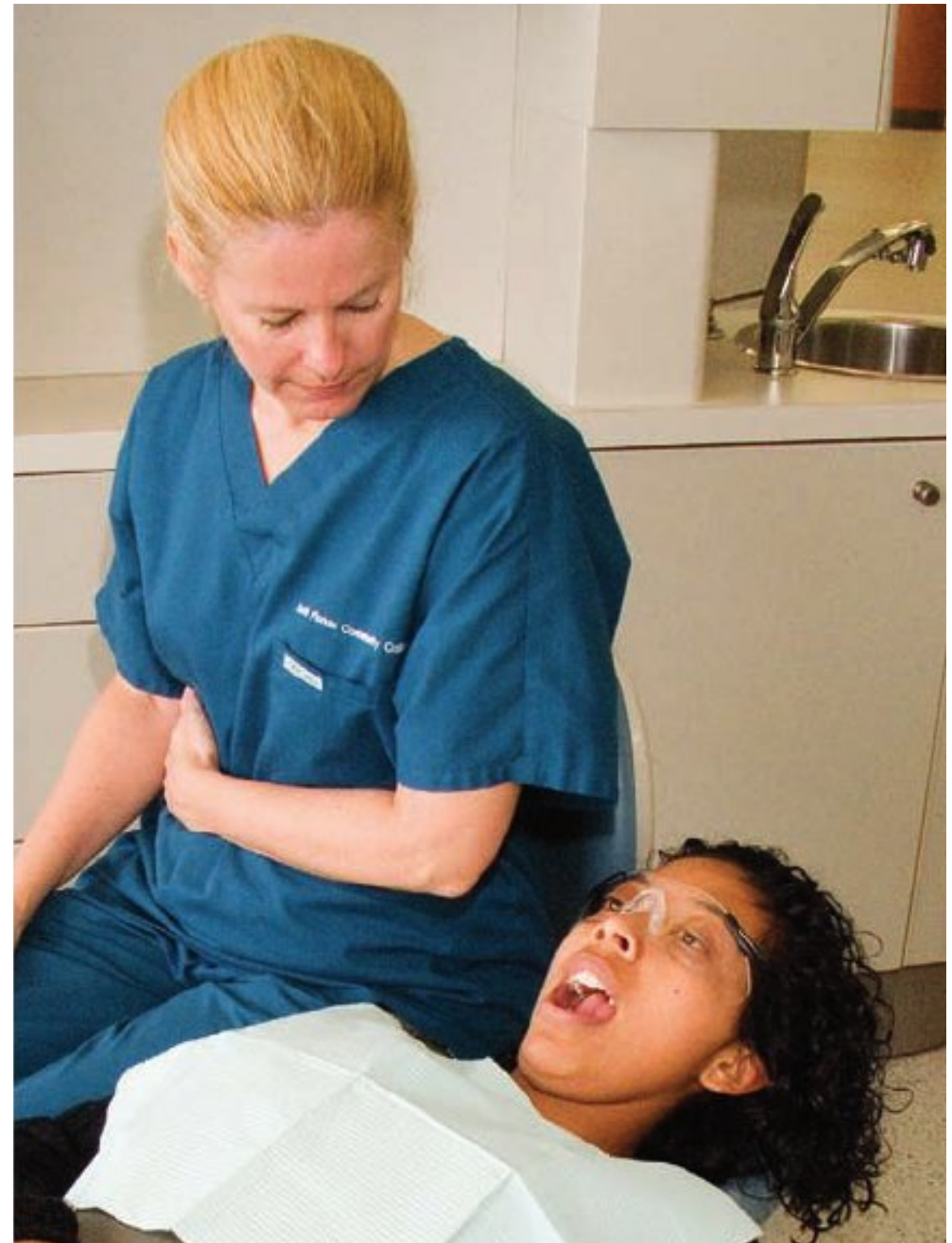


Figure 1-48

Section 8

Ancillary Equipment

Ancillary equipment that may be helpful to the clinician during periodontal instrumentation includes a coaxial illumination source and magnification loupes.

DENTAL HEADLIGHTS: COAXIAL ILLUMINATION

Adequate light must be present for human eyes to function effectively. In many instances, the clinician's hands or instruments block the light from the overhead dental light causing the clinician to crane the neck and assume a poor working posture. Instead of using the overhead dental light for illumination, many clinicians use a light source attached to a headband or mounted to magnification loupes (Fig. 1-49).



Figure 1-49. CoAxial Illumination Source. A headlight mounted to eyeglass frames. Note also that magnification loupes are mounted to the lenses of the glasses. The battery power source for headlight is shown on the left-hand side of this photo. (Courtesy of SurgiTel/General Scientific Corporation.)

1. Coaxial Illumination

- **Coaxial illumination sources** are spectacle-mounted or headband-mounted miniature lights that provide a beam of light that is parallel to the clinician's sight line (Figs. 1-50 to 1-52). In everyday terms, coaxial illumination sources are called **dental headlights**.

2. Advantages of Dental Headlights

- Coaxial illumination provides a light source that is parallel to the clinician's line of vision that eliminates shadows produced by hands and instruments. Dental headlights provide the clinician with shadow-free light and facilitate improved posture (50).
- Dental professionals spend many hours per year adjusting traditional overhead dental lights. Dental headlights improve productivity because time is not wasted adjusting a traditional overhead dental light (50).
- Recently, Dr. Janet Harrison researched ocular hazards from dental headlights (51). Although most manufacturers advertise that their devices emit "white" light, some dental headlights have a strong blue-light component versus the green-light component. Blue light is highly energized and is close in the color spectrum to ultraviolet light. The hazards of retinal damage with the use of high-intensity blue lights have been well-documented. There is limited research regarding the possible ocular hazards of usage of high-intensity illuminating devices. Another unexamined component is the effect of high-intensity light reflective glare and magnification back to the practitioner's eyes due to the use of water during dental procedures.



Figure 1-50. Dental Headlight. A dental hygienist wearing a spectacle-mounted dental headlight.



Figure 1-51. Illumination with an Overhead Light. Often, it is difficult to position an overhead light to achieve good illumination of the maxillary arch. Note that the hygienist's head is blocking the light beams.

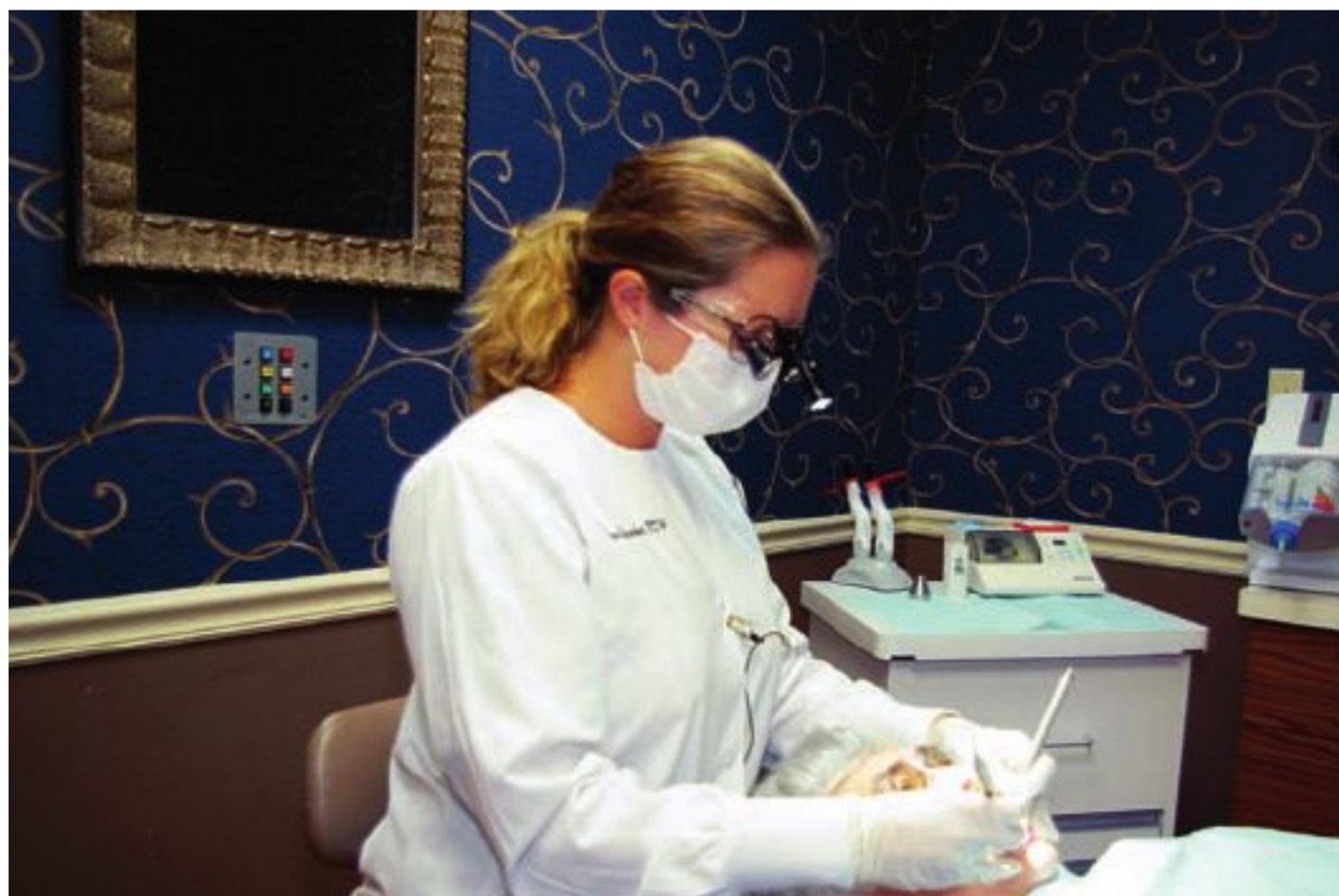


Figure 1-52. Coaxial Illumination. The dental headlight provides a beam of light that is parallel to the clinician's line of sight. The headlight provides good illumination of maxillary and mandibular treatment areas. And, there is no need to reach up to adjust an overhead light!

MAGNIFICATION LOUPES

1. Magnification Loupes: Ergonomically Helpful or Harmful? Magnification through surgical telescopes—known as **magnification loupes**—may be a technological aid during periodontal instrumentation (Fig. 1-53).

A. Research Evidence Concerning Magnification Loupes

1. While the use of loupes is often promoted as an ergonomic intervention, there is little published research to support this claim (8).
 - a. A study by Hayes et al. (8) suggests that wearing loupes has both positive and negative effects on upper extremity MSDs among dental hygienists (22,50,53). Additional research is needed to assess the long-term *effects of loupes wear*, over an extended period of time.
 - b. A study by Hoerler et al. (52) shows no statistically significant data to support the use of magnification loupes to enhance indirect vision skills among dental hygiene students.
2. Magnification may reduce the tendency to lean forward in an attempt to obtain a better view of the treatment area and therefore, reduce musculoskeletal strain to the clinician's neck, back, and shoulder muscles.

B. Problems Associated with Loupes

1. As with most equipment, how the loupes are used determines whether this equipment is beneficial in reducing musculoskeletal strain (Fig. 1-54). A poorly fitted or incorrectly used magnification system is more likely to exacerbate musculoskeletal problems than to solve them (54–57). It is important to make sure that the magnification system is properly fitted to the clinician.
2. According to Chang (55), President and Chief Scientist of SurgiTel/General Scientific Group, “Many clinicians think loupes solve ergonomic problems, but loupes can create ergonomic problems. The key is to find loupes that meet their ergonomic requirements.”
 - a. Loupes with improper working distances and declination angles can actually cause chronic neck and upper back pain (55,57–59).
 - b. Misalignment of the two oculars can cause eyestrain, double vision, and headaches. Clinicians should try loupes before they buy and ensure the loupes are custom-fit.



Figure 1-53. Flip-Up Style. Flip-up styles have the magnification telescopes attached to the eyeglasses by a hinged bracket. The bracket allows the clinician to obtain nonmagnified vision by rotating the telescopes above the eyewear. (Courtesy of SurgiTel/General Scientific Corporation.)



Figure 1-54. Loupes and Posture. As, this clinician's poor position clearly demonstrates, there is no "magic, easy fix" for maintaining neutral posture. As with most equipment, how the loupes are used determines whether this equipment is beneficial in reducing musculoskeletal strain.

2. Magnification Loupes for Periodontal Instrumentation

A. Ergonomic Criteria for Loupes Selection. Three essential considerations when selecting loupes are working distance, declination angle, depth of field, and frame size and weight (55,59).

1. **Working distance** is the distance measured from the eyes to the teeth being treated. If the working distance measured for the loupes is too short, the clinician needs to assume a head-forward or hunching posture to see the treatment area.
2. **Angle of declination** is the angle between the temple piece of the spectacle-mounted magnification system and the actual line of sight chosen by the clinician (Fig. 1-55).
 - a. Each clinician has a unique optimal declination angle determined by the individual's most balanced seated position (55,59).
 - b. If the declination angle of the loupes is too small, the clinician will have to tip the head forward or use a hunching posture to view the treatment area through the loupes. If the declination angle is too great, the clinician will have to tilt the head backward in order to view the treatment area through the loupes.
3. **Depth of Field.** **Depth of field** is the distance range within which the object being viewed remains in sharp focus.
 - a. Adequate depth of field allows the clinician to move his or her head without the treatment area going out of focus.
 - b. Inadequate depth of field may cause the clinician to assume an awkward head position in order to clearly view the treatment area.
4. **Sizes and Weight of Spectacle Frame**
 - a. Large frames that sit low on the cheek allow better placement of the telescopes than narrow, oval frames. In general, the lower the telescopes are in relation to the clinician's pupils, the better the declination angle.
 - b. The dental professional may wear magnification loupes for many hours each day. It is important, therefore, that the frames be as light and comfortable as possible.

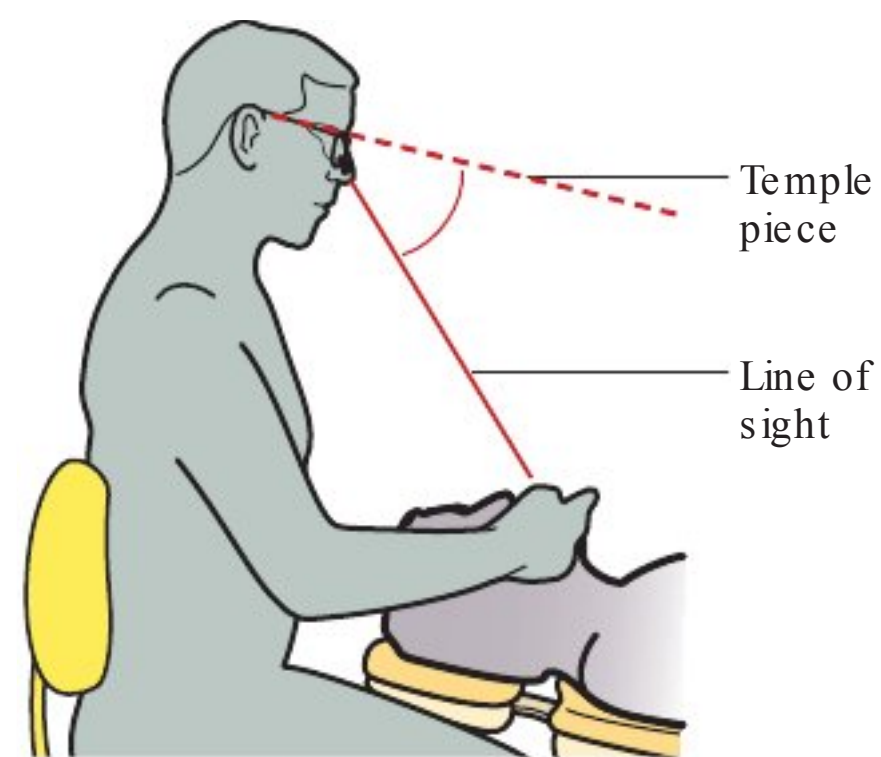


Figure 1-55. Declination Angle. The declination angle is the angle formed between the temple piece of spectacle-mounted magnification system and the clinician's actual line of sight.

3. Important Considerations for Preclinical Periodontal Instrumentation

A. Limitations on What Can Be Seen with Magnification

1. **Limited Field of Vision with Magnification.** The **field of view** is the total size of the object that can be viewed through the loupes. The most popular magnification strengths for periodontal instrumentation are 2.0 \times , 2.5 \times , and 2.6 \times (55). The lowest level of magnification required should be selected. Lower magnification levels increase the depth of field and minimize the blind zone.
2. **Blind Zone with Magnification.** The **blind zone** is an area of vision between the unmagnified peripheral field of vision and the magnified center of the field of vision.
 - a. The blind zone presents the most difficulty when an instrument is being moved into or out of the magnified field of view. Injury to the patient or the clinician is a possibility as the instrument is moved through the blind spot. Most clinicians simply move the loupes aside until a stable fulcrum has been established with the instrument.
 - b. The lowest magnification should be selected to minimize the size of the blind zone.

B. Criteria for Use of Magnification Loupes in Preclinical Setting

1. Ability for Student Self-Assessment

- a. When learning the skills of clinician position, patient position, clock positions, mirror use, and finger rests it is vital that the student clinician is able to continuously self-assess the positioning of his or her body, arms, hands, and fingers.
- b. Self-assessment of these skills during the learning process means that the student clinician must have a visual field that includes the patient's head and the clinician's arms, hands, and fingers as well as the oral cavity.
- c. Figure 1-56 shows the minimum field of vision needed by the student clinician while practicing and mastering the fundamental skills of patient position, clock positions, mirror use, and finger rests.
- d. Magnification loupes limit the clinician's field of vision to the oral cavity (60). Figure 1-57 shows the clinician's field of vision using with 2.5 \times magnification loupes. Once a clinician has mastered the fundamental skills of patient position, clock positions, mirror use, and finger rests, the loupes provide a field of vision that is adequate for instrumentation.
- e. This magnified field of vision, however, is too restrictive to permit self-evaluation of skills when acquiring the fundamental preclinical skills of positioning and finger rests.

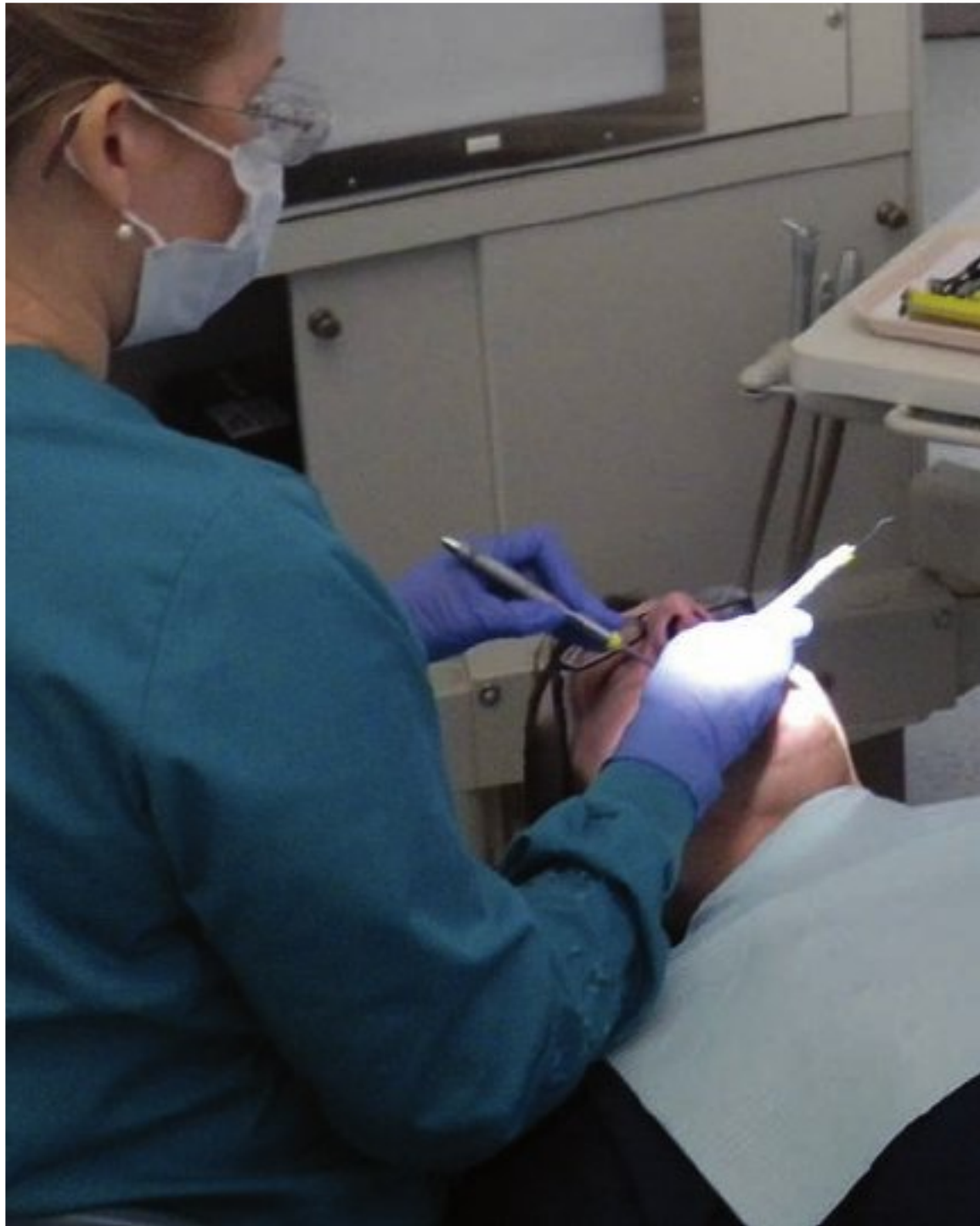


Figure 1-56. Field of Vision without Loupes. When learning and mastering the fundamental skills of positioning, mirror use, and finger rests, the student clinician needs a field of vision that allows him or her to continuously self-evaluate these skills.

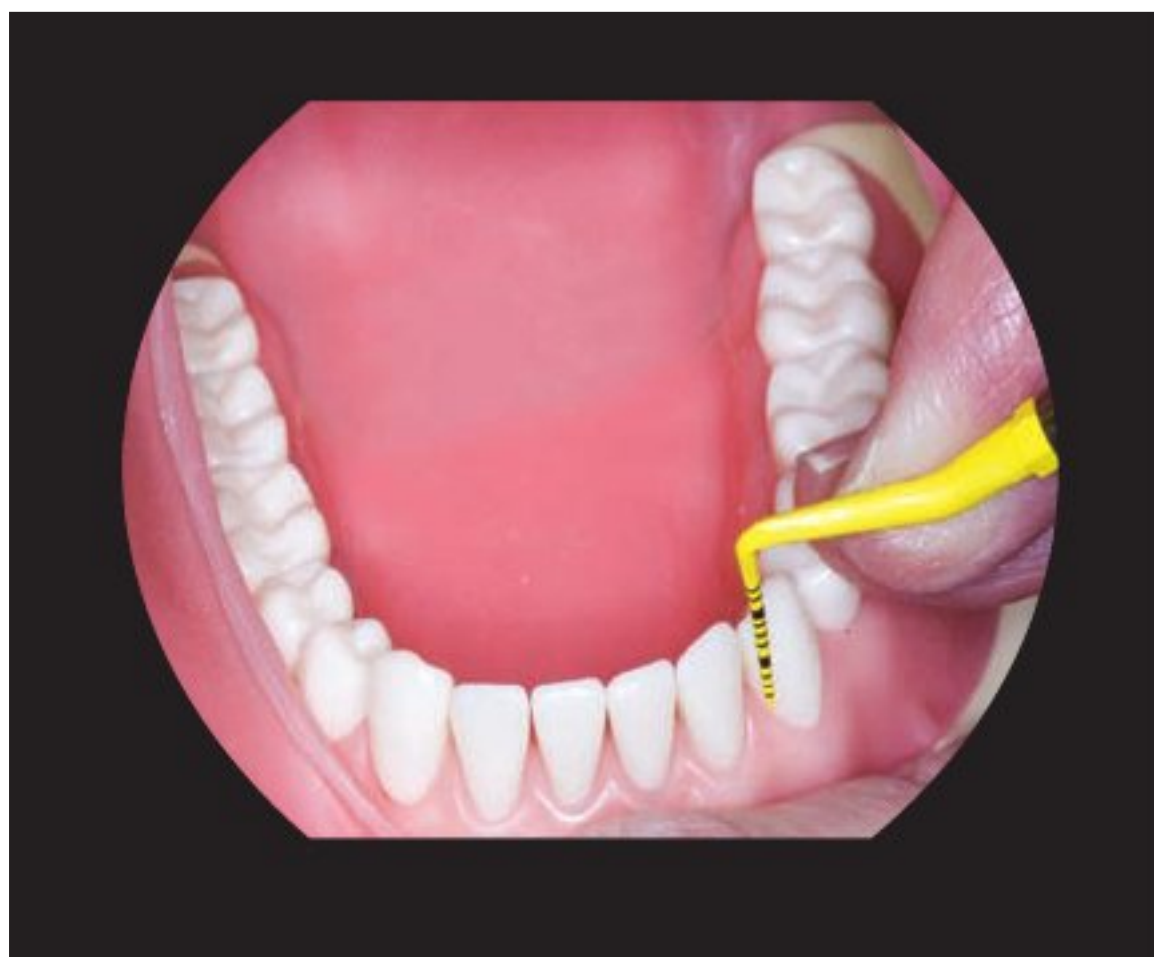


Figure 1-57. Limited Field of Vision with Loupes. When wearing magnification loupes, the clinician's field of vision is limited to the oral cavity. This field of vision is too restrictive when practicing and perfecting the fundamental skills of positioning, mirror use, and finger rests (Box 1-2).

Box 1-2

No Magnification, Please



Magnification loupes should not be worn when practicing and perfecting certain fundamental skills of periodontal instrumentation. The limited field of vision created by magnification loupes make it impossible for student clinicians to self-evaluate fundamental skills such as positioning, grasp, and finger rests. Self-assessment of these skills requires an unlimited field of vision.

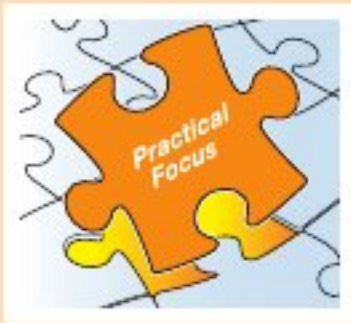
References

1. Kroemer KH. Fitting the human: introduction to ergonomics. 6th ed. Boca Raton, FL: CRC Press; 2009. xix, 437.
2. Hayes MJ, Smith DR, Cockrell D. Prevalence and correlates of musculoskeletal disorders among Australian dental hygiene students. *Int J Dent Hyg.* 2009;7(3):176–181.
3. Hayes MJ, Smith DR, Taylor JA. Musculoskeletal disorders in a 3 year longitudinal cohort of dental hygiene students. *J Dent Hyg.* 2014;88(1):36–41.
4. Hayes MJ, Taylor JA, Smith DR. Predictors of work-related musculoskeletal disorders among dental hygienists. *Int J Dent Hyg.* 2012;10(4):265–269.
5. Khan SA, Chew KY. Effect of working characteristics and taught ergonomics on the prevalence of musculoskeletal disorders amongst dental students. *BMC Musculoskelet Disord.* 2013;14:118.
6. Graham C. Ergonomics in dentistry, Part 1. *Dent Today.* 2002;21(4):98–103.
7. Hayes M, Cockrell D, Smith DR. A systematic review of musculoskeletal disorders among dental professionals. *Int J Dent Hyg.* 2009;7(3):159–165.
8. Hayes MJ, Osmotherly PG, Taylor JA, Smith DR, Ho A. The effect of wearing loupes on upper extremity musculoskeletal disorders among dental hygienists. *Int J Dent Hyg.* 2014;12(3):174–179.
9. Hayes MJ, Smith DR, Cockrell D. An international review of musculoskeletal disorders in the dental hygiene profession. *Int Dent J.* 2010;60(5):343–352.
10. Hayes MJ, Smith DR, Taylor JA. Musculoskeletal disorders and symptom severity among Australian dental hygienists. *BMC Res Notes.* 2013;6:250.
11. Kanteshwari K, Sridhar R, Mishra AK, Shirahatti R, Maru R, Bhusari P. Correlation of awareness and practice of working postures with prevalence of musculoskeletal disorders among dental professionals. *Gen Dent.* 2011;59(6):476–483; quiz 84–85.
12. Lindfors P, von Thiele U, Lundberg U. Work characteristics and upper extremity disorders in female dental health workers. *J Occup Health.* 2006;48(3):192–197.
13. Puriene A, Janulyte V, Musteikyte M, Bendinskaite R. General health of dentists. Literature review. *Stomatologija.* 2007;9(1):10–20.
14. Beach JC, DeBiase CB. Assessment of ergonomic education in dental hygiene curricula. *J Dent Educ.* 1998;62(6):421–425.
15. Morse T, Bruneau H, Dussetschleger J. Musculoskeletal disorders of the neck and shoulder in the dental professions. *Work.* 2010;35(4):419–429.
16. Andersson GB, Murphy RW, Ortengren R, Nachemson AL. The influence of backrest inclination and lumbar support on lumbar lordosis. *Spine (Phila Pa 1976).* 1979;4(1):52–58.
17. Dylla J, Forrest JL. Training to sit, starting with structure. *Access.* 2006;20(5):42–44.
18. Dylla J, Forrest JL. Training to sit, starting with structure part II. *Access.* 2006;20(8):19–23.
19. Dylla J, Forrest JL. Fit to sit—strategies to maximize function and minimize occupational pain. *J Mich Dent Assoc.* 2008;90(5):38–45.
20. Mandal AC. Balanced sitting posture on forward sloping seat. 2008. Epub March 17, 2008. Available online at <http://www.acmandal.com> on. Accessed October 6, 2015.
21. Rucker L. Musculoskeletal health status in B.C. dentist and dental hygienists: Evaluation the preventive impact of surgical ergonomics training and surgical magnification. Workers' Compensation Board of British Columbia. 2001.
22. Rucker LM, Sunell S. Ergonomic risk factors associated with clinical dentistry. *J Calif Dent Assoc.* 2002;30(2):139–148.
23. Schoberth H. Correct workplace sitting, scientific studies, results and solutions. Der Arbeitssitz in Industriellen Produktionsbereich. Dortmund, Germany: Schriftenreihe Arbeitsschutz; 1970.
24. Valachi B, Valachi K. Preventing musculoskeletal disorders in clinical dentistry: strategies to address the mechanisms leading to musculoskeletal disorders. *J Am Dent Assoc.* 2003;134(12):1604–1612.
25. Akesson I, Johnsson B, Rylander L, Moritz U, Skerfving S. Musculoskeletal disorders among female dental personnel—clinical examination and a 5-year follow-up study of symptoms. *Int Arch Occup Environ Health.* 1999;72(6):395–403.
26. Anton D, Rosecrance J, Merlino L, Cook T. Prevalence of musculoskeletal symptoms and carpal tunnel syndrome among dental hygienists. *Am J Ind Med.* 2002;42(3):248–257.
27. Barry RM, Woodall WR, Mahan JM. Postural changes in dental hygienists. Four-year longitudinal study. *J Dent Hyg.* 1992;66(3):147–150.
28. de Carvalho MV, Soriano EP, de Franca Caldas A Jr, Campello RI, de Miranda HF, Cavalcanti FI. Work-related musculoskeletal disorders among Brazilian dental students. *J Dent Educ.* 2009;73(5):624–630.
29. Melis M, Abou-Atme YS, Cottogno L, Pittau R. Upper body musculoskeletal symptoms in Sardinian dental students. *J Can Dent Assoc.* 2004;70(5):306–310.
30. Michalak-Turcotte C. Controlling dental hygiene work-related musculoskeletal disorders: the ergonomic process. *J Dent Hyg.* 2000;74(1):41–48.
31. Morse T, Bruneau H, Michalak-Turcotte C, et al. Musculoskeletal disorders of the neck and shoulder in dental hygienists and dental hygiene students. *J Dent Hyg.* 2007;81(1):10.
32. Rising DW, Bennett BC, Hursh K, Plesh O. Reports of body pain in a dental student population. *J Am Dent Assoc.* 2005; 136(1):81–86.
33. Samotoi A, Moffat SM, Thomson WM. Musculoskeletal symptoms in New Zealand dental therapists: prevalence and associated disability. *N Z Dent J.* 2008;104(2):49–53; quiz 65.
34. Thornton LJ, Barr AE, Stuart-Buttle C, et al. Perceived musculoskeletal symptoms among dental students in the clinic work environment. *Ergonomics.* 2008;51(4):573–586.
35. Warren N. Causes of musculoskeletal disorders in dental hygienists and dental hygiene students: a study of combined biomechanical and psychosocial risk factors. *Work.* 2010;35(4):441–454.
36. Yamalik N. Musculoskeletal disorders (MSDs) and dental practice Part 2. Risk factors for dentistry, magnitude of the problem, prevention, and dental ergonomics. *Int Dent J.* 2007;57(1):45–54.
37. Occupational Health and Safety Council of Ontario (OHSCO). Occupational Health and Safety Council of Ontario's MSD Prevention Series. Part 1: MSD Prevention Guideline for Ontario. 2007. www.osach.ca/misc_pdf/MSDGuideline.pdf. Accessed November 23, 2015.

38. Levangie PK, Norkin CC. *Joint Structure and Function : A Comprehensive Analysis*. 4th ed. Philadelphia, PA: F.A. Davis Co.; 2005. xix, 588.
39. Wyoming AgrAbility. What to look for when selecting or modifying hand tools to provide a better fit for the user. http://www.uwyo.edu/agrability/fact_sheets/what_to_look_for_in_hand_tools.pdf. Accessed October 6, 2015.
40. Sanders MJ, Turcotte CA. Ergonomic strategies for dental professionals. *Work*. 1997;8(1):55–72.
41. Sanders MA, Turcotte CM. Strategies to reduce work-related musculoskeletal disorders in dental hygienists: two case studies. *J Hand Ther*. 2002;15(4):363–374.
42. Silverstein BA, Fine LJ, Armstrong TJ. Occupational factors and carpal tunnel syndrome. *Am J Ind Med*. 1987;11(3):343–358.
43. Kilbom S, Armstrong T, Buckle P, et al. Musculoskeletal disorders: work-related risk factors and prevention. *Int J Occup Environ Health*. 1996;2(3):239–246.
44. Latko WA, Armstrong TJ, Foulke JA, Herrin GD, Rabourn RA, Ulin SS. Development and evaluation of an observational method for assessing repetition in hand tasks. *Am Ind Hyg Assoc J*. 1997;58(4):278–285.
45. Silverstein BA, Fine LJ, Armstrong TJ. Hand wrist cumulative trauma disorders in industry. *Br J Ind Med*. 1986;43(11):779–784.
46. Surgeons AAoO. Spine basics: spinal curves. American Academy of Orthopedic Surgeons.
47. Valachi B, Valachi K. Mechanisms leading to musculoskeletal disorders in dentistry. *J Am Dent Assoc*. 2003;134(10):1344–1350.
48. Martin MM, Adhern D, Gotcher J, et al. In introduction to ergonomics: Risk factors, MSDs, Approaches and Interventions. Chicago, Illinois: American Dental Association; 2004.
49. Rucker LM, Sunell S. “Dental Clinical Ergonomics Module” materials, 22 modules. www.dentistry.ubc.ca/ergo, 2006-date. Accessed October 6, 2015.
50. Branson BG, Bray KK, Gadbury-Amyot C, et al. Effect of magnification lenses on student operator posture. *J Dent Educ*. 2004;68(3):384–389.
51. Stamatacos C, Harrison JL. The possible ocular hazards of LED dental illumination applications. *J Mich Dent Assoc*. 2014;96(4):34–39.
52. Hoerler SB, Branson BG, High AM, Mitchell TV. Effects of dental magnification lenses on indirect vision: a pilot study. *J Dent Hyg*. 2012;86(4):323–330.
53. Maillet JP, Millar AM, Burke JM, Maillet MA, Maillet WA, Neish NR. Effect of magnification loupes on dental hygiene student posture. *J Dent Educ*. 2008;72(1):33–44.
54. Alexopoulos EC, Stathi IC, Charizani F. Prevalence of musculoskeletal disorders in dentists. *BMC Musculoskelet Disord*. 2004;5:16.
55. Chang BJ. Ergonomic benefits of surgical telescope systems: selection guidelines. *J Calif Dent Assoc*. 2002;30(2):161–169.
56. Donaldson ME, Knight GW, Guenzel PJ. The effect of magnification on student performance in pediatric operative dentistry. *J Dent Educ*. 1998;62(11):905–910.
57. Rucker LM. Surgical Magnification: Posture Maker or Posture Breaker?, In: Ergonomics and the Dental Care Worker, Murphy DC, ed. Chapter 8, Washington, DC: American Public Health Association, pp. 191–216, 1998.
58. Chaffin DB. Localized muscle fatigue—definition and measurement. *J Occup Med*. 1973;15(4):346–354.
59. Rucker LM, Beattie C, McGregor C, Sunell S, Ito Y. Declination angle and its role in selecting surgical telescopes. *J Am Dent Assoc*. 1999;130(7):1096–1100.
60. Barbieri S. Magnification for the dental hygienist. *Dimen Dent Hyg*. 2006;4(11):28, 30–31.

Section 9

Skill Application



PRACTICAL FOCUS

Selecting A Clinician Stool

Dental professionals spend long hours sitting. Clinician stools cannot be a “one size fits all” design. Dentists and dental hygienists come in all sizes: tall or short with a delicate or round physique. A dental hygienist who is 6’4” in height certainly needs a different chair than a dental hygienist who is 5’1” in height. A stool that is adjusted correctly for clinician A may be uncomfortable for clinician B. Just as each driver of the family car must change the position of the driver’s seat and mirrors, each clinician should adjust the stool height and seat back to conform to his or her own body proportions and height. Properly designed clinician seating is the foundation for a healthy neutral sitting position (18,19,22,47). Table 1-3 provides evaluation criteria for assessment of clinician seating.

TABLE 1-3. ERGONOMIC SEATING EVALUATION FORM

Evaluation Criteria	Scale: U = Unacceptable A = Average E = Excellent
<p>A. Legs</p> <ol style="list-style-type: none"> 1. Five legs for stability 2. Large casters for easy movement 	
<p>B. Stool Adjustments</p> <ol style="list-style-type: none"> 1. Stool seat height, backrest, and seat pan adjust independently to allow for comfortable seating. 2. Stool seat height, backrest, and seat pan adjust easily while in a seated position. 3. Seat height easily adjusts to accommodate both tall and short clinicians (range of 14–20 in). 4. Seat pan tilts slightly so that the seat back is an inch or so higher than the front. 	
<p>C. Seat Comfort</p> <ol style="list-style-type: none"> 1. Seat pan depth is comfortable and supportive. Seat pan is large enough to support the clinician’s thighs and buttocks. 2. Front edge of the seat pan has a waterfall shape (rounded front edge). 3. When the clinician is seated with his or her back against the backrest, the seat pan does not impinge on the back of the clinician’s knees, but allows a couple of inches between the edge and the back of the knee. 	
<p>D. Backrest Comfort</p> <ol style="list-style-type: none"> 1. The backrest adjusts in a vertical direction—up and down—to provide support to the lumbar region of the back for both short and tall clinicians. 2. The backrest adjusts in a horizontal direction—closer or farther away from the seat—to provide lumbar support. 	

ONLINE MODULE SKILL EVALUATIONS



Module Skill evaluations for instructor use can be downloaded at <http://thepoint.lww.com/GehrigFundamentals8e>

Module skill evaluations may be downloaded for use on a computer (Fig. 1-58) or printed out as paper copies.

- These computerized module evaluations automatically tabulate the percentage grade for each module evaluation.
- The computerized evaluation forms may be customized to meet each individual dental hygiene program's needs by adding or deleting criteria.
- In addition to the individual module evaluation forms, a summative evaluation form for use as a psychomotor final examination is available on The Point website.
- For details see the **Instructor Resources** section of the online materials at thePoint website accessed at <http://thepoint.lww.com/GehrigFundamentals8e>

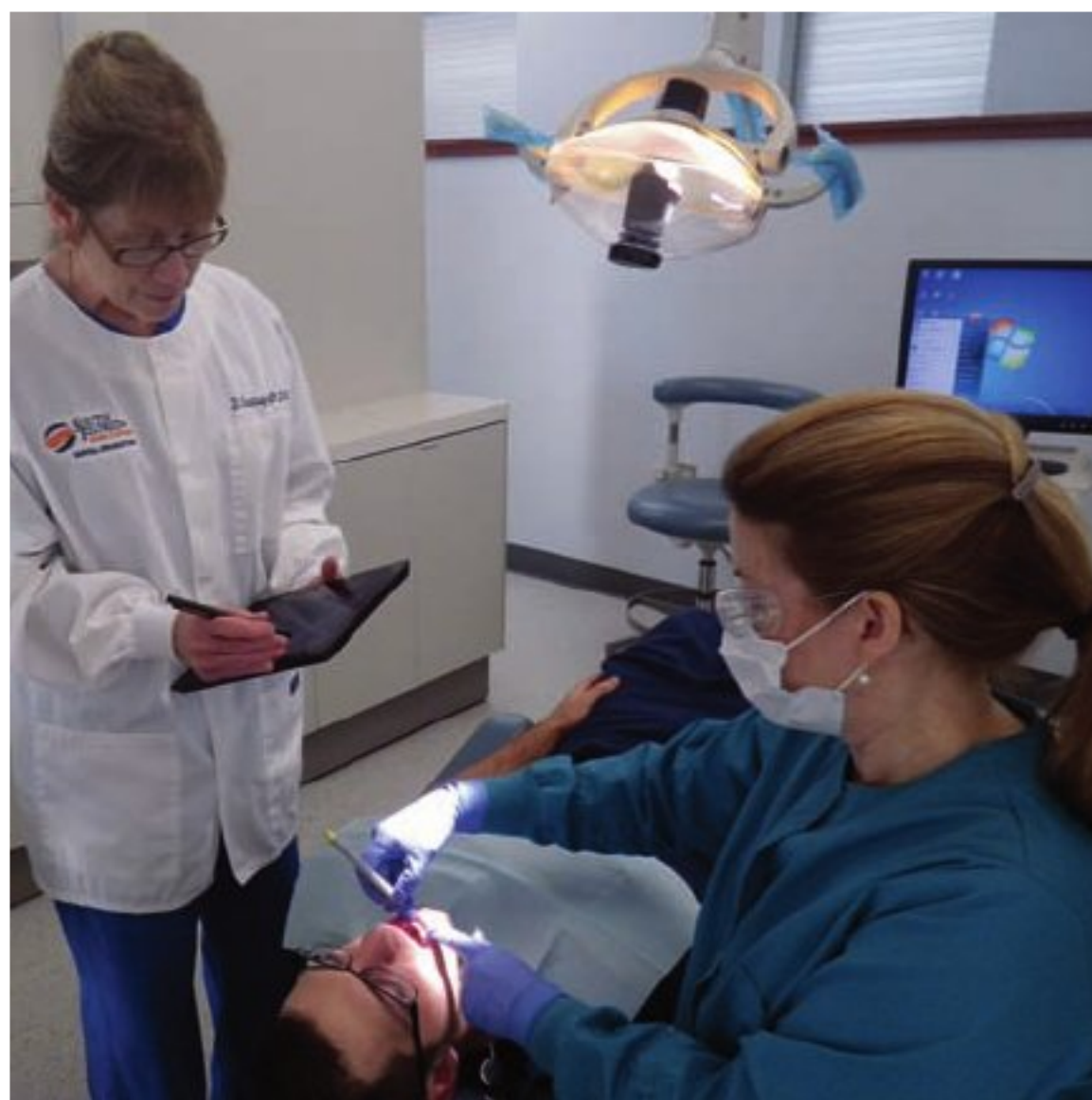


Figure 1-58. Computerized Skill Evaluation Forms. Skill evaluation forms downloaded from thePoint website may be used on a computer during the preclinical evaluation process.



Student Self-Evaluation Module 1: Position

Student: _____

date: _____

DIRECTIONS: Self-evaluate your skill level in each treatment area as: **S** (satisfactory) or **U** (unsatisfactory).

Positioning/Ergonomics	Self Evaluation
Adjusts clinician chair correctly	
Reclines patient chair and assures that patient's head is even with top of headrest	
Positions instrument table within easy reach for front, side, or rear delivery as appropriate for operatory configuration	
Positions unit light at arm's length or dons dental headlight and adjusts it for use	
Positions backrest of patient chair for the specified dental arch	
Adjusts height of patient chair so that clinician's elbows remain at waist level when the clinician's fingers are touching the teeth in treatment area	
Maintains neutral seated position	

2

Clinician Position in Relation to the Treatment Area

Module Overview

The manner in which the seated clinician is positioned in relation to a treatment area is known as the clock position. This module introduces the traditional clock positions for periodontal instrumentation.

Module Outline

Section 1	Clock Positions for Instrumentation	41
Section 2	Positioning for the RIGHT-Handed Clinician	43
	<i>Skill Building. Clock Positions for the RIGHT-Handed Clinician, p. 43</i>	
	<i>Flow Chart: Sequence for Practicing Patient/Clinician Position</i>	
	<i>Use of Textbook during Skill Practice</i>	
	<i>Quick Start Guide to the Anterior Sextants, p. 47</i>	
	<i>Skill Building. Clock Positions for the Anterior Surfaces Toward, p. 48</i>	
	<i>Skill Building. Clock Positions for the Anterior Surfaces Away, p. 49</i>	
	<i>Quick Start Guide to the Posterior Sextants, p. 50</i>	
	<i>Skill Building. Clock Positions for the Posterior Sextants, Aspects Facing Toward the Clinician, p. 51</i>	
	<i>Skill Building. Clock Positions for the Posterior Sextants, Aspects Facing Away From the Clinician, p. 52</i>	
	<i>Reference Sheet: Position for the RIGHT-Handed Clinician</i>	
Section 3	Positioning for the LEFT-Handed Clinician	54
	<i>Skill Building. Clock Positions for the LEFT-Handed Clinician, p. 54</i>	
	<i>Flow Chart: Sequence for Practicing Patient/Clinician Position</i>	
	<i>Use of Textbook During Skill Practice</i>	
	<i>Quick Start Guide to the Anterior Sextants, p. 58</i>	
	<i>Skill Building. Clock Positions for the Anterior Surfaces Toward, p. 59</i>	
	<i>Skill Building. Clock Positions for the Anterior Surfaces Away, p. 60</i>	
	<i>Quick Start Guide to the Posterior Sextants, p. 61</i>	
	<i>Skill Building. Clock Positions for the Posterior Sextants, Aspects Facing Toward the Clinician, p. 62</i>	
	<i>Skill Building. Clock Positions for the Posterior Sextants, Aspects Facing Away from the Clinician, p. 63</i>	
	<i>Reference Sheet: Position for the LEFT-Handed Clinician</i>	
Section 4	Modified Positioning: Working from a Standing Position	65

Practical Focus. Assessing Patient and Clinician Position
 Student Self Evaluation Module 2: Positioning and Clock Positions



Online resources for this module:

- Clock Positions for Anterior Teeth (right- and left-handed versions)
- Clock Positions for Posterior Teeth (right- and left-handed versions)

Available at: <http://thepoint.lww.com/GehrigFundamentals8e>

Key Terms

Clock positions

Anterior surfaces toward
the clinician

Anterior surfaces away from
the clinician

Posterior aspects facing
toward the clinician

Posterior aspects facing away
from the clinician

Learning Objectives

- Demonstrate and maintain neutral seated posture for each of the mandibular and maxillary treatment areas.
- Demonstrate correct patient position relative to the clinician.
- Demonstrate, from memory, the clock position(s) for each of the mandibular and maxillary treatment areas.
- Demonstrate standing clinician position for the mandibular treatment areas.
- Recognize incorrect position and describe or demonstrate how to correct the problem.



RIGHT- AND LEFT-HANDED SECTIONS IN THIS MODULE

- Beginning with Section 2, the sections in this module are customized for right-handed and left-handed clinicians.
- Having two different versions of the content in the Module sometimes can be annoying or confusing. For example, a left-handed clinician finds it time consuming to bypass all the right-handed pages to locate the left-handed version. Sometimes readers turn to the wrong version and become confused.
- For ease of use—and avoidance of confusion—if you are right-handed, it is recommended that you either (1) tear the left-handed pages from the book or (2) staple these pages together. If you are left-handed, use the same approach with the right-handed pages.

Section 1

Clock Positions for Instrumentation

1. **Range of Clinician Positions.** During periodontal instrumentation the seated clinician moves around the patient to maintain neutral body posture.
 - A. **Goal of Positioning.** Correct positioning of the seated clinician in relation to the treatment area (1) facilitates neutral posture of the clinician’s head, arms, wrists, and hands and (2) provides optimal vision of the tooth surfaces.
 - B. **Clock Positions**
 1. Instrumentation of the various treatment areas may be accomplished from a range of clinician positions in relation to the patient’s head (Fig. 2-1).
 2. Using an analog clock face as a guide—with the patient’s head being at 12 o’clock and the feet being at 6 o’clock—is a common method of identifying the clinician’s position in relation to the patient (Fig. 2-2).
 3. The positions that the clinician assumes in relation to the patient’s head are known as “**clock positions**”.
2. **Range of Patient Head Positions.** In addition to assuming an optimal clock position, it is important to ask the patient to assume a head position that facilitates neutral arm, wrist, and hand position for the clinician (Fig. 2-3).

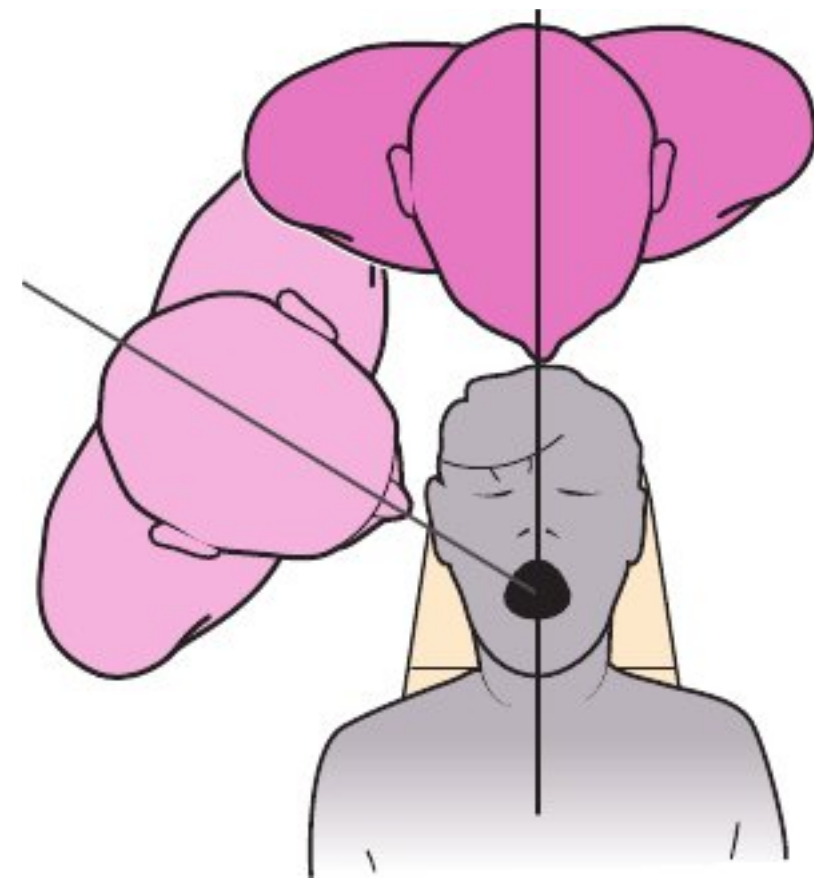


Figure 2-1. Movement Around the Patient.

- The seated clinician can assume a range of positions around the patient during periodontal instrumentation.
- This illustration shows two examples of possible seated positions in relation to the patient.

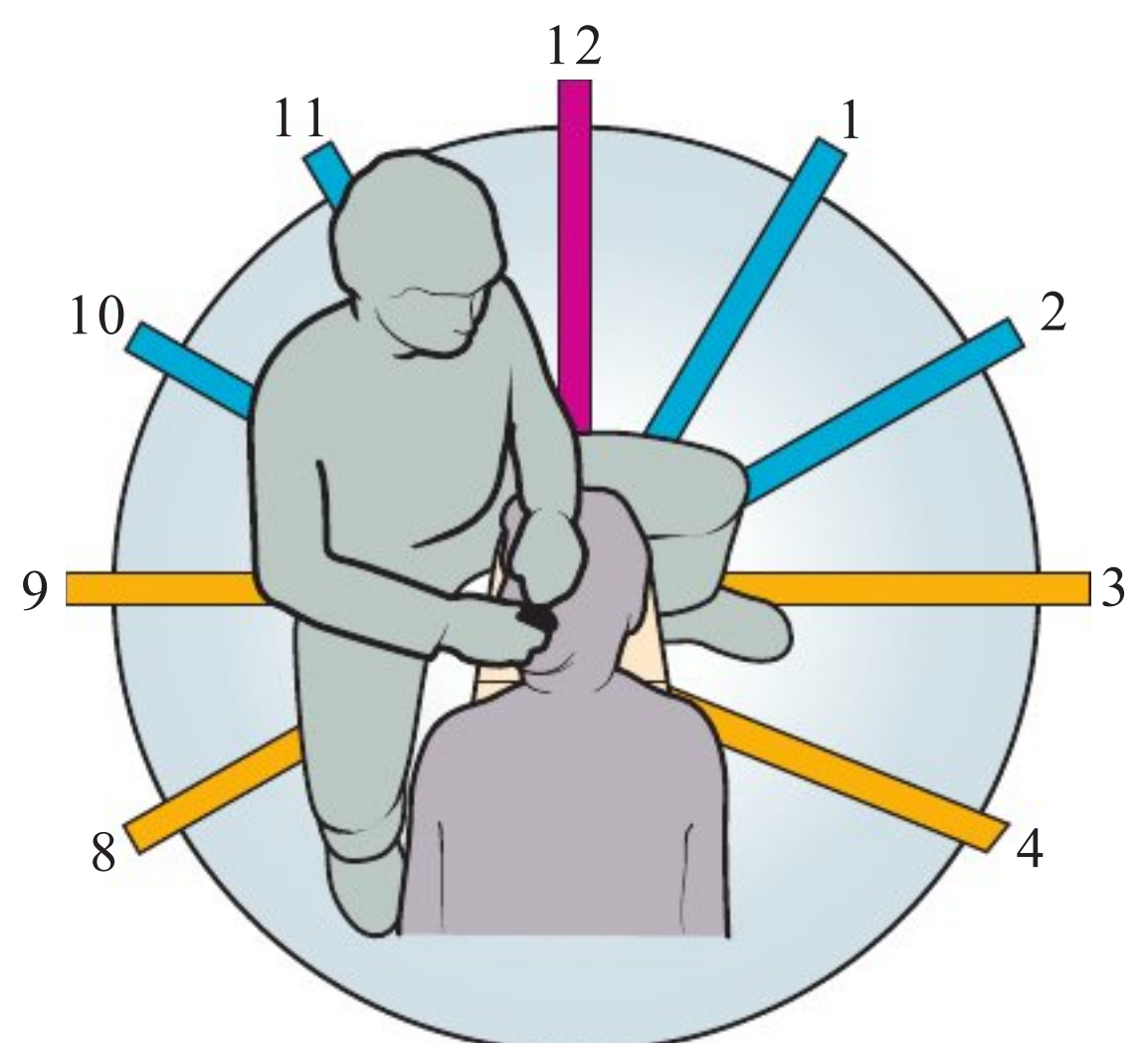
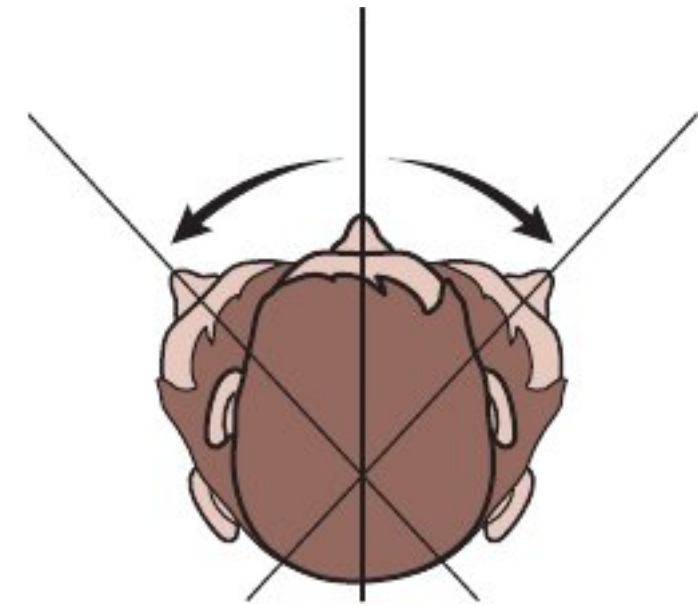


Figure 2-2. Clinician Clock Positions.

- Clinician clock positions are identified using the face of an analog clock as the guide (Box 2-1).
- The patient’s head is at the 12 o’clock position and the feet are at the 6 o’clock position.
- Right-handed clinicians sit from 8 to 1 o’clock; left-handed from 11 to 4 o’clock.

Figure 2-3. Patient Head Positions.

- The patient's head should be positioned to facilitate neutral arm, wrist, and hand posture for the clinician. The patient's head may be straight or turned toward or away from the clinician.
- The clinician should request that the patient position the head to facilitate visibility and access to the treatment area. The patient is in the dental chair only for 45 to 60 minutes, while the clinician works at chairside throughout an 8-hour day.

**Box 2-1****Directions for Sections 2 and 3 of this Module**

1. The next two sections of this Module contain instructions for practicing the traditional clock positions for each treatment area of the mouth.
2. For this module, you should concentrate on mastering your positioning for each treatment area.
 - Work without dental instruments and just concentrate on learning positioning.
 - **Before** picking up a periodontal instrument you should master the large motor skills of **positioning yourself**, your patient, and the dental equipment to **facilitate** neutral position.
3. As you practice each clock position, position your arms and hands as described in this module.
 - You will use both of your hands for periodontal instrumentation, the periodontal instrument is held in your dominant hand and the mirror is held in your nondominant hand.
 - For this module, practice placing the fingertips of your hands as shown in the illustration for each clock position.
 - 0 Place your dominant hand on the teeth in the treatment area.
 - 0 Rest your nondominant hand on the patient's cheek or chin.
4. You will not be able to obtain a clear view of all tooth surfaces as you practice positioning in this module. In Modules 4 to 7, you will learn to use a dental mouth mirror to view these "hidden" tooth surfaces.
5. Do not wear magnification loupes when practicing and **perfecting** your positioning skills in this module. You need an unrestricted visual field **for self-evaluation**.

The remainder of this module is divided into right- and left-handed sections.

Section 2

Positioning for the RIGHT-Handed Clinician



SKILL BUILDING

Clock Positions for the RIGHT-Handed Clinician

Directions: Practice each clock position by following the criteria outlined below.

8 o'clock Positions (To the Front of the Patient)

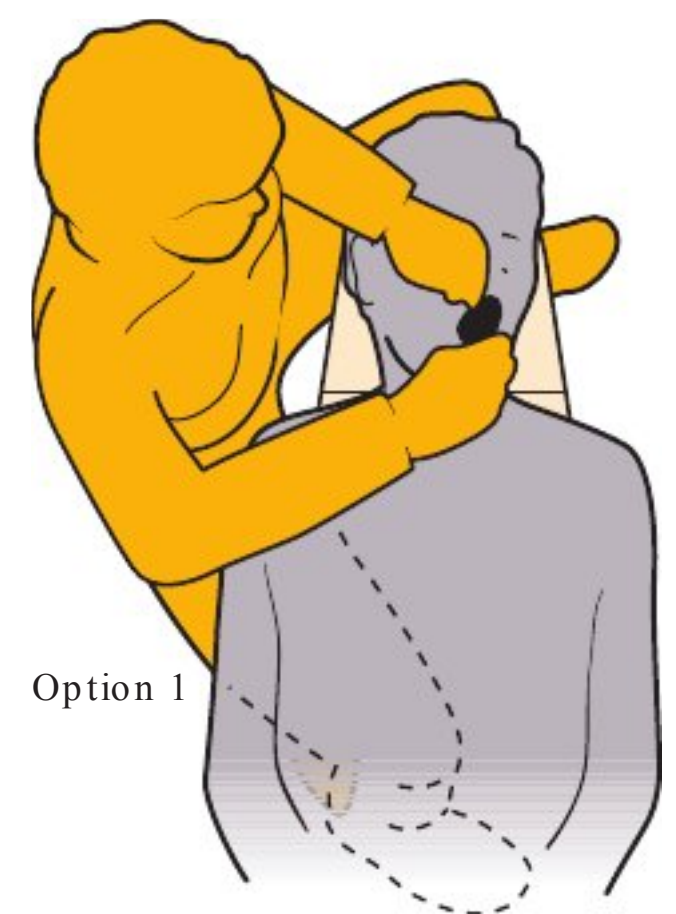
- **Torso Position.** Sit facing the patient with your hip in line with the patient's upper arm.
- **Leg Position.** Your thighs should rest against the side of the patient chair.
- **Arm Positions.** To reach the patient's mouth, hold your arms slightly away from your sides. Hold your lower right arm over the patient's chest. NOTE: Do not rest your arm on the patient's head or chest.
- **Line of Vision.** Your line of vision is straight ahead, into the patient's mouth.



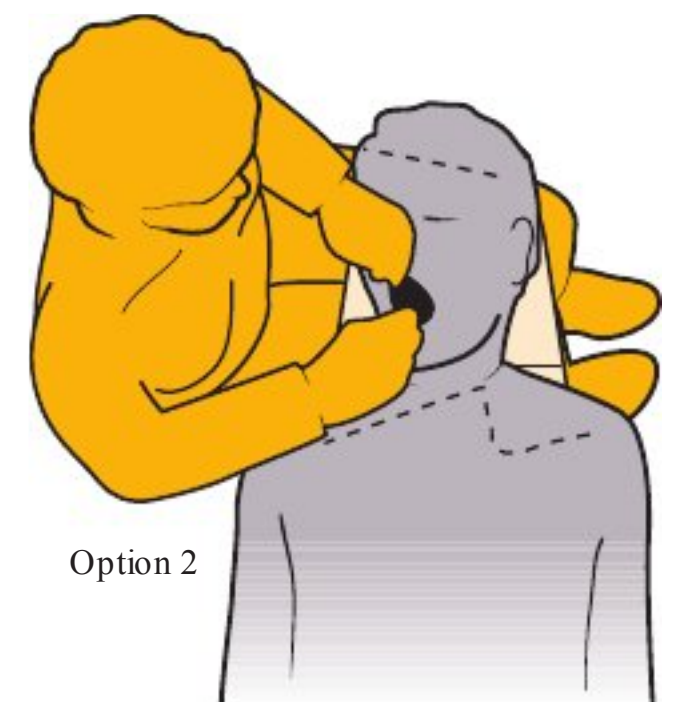
Ergonomic Considerations: Use of the 8 o'clock position should be limited since it is difficult to maintain neutral arm and torso posture in this clock position. The goal is to minimize postural abnormalities whenever possible.

9 o'clock Position (To the Side of the Patient)

- **Torso Position.** Sit facing the side of the patient's head. The midline of your torso is even with the patient's mouth.
- **Leg Position.** Your legs may be in either of two acceptable positions: (1) straddling the patient chair or (2) underneath the *headrest* of the patient chair—not under the chair back. Neutral position is best achieved by straddling the chair; however, you should use the alternative position if you find straddling uncomfortable.
- **Arm Positions.** To reach the patient's mouth, hold the lower half of your right arm in approximate alignment with the patient's shoulder. Hold your left hand and wrist over the region of the patient's right eye.
- **Line of Vision.** Your line of vision is straight down into the mouth.



Option 1



Option 2

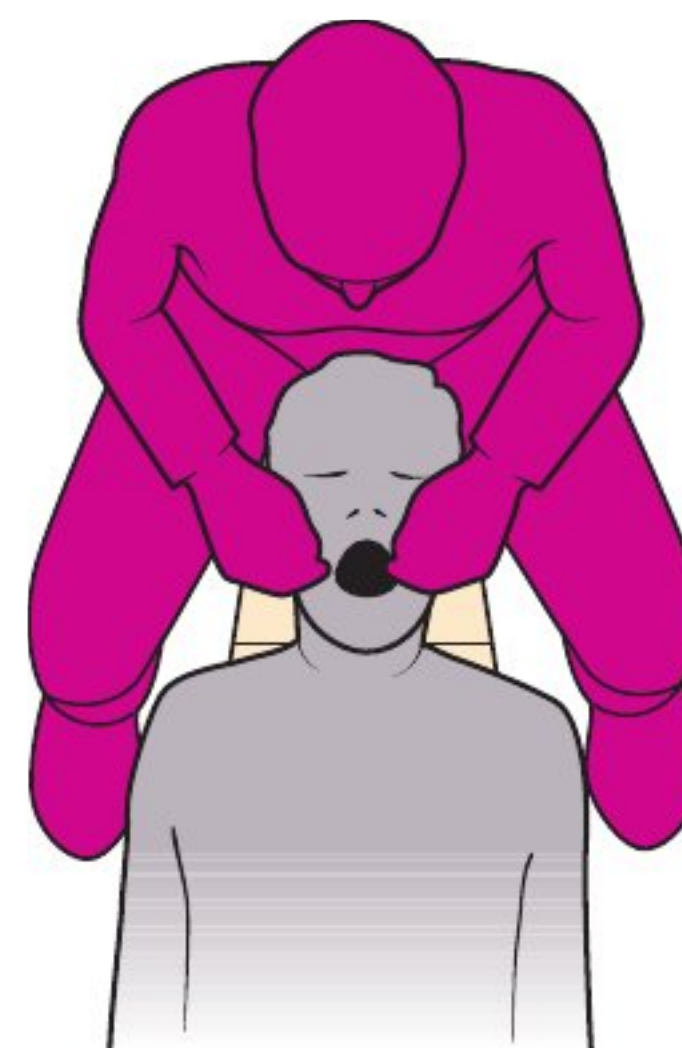
10 to 11 o'clock Position (Near Corner of Headrest)

- **Torso Position.** Sit at the top right corner of the headrest; the midline of your torso is even with the temple region of the patient's head.
- **Leg Position.** Your legs should straddle the corner of the headrest.
- **Arm Positions.** To reach the patient's mouth, hold your right hand directly across the corner of the patient's mouth. Hold your left hand and wrist above the patient's nose and forehead.
- **Line of Vision.** Your line of vision is straight down into the mouth.



12 o'clock Position (Behind the Patient)

- **Torso Position.** Sit behind the patient's head.
- **Leg Position.** Your legs should straddle the headrest.
- **Arm Positions.** To reach the patient's mouth, hold your wrists and hands above the region of the patient's ears and cheeks.
- **Line of Vision.** Your line of vision is straight down into the patient's mouth.



1 to 2 o'clock Position (Near Corner of Headrest)

- **Torso Position.** Sit at the top left corner of the headrest; the midline of your torso is even with the temple region of the patient's head.
- **Leg Position.** Your legs should straddle the corner of the headrest.
- **Arm Positions.** To reach the patient's mouth, hold your left hand directly across the corner of the patient's mouth. Hold your right hand and wrist above the patient's nose and forehead.
- **Line of Vision.** Your line of vision is straight down into the mouth.



FLOW CHART: SEQUENCE FOR ESTABLISHING POSITION

For successful periodontal instrumentation, it is important to proceed in a step-by-step manner. A useful saying to help you remember the step-by-step approach is “Me, My Patient, My Light, My Non-dominant hand, My Dominant hand” (Fig. 2-4).

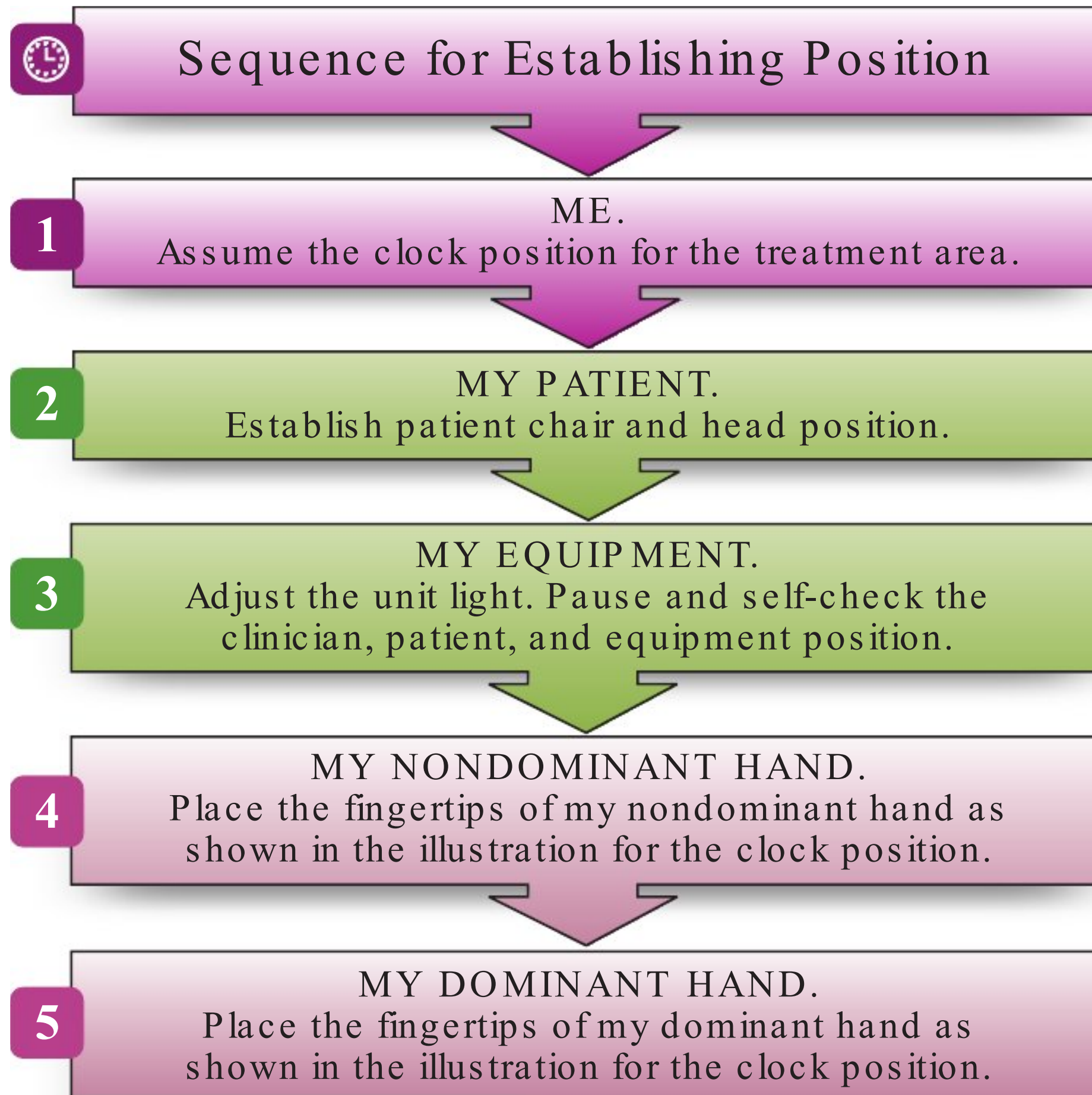


Figure 2-4. Sequence for Establishing Position.

USE OF TEXTBOOK DURING SKILL PRACTICE

The Skill Building sections of each module are designed to lead the reader step-by-step through each skill practice. It is important to position the textbook for ease of viewing throughout each skill practice (Figs. 2-5 and 2-6).

Figure 2-5. Position the Book for Ease of Viewing. Position the book so that it is easy to view during skill practice. Follow along step-by-step with the steps shown in the book.



Figure 2-6. Book Position When Working Behind the Patient. Position the book so that it is easy to view when seated behind the patient.





q u ICKSTART Gu Id E TO THE An TERIORSEx TAn TS

Directions: There is no need to waste time memorizing the clock position for each treatment area. The clock positions are easy to remember if you learn to recognize the positioning pattern for the anterior teeth (Figs. 2-7 and 2-8). For periodontal instrumentation of the anterior teeth, each tooth is divided in half at the midline.

Figure 2-7. Anterior Surfaces Toward the Right-Handed Clinician.

- The anterior tooth surfaces shaded in yellow on this drawing are called the **anterior surfaces toward the clinician**.
- The **clock position** for the anterior surfaces toward the clinician ranges from **8 to 9 o'clock**.

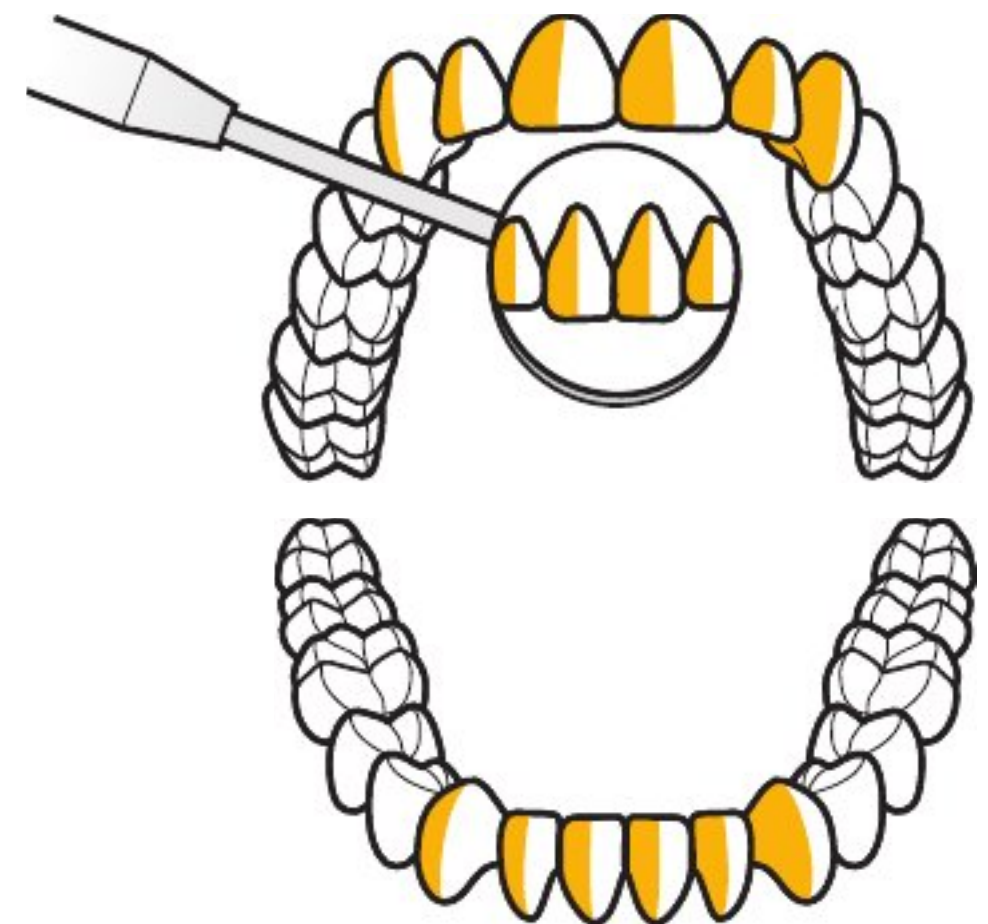
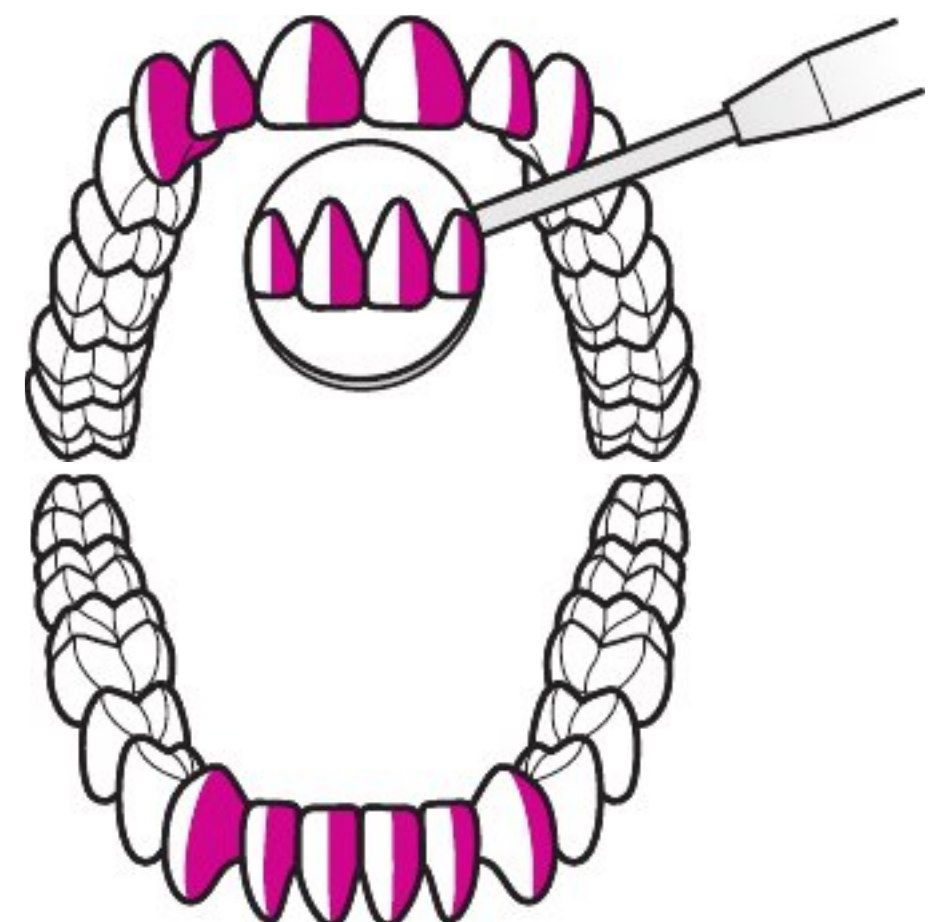


Figure 2-8. Anterior Surfaces Away from the Right-Handed Clinician.

- The anterior surfaces shaded in purple on this drawing are called the **anterior surfaces away from the clinician**.
- The **clock position** for anterior surfaces away from the clinician ranges from **11 to 1 o'clock**.





SKILL BUILT IN

Clock Positions for the Anterior Surfaces Toward

Directions: Practice the recommended clinician clock and patient head positions for the anterior “SURFACES TOWARD” by following the illustrations shown below in Figures 2-9 and 2-10.

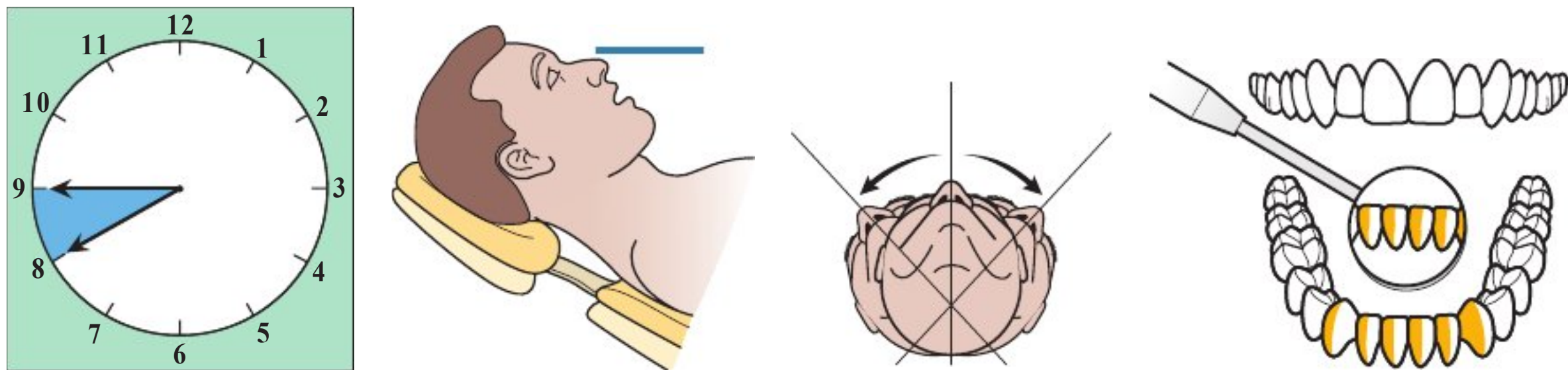


Figure 2-9. A–d : Mandibular Anterior Surfaces, TOWARD.

- Clinician in the 8 to 9 o'clock position.
- Patient chin DOWN; place the mandibular occlusal plane as parallel to the floor as possible.
- Patient head position ranges from neutral to turned to the right or left to facilitate vision of the tooth surfaces.

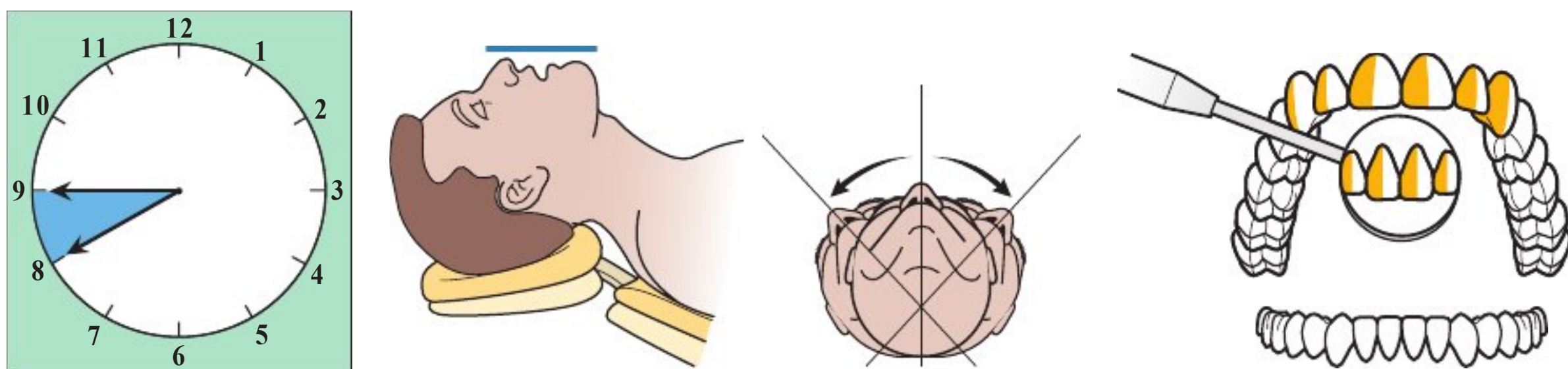


Figure 2-10. A–d : Maxillary Anterior Surfaces, TOWARD.

- Clinician in the 8 to 9 o'clock position.
- Patient chin UP; place the maxillary occlusal plane perpendicular to the floor.
- Patient head position ranges from neutral to turned to the right or left to facilitate vision of the tooth surfaces.



SKILL BUILDING

Clock Positions for the Anterior Surfaces Away

Directions: Practice the recommended clinician clock and patient head positions for the anterior “SURFACES AWAY” by following the illustrations shown below in Figures 2-11 and 2-12.

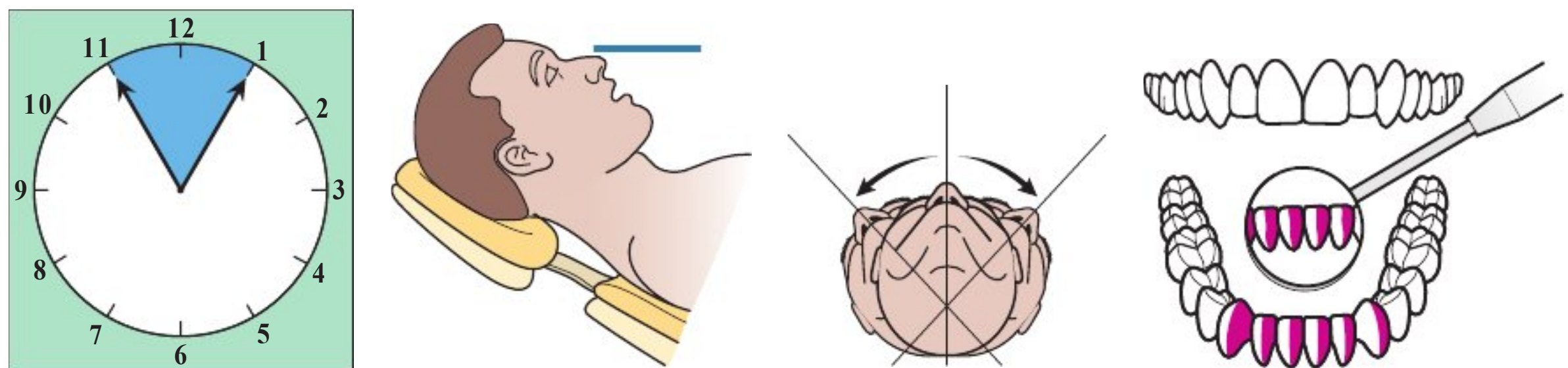


Figure 2-11. A–d : Mandibular Anterior Surfaces, AWAY.

- Clinician in the 11 to 1 o'clock position.
- Patient chin DOWN; place the mandibular occlusal plane as parallel to the floor as possible.
- Patient head position ranges from a neutral position to turning the head to the right or left to facilitate vision of the tooth surfaces.

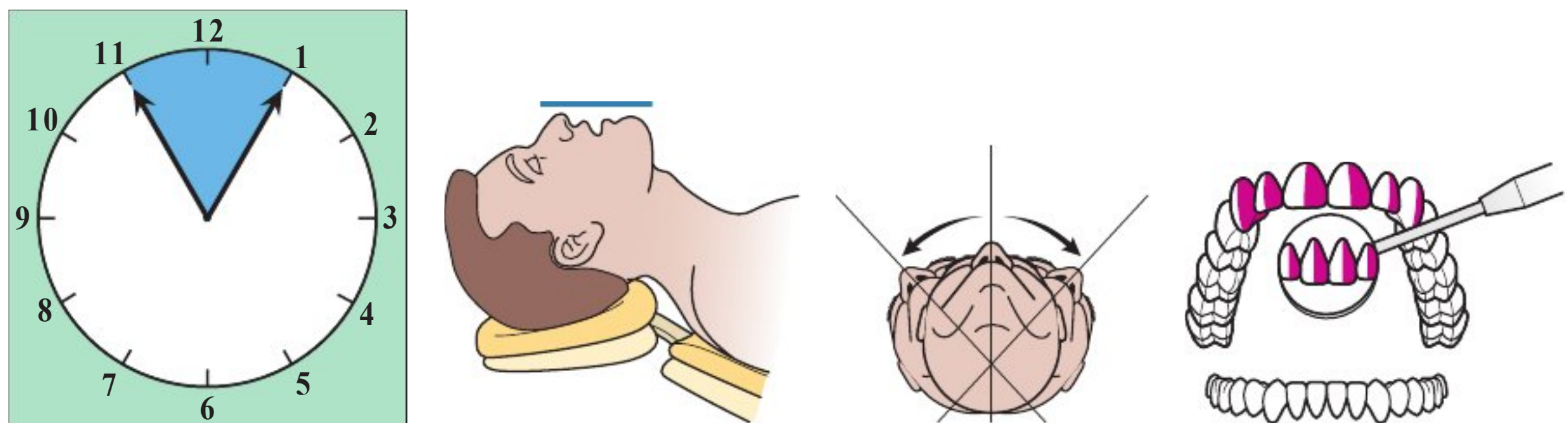


Figure 2-12. A–d : Maxillary Anterior Surfaces, AWAY.

- Clinician in the 11 to 1 o'clock position.
- Patient chin UP; place the maxillary occlusal plane perpendicular to the floor.
- Patient head position ranges a neutral position to turning the head to the right or left to facilitate vision of the tooth surfaces.



q u ICK START Gu Id E TO THE POSTERIOR SEx TAn TS

Directions: There is no need to waste time memorizing the clock position for each posterior treatment area. The clock positions are easy to remember if you learn to recognize the positioning pattern for the posterior sextants (Figs. 2-13 and 2-14). For periodontal instrumentation each posterior sextant is divided into two aspects: the (1) facial aspect and (2) lingual aspect of the sextant.

Figure 2-13. Posterior Aspects Facing Toward the Right-Handed Clinician.

- The posterior surfaces shaded in yellow on this drawing are called the **posterior aspects facing toward the clinician**.
- The **clock position** for posterior aspects toward the clinician is 9 o'clock.

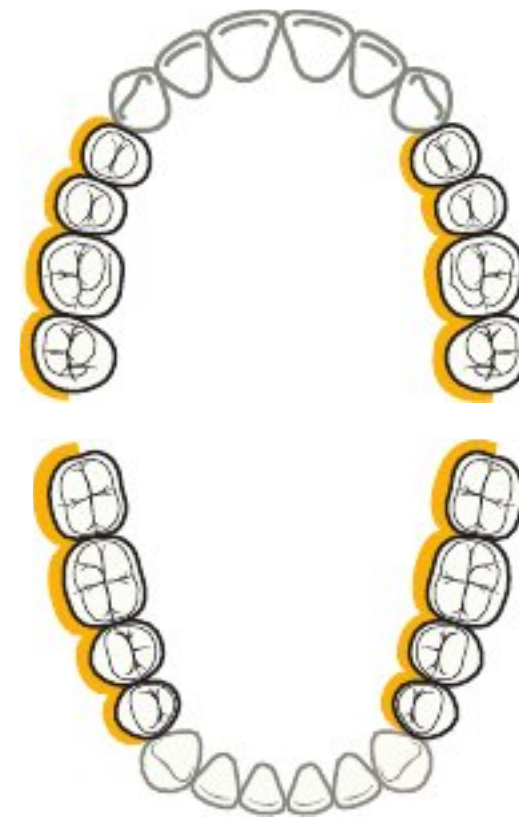
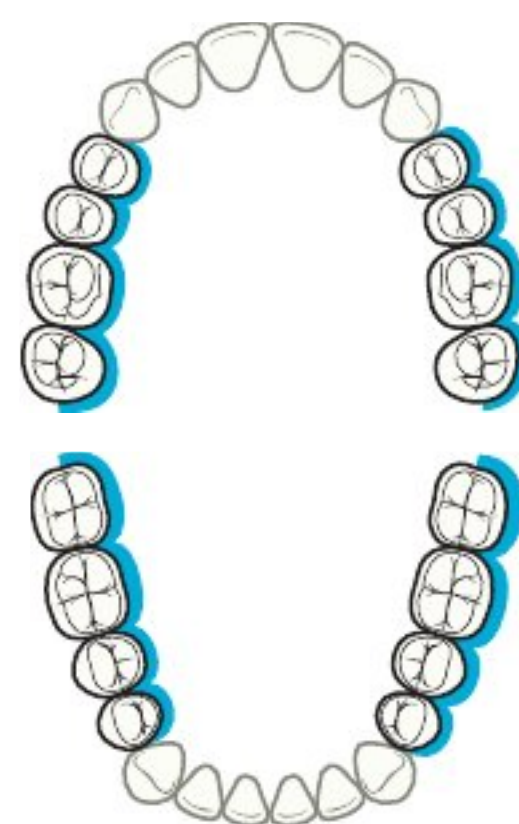


Figure 2-14. Posterior Aspects Facing Away from the Right-Handed Clinician.

- The posterior surfaces shaded in blue on this drawing are called the **posterior aspects facing away from the clinician**.
- The **clock position** for posterior aspects away from the clinician ranges from **10 to 11 o'clock**.





SKILL BUILDING

Clock Positions for the Posterior Sextants, Aspects Facing Toward the Clinician

Directions: Practice the recommended clinician clock and patient head positions for the posterior sextants “FACING TOWARD” the clinician by following the illustrations shown below in Figures 2-15 and 2-16.

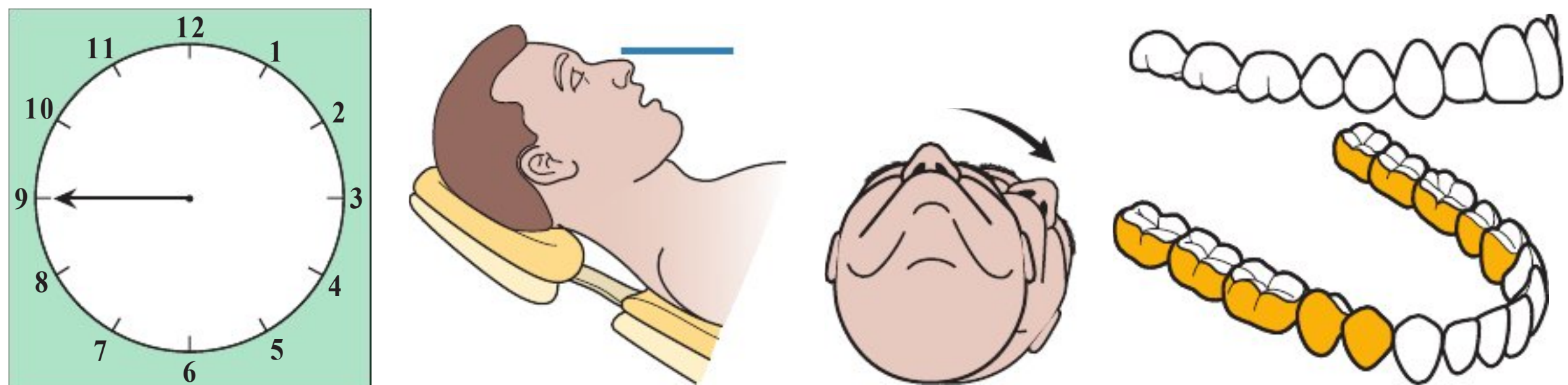


Figure 2-15. A–d : Mandibular Posterior Aspects Facing TOWARD.

- Clinician in the 9 o’clock position.
- Chin DOWN; place the mandibular occlusal plan as parallel to the floor as possible.
- Patient head position ranges from a neutral position to turning the head slightly away from the clinician.

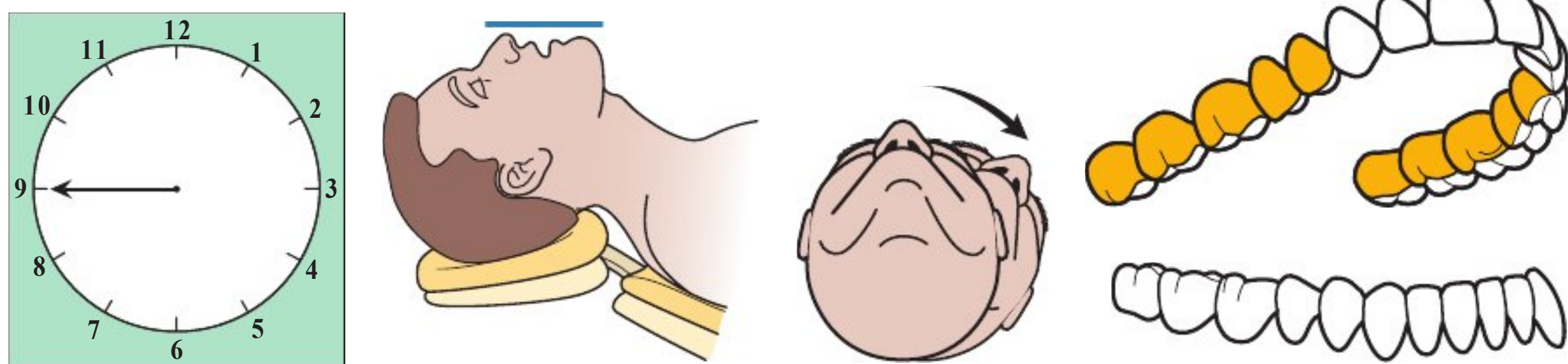


Figure 2-16. A–d : Maxillary Posterior Aspects Facing TOWARD.

- Clinician in the 9:00 o’clock position.
- Chin UP; place the maxillary occlusal plane perpendicular to the floor.
- Patient head position ranges from a neutral position to turning the head slightly away from the clinician.



SKILL BUILDING

Clock Positions for the Posterior Sextants, Aspects Facing Away From the Clinician

Directions: Practice the recommended clinician clock and patient head positions for the posterior sextants “FACING AWAY FROM” the clinician by following the illustrations shown below in Figures 2-17 and 2-18.

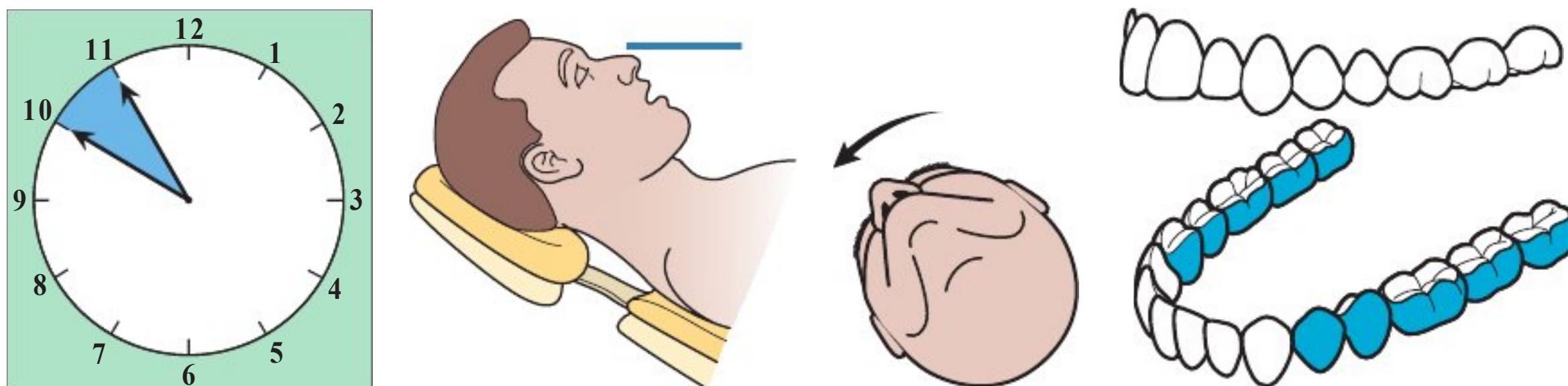


Figure 2-17. A–d: Mandibular Posterior Aspects Facing AWAY.

- Clinician seated in the 10 to 11 o'clock position.
- Chin DOWN; place the mandibular occlusal plan as parallel to the floor as possible.
- Patient head position is turned toward the clinician.

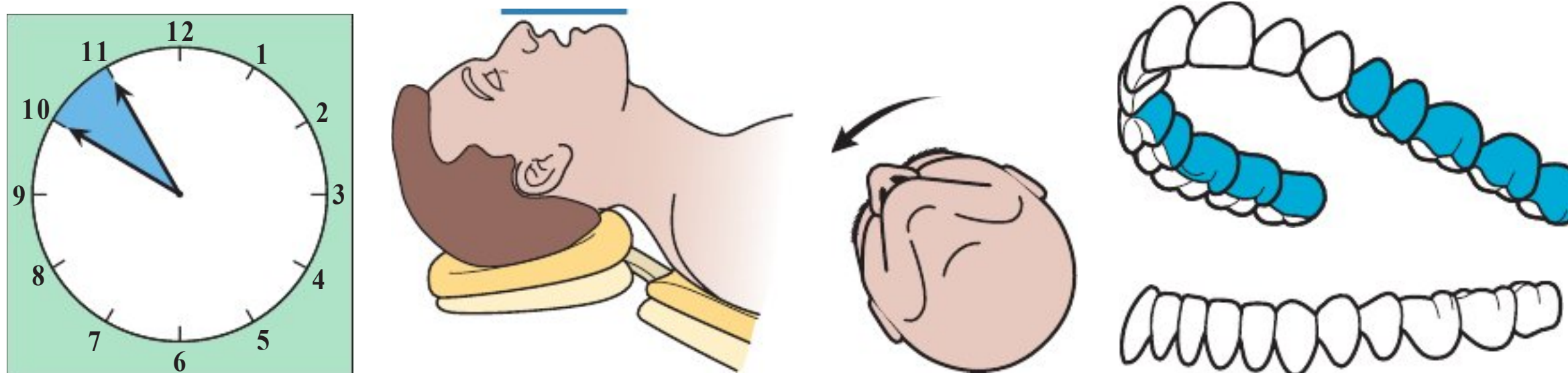


Figure 2-18. A–d: Maxillary Posterior Aspects Facing AWAY.

- Clinician seated in the 10 to 11 o'clock position.
- Chin UP; place the maxillary occlusal plane perpendicular to the floor.
- Patient head position is turned toward the clinician.

REFERENCE SHEET: POSITION FOR THE RIGHT-HANDED CLINICIAN

Table 2-1 summarizes the clock positions for the right-handed clinician. Photocopy this page and use it for quick reference as you practice your positioning skills. Place the photocopied reference sheet in a plastic page protector for longer use.

TABLE 2-1. CLOCK POSITIONS—POSITIONING SUMMARY

Treatment Area	Clock Position	Patient Head Position
Mandibular arch—Anterior surfaces toward	8–9	Chin-down; neutral to turned right or left
Maxillary arch—Anterior surfaces toward	8–9	Chin-up; neutral to turned right or left
Mandibular arch—Anterior surfaces away	11–1	Chin-down; neutral to turned right or left
Maxillary arch—Anterior surfaces away	11–1	Chin-up; neutral to turned right or left
Mandibular arch—Posterior aspects toward	9	Chin-down; neutral
Maxillary arch—Posterior aspects toward	9	Chin-up; neutral to turned slightly away
Mandibular arch—Posterior aspects away	10–11	Chin-down; toward
Maxillary arch—Posterior aspects away	10–11	Chin-up; toward

RIGHT-Handed Clinicians: This ends Section 2 for the RIGHT-Handed clinician. Please turn to Section 4. Working from a Standing Position.

Section 3

Positioning for the LEFT-Handed Clinician

**SKILL BUILDING**

Clock Positions for the LEFT-Handed Clinician

Directions: Practice each clock position by following the criteria outlined below.

3 to 4 o'clock Position (To the Front of the Patient)

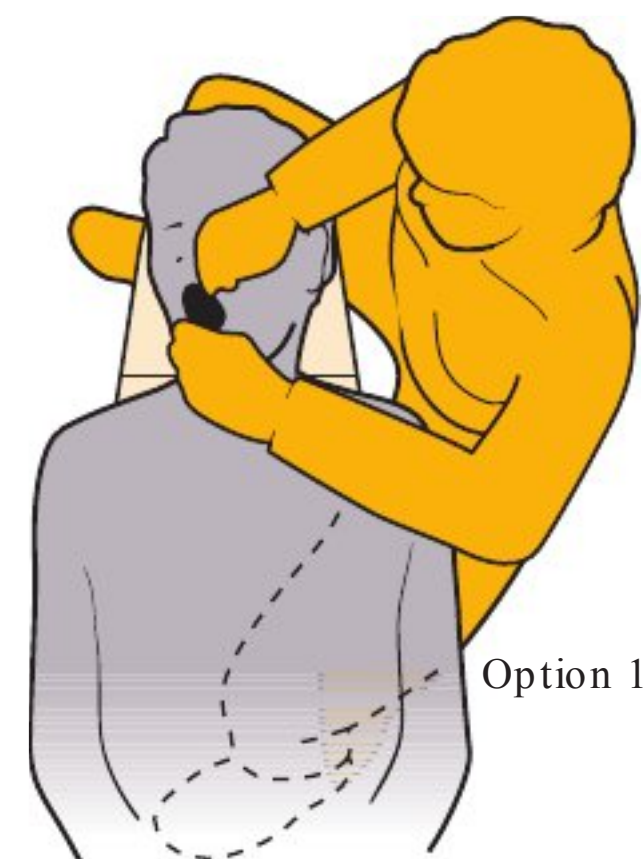
- **Torso Position.** Sit facing the patient with your hip in line with the patient's upper arm.
- **Leg Position.** Your thighs should rest against the side of the patient chair.
- **Arm Positions.** To reach the patient's mouth, hold your arms slightly away from your sides. Hold your lower left arm over the patient's chest. The side of your right hand rests in the area of the patient's right cheekbone and upper lip. **NOTE:** Do not rest your arm on the patient's head or chest.
- **Line of Vision.** Your line of vision is straight ahead, into the patient's mouth.



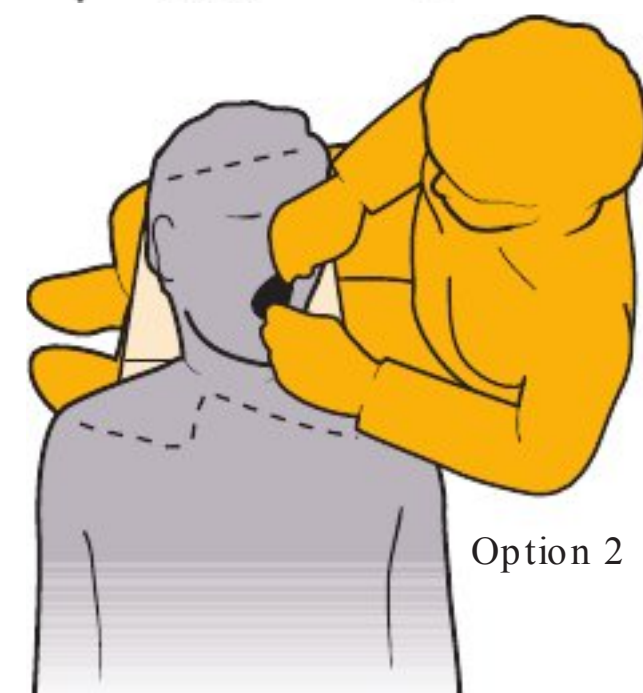
Ergonomic Considerations: Use of the 4 o'clock position should be limited since it is difficult to maintain neutral arm and torso posture in this clock position. The goal is to minimize postural abnormalities whenever possible.

3 o'clock Position (To the Side)

- **Torso Position.** Sit facing the side of the patient's head. The midline of your torso is even with the patient's mouth.
- **Leg Position.** Your legs may be in either of two acceptable positions: (1) straddling the patient chair or (2) underneath the *headrest* of the patient chair. Neutral position is best achieved by straddling the chair, however you should use the alternative position if you find straddling uncomfortable.
- **Arm Positions.** To reach the patient's mouth, hold the lower half of your left arm in approximate alignment with the patient's shoulder. Hold your right hand and wrist over the region of patient's left eye.
- **Hand Positions.** Rest your right hand in the area of the patient's left cheekbone. Rest the fingertips of your left hand on the premolar teeth of the mandibular left posterior sextant.
- **Line of Vision.** Your line of vision is straight down into the mouth.



Option 1



Option 2

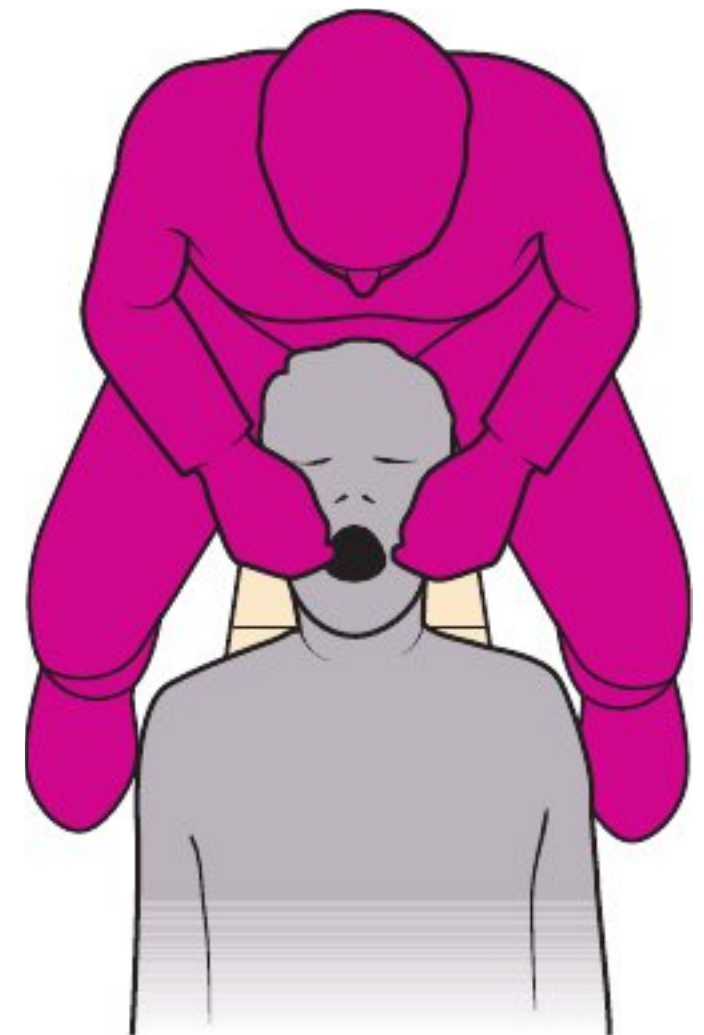
1 to 2 o'clock Position (Near Corner of Headrest)

- **Torso Position.** Sit at the top left corner of the headrest; the midline of your torso is even with the temple region of the patient's head.
- **Leg Position.** Your legs should straddle the corner of the headrest.
- **Arm Positions.** To reach the patient's mouth, hold your left hand directly across the corner of the patient's mouth. Hold your right hand and wrist above the patient's nose and forehead.
- **Line of Vision.** Your line of vision is straight down into the mouth.



12 o'clock Position (Directly behind Patient)

- **Torso Position.** Sit directly behind the patient's head; you may sit anywhere from the left corner of the headrest to directly behind the headrest.
- **Leg Position.** Your legs should straddle the headrest.
- **Arm Positions.** To reach the patient's mouth, hold your wrists and hands above the region of the patient's ears and cheeks.
- **Line of Vision.** Your line of vision is straight down into the patient's mouth.



10 to 11 o'clock Position (Near Corner of Headrest)

- **Torso Position.** Sit at the top right corner of the headrest; the midline of your torso is even with the temple region of the patient's head.
- **Leg Position.** Your legs should straddle the corner of the headrest.
- **Arm Positions.** To reach the patient's mouth, hold your right hand directly across the corner of the patient's mouth. Hold your left hand and wrist above the patient's nose and forehead.
- **Line of Vision.** Your line of vision is straight down into the mouth.



FLOW CHART: SEQUENCE FOR ESTABLISHING POSITION

For successful periodontal instrumentation, it is important to proceed in a step-by-step manner. A useful saying to help you remember the step-by-step approach is “Me, My Patient, My Light, My Non-dominant hand, My Dominant hand” (Fig. 2-19).

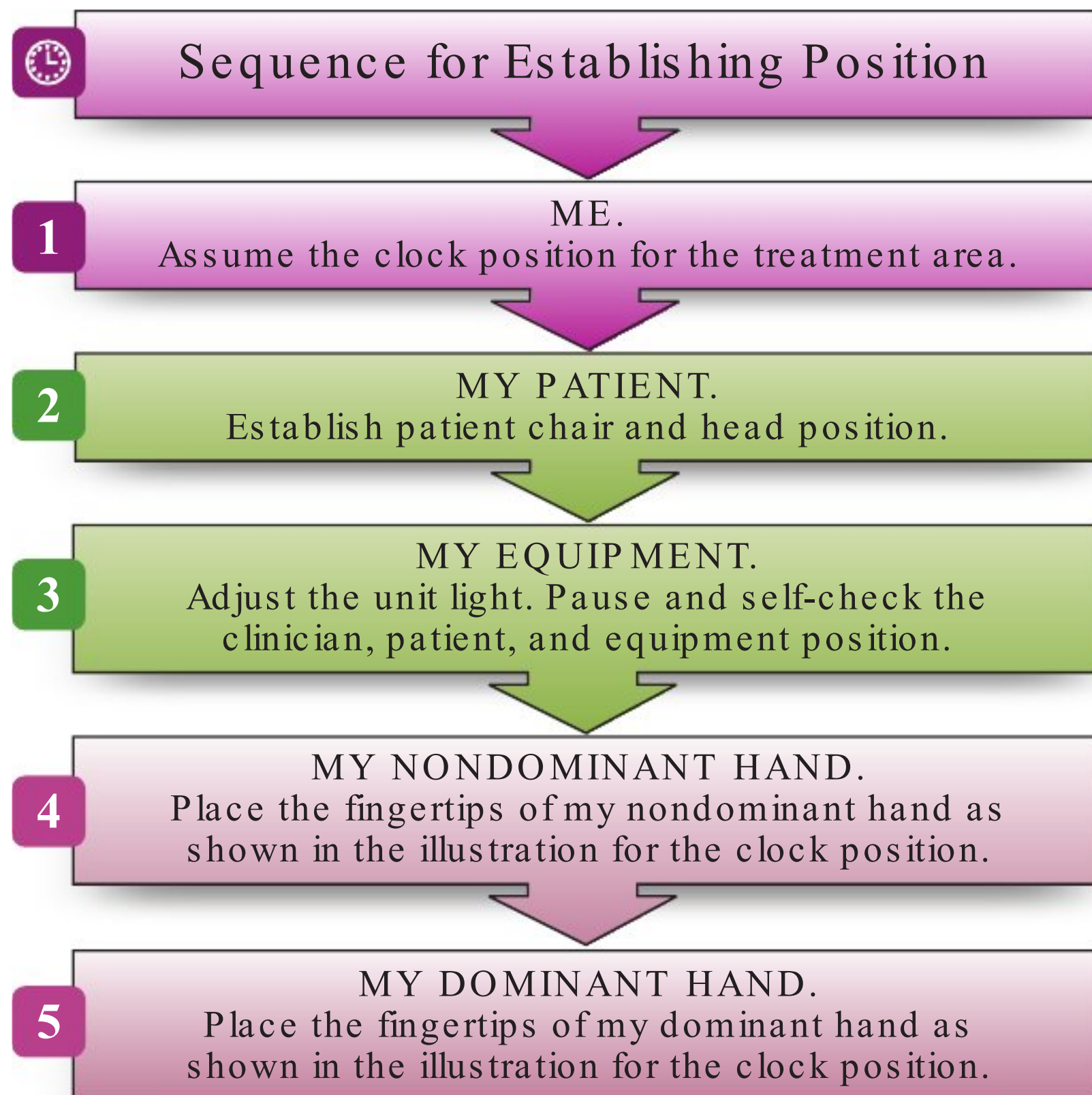


Figure 2-19. Sequence for Establishing Position.

USE OF TEXTBOOK DURING SKILL PRACTICE

The Skill Building sections of each module are designed to lead the reader step-by-step through each skill practice. It is important to position the textbook for ease of viewing throughout each skill practice (Figs. 2-20 and 2-21).



Figure 2-20. Position the Book for Ease of Viewing. Position the book so that it is easy to view during skill practice. Follow along step-by-step with the steps shown in the book.



Figure 2-21. Book Position When Working Behind the Patient. Position the book so that it is easy to view when seated behind the patient.



q u ICKSTART Gu Id E TO THE An TERIOR SEx TAn TS

Directions: There is no need to waste time memorizing the clock position for each treatment area. The clock positions are easy to remember if you learn to recognize the positioning pattern for the anterior teeth (Figs. 2-22 and 2-23). For periodontal instrumentation of the anterior teeth, each tooth is divided in half at the midline.

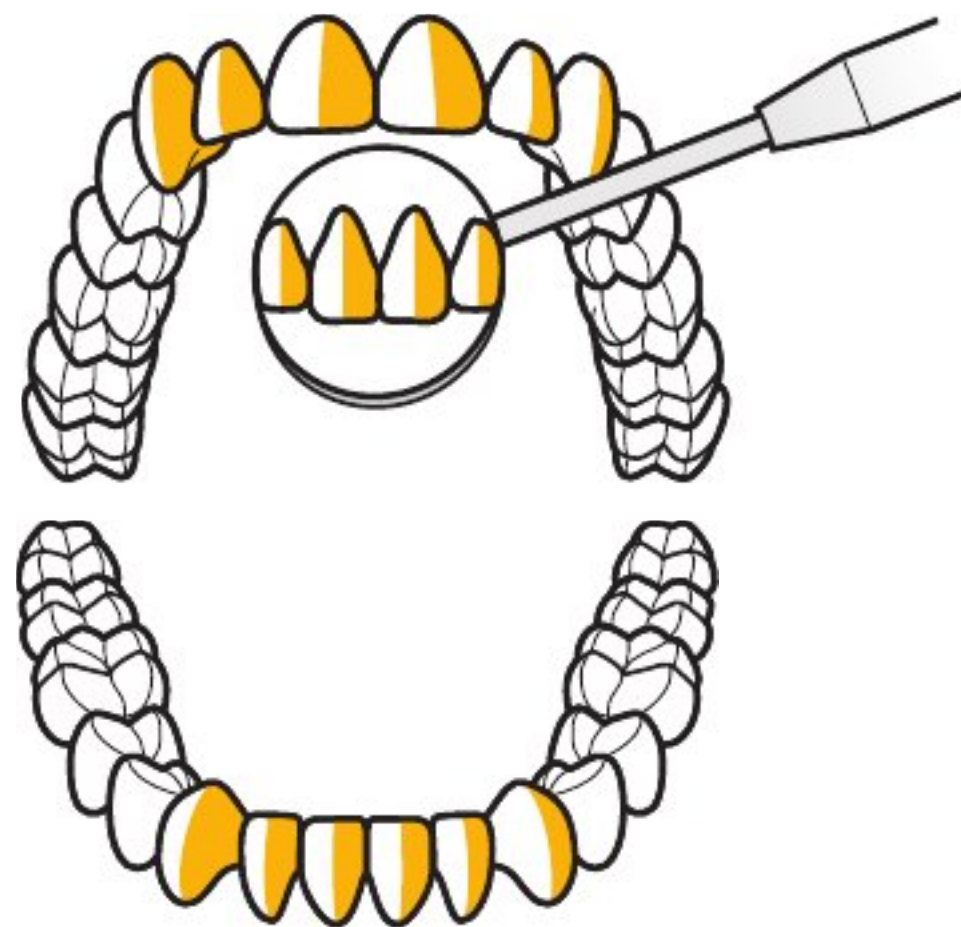


Figure 2-22. Anterior Surfaces Toward the Left-Handed Clinician.

- The anterior tooth surfaces shaded in yellow on this drawing are called the **anterior surfaces toward the clinician**.
- The **clock position** for the anterior surfaces toward the clinician ranges from **3 to 4 o'clock**.

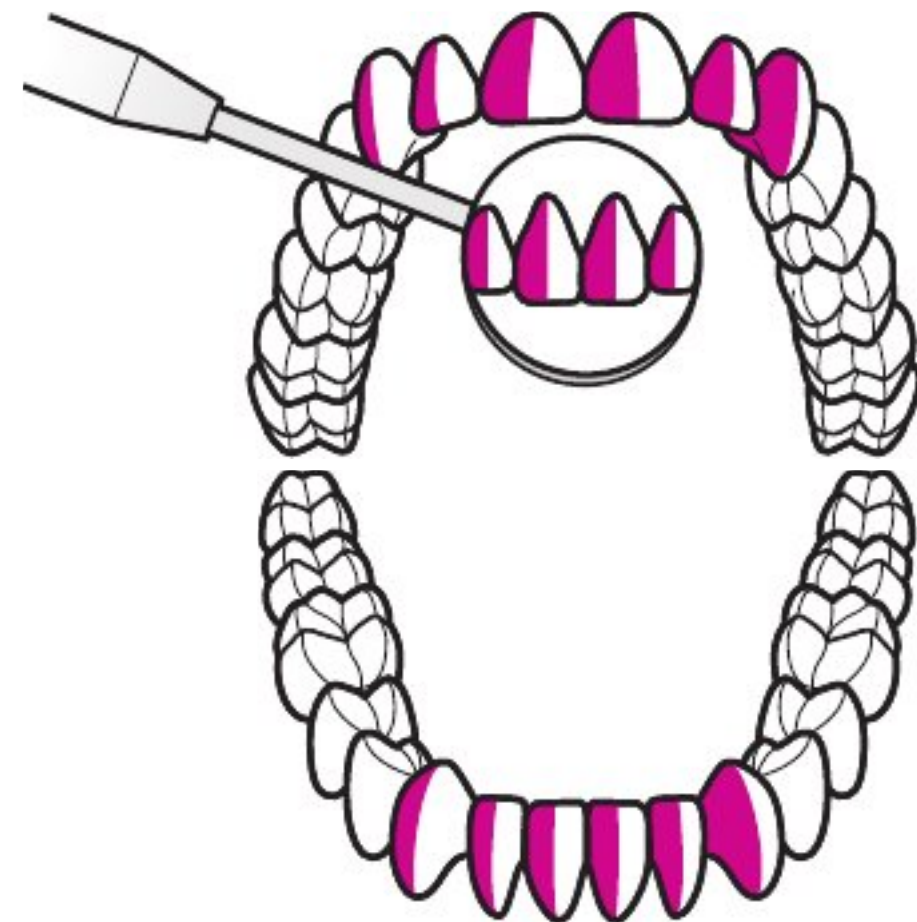


Figure 2-23. Anterior Surfaces Away from the Left-Handed Clinician.

- The anterior surfaces shaded in purple on this drawing are called the **anterior surfaces away from the clinician**.
- The **clock position** for the anterior surfaces away from the clinician ranges from **11 to 1 o'clock**.



SKILL BUILDING

Clock Positions for the Anterior Surfaces Toward

Directions: Practice the recommended clinician clock and patient head positions for the anterior “SURFACES TOWARD” by following the illustrations shown below in Figures 2-24 and 2-25.

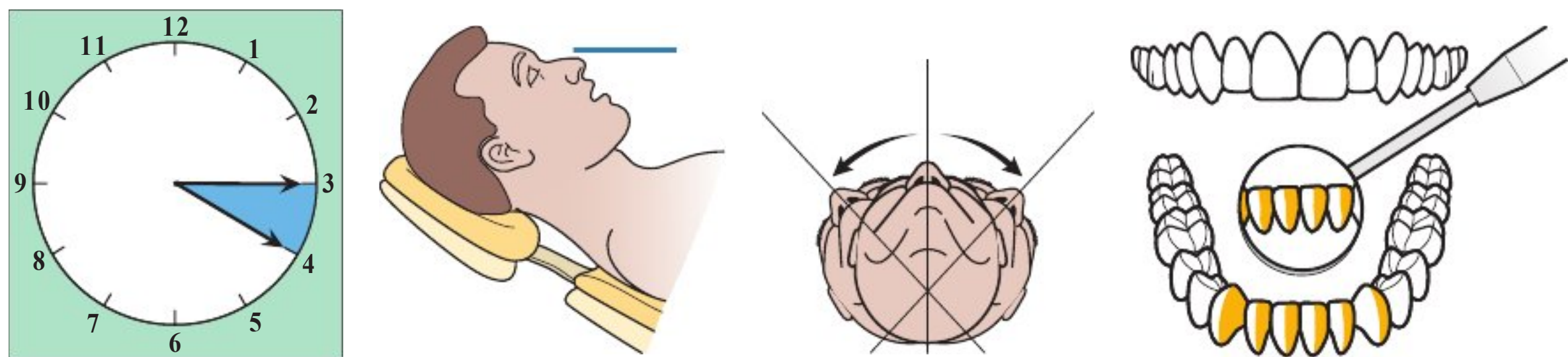


Figure 2-24. A–d: Mandibular Anterior Surfaces, TOWARD.

- Clinician seated in the 3 to 4 o’clock position.
- Patient chin DOWN; place the mandibular occlusal plane as parallel to the floor as possible.
- Patient head position ranges from neutral to turned to the right or left to facilitate vision of the tooth surfaces.

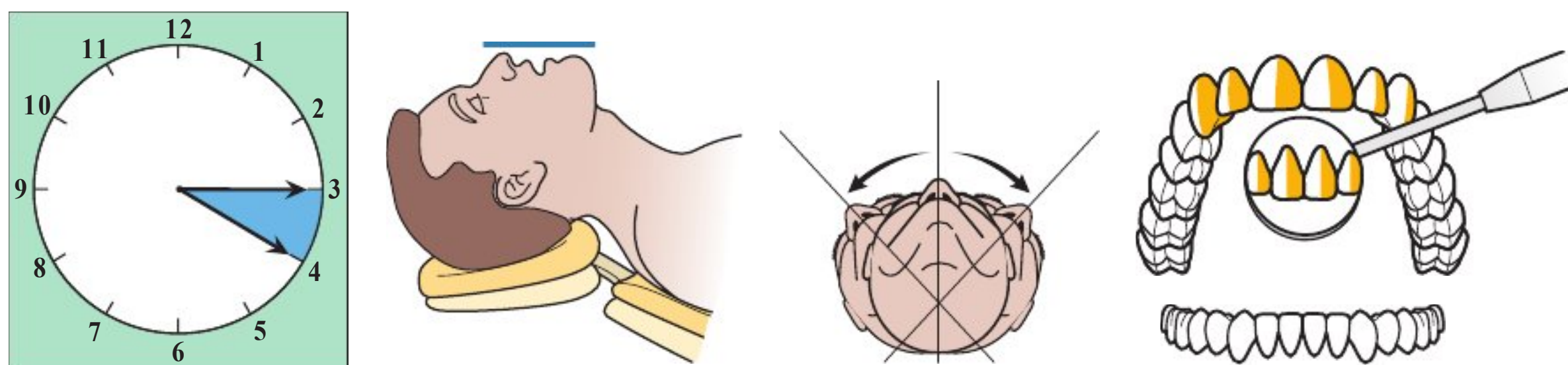


Figure 2-25. A–d: Maxillary Anterior Surfaces, TOWARD.

- Clinician in the 3 to 4 o’clock position.
- Patient chin UP; place the maxillary occlusal plane perpendicular to the floor.
- Patient head position ranges from neutral to turned to the right or left to facilitate vision of the tooth surfaces.



SKILL BUILT IN

Clock Positions for the Anterior Surfaces Away

Directions: Practice the recommended clinician clock and patient head positions for the anterior “SURFACES AWAY” by following the illustrations shown below in Figures 2-26 and 2-27.

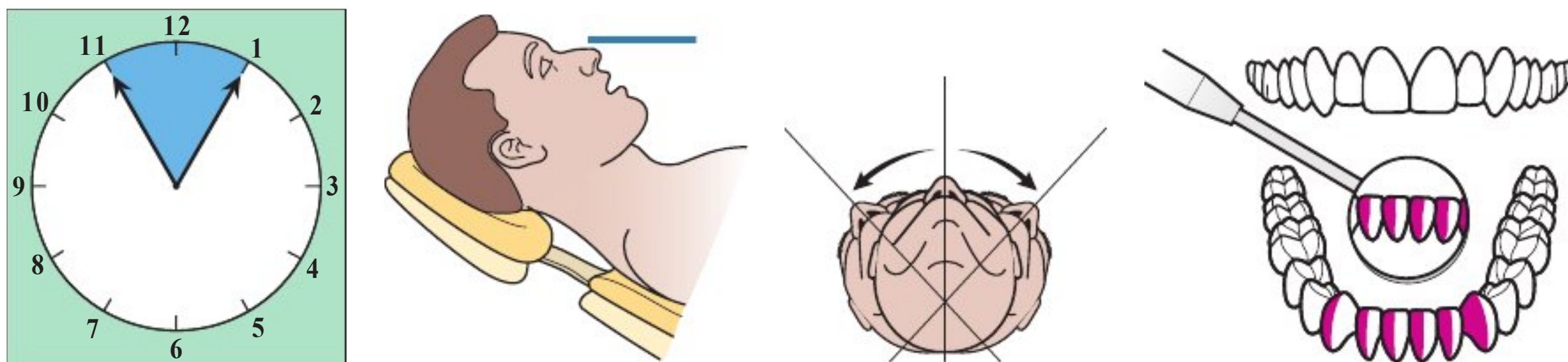


Figure 2-26. A–d : Mandibular Anterior Surfaces, AWAY.

- Clinician seated in the 11 to 1 o’clock position.
- Patient chin DOWN; place the mandibular occlusal plane as parallel to the floor as possible.
- Patient head position ranges from a neutral position to turning the head to the right or left to facilitate vision of the tooth surfaces.

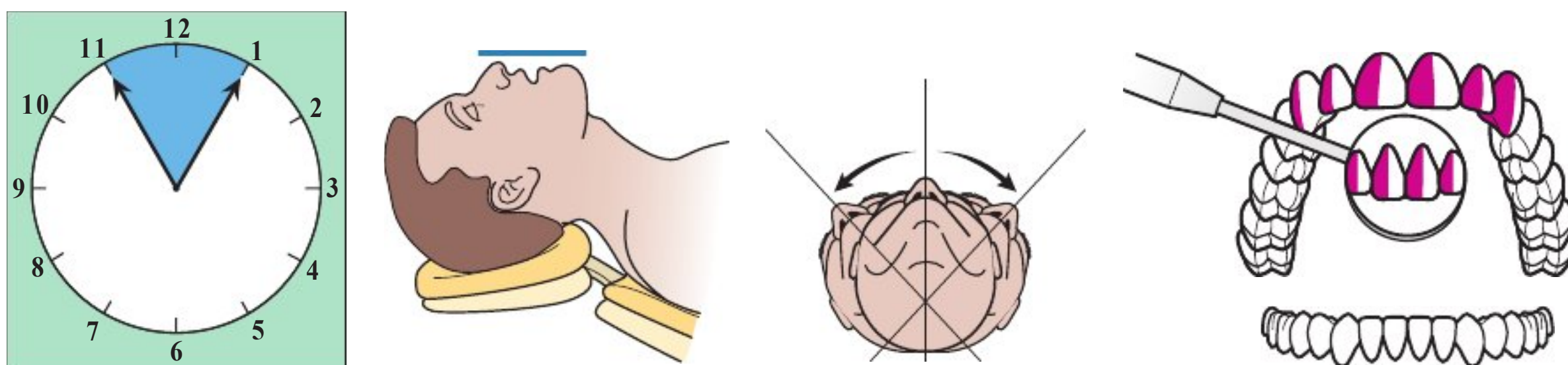


Figure 2-27. A–d : Maxillary Anterior Surfaces, AWAY.

- Clinician seated in the 11 to 1 o’clock position.
- Patient chin UP; place the maxillary occlusal plane perpendicular to the floor.
- Patient head position ranges from a neutral position to turning the head to the right or left to facilitate vision of the tooth surfaces.



q u ICKSTART Gu Id E TO THE POSTERIOR SEx TAN TS

Directions: There is no need to waste time memorizing the clock position for each posterior treatment area. The clock positions are easy to remember if you learn to recognize the positioning pattern for the posterior sextants (Figs. 2-28 and 2-29). For periodontal instrumentation each posterior sextant is divided into two aspects: the (1) facial aspect and (2) lingual aspect of the sextant.

Figure 2-28. Posterior Aspects Facing Toward the Left-Handed Clinician.

- The posterior surfaces shaded in yellow on this drawing are called the **posterior aspects facing toward the clinician**.
- The **clock position** for the posterior aspects toward the clinician is **3 o'clock**.

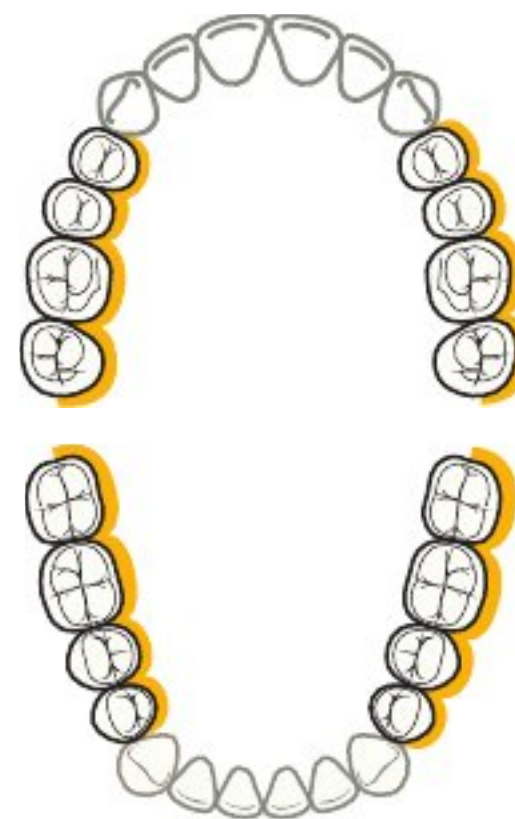
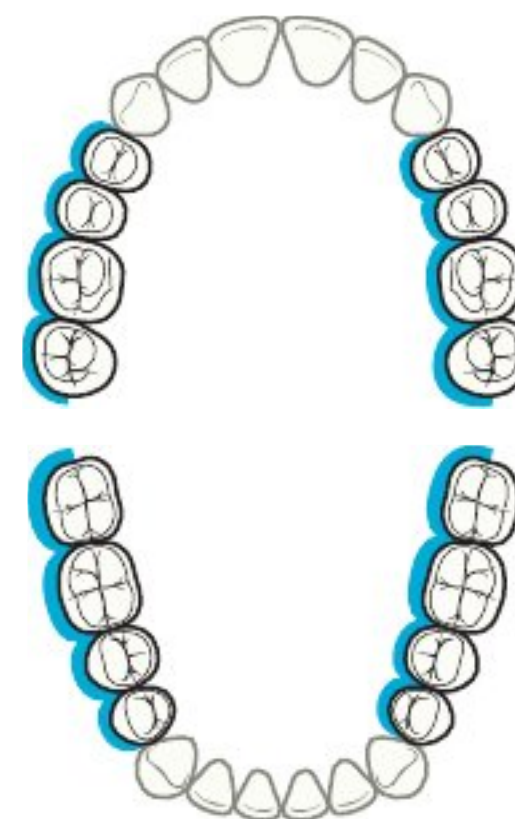


Figure 2-29. Posterior Aspects Facing Away from the Left-Handed Clinician.

- The posterior surfaces shaded in blue on this drawing are called the **posterior aspects facing away from the clinician**.
- The **clock position** for posterior aspects away from the clinician ranges from **1 to 2 o'clock**.





SKILL BUILDING

Clock Positions for the Posterior Sextants, Aspects Facing Toward the Clinician

Directions: Practice the recommended clinician clock and patient head positions for the posterior sextants “FACING TOWARD” the clinician by following the illustrations shown below in Figures 2-30 and 2-31.

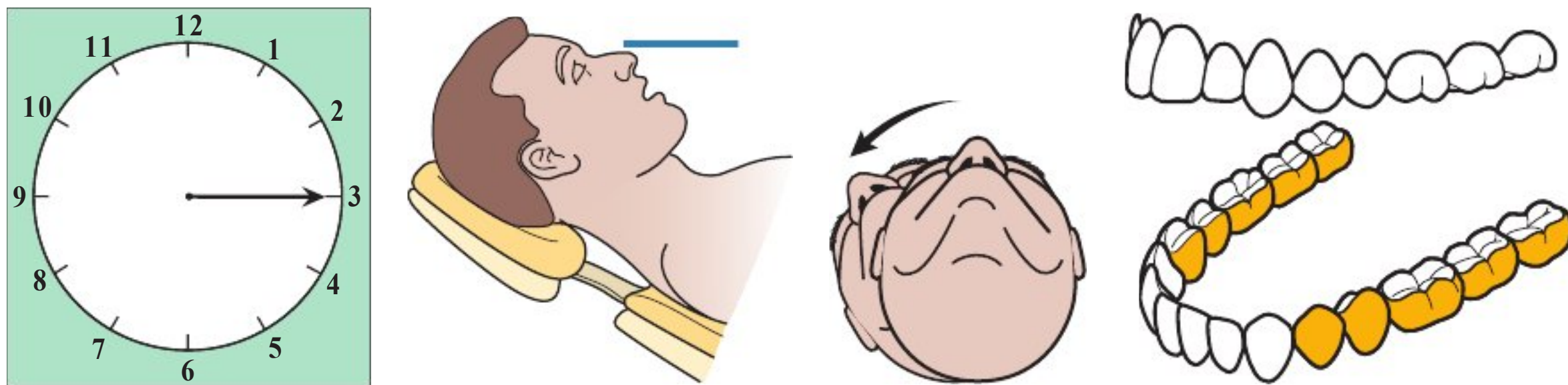


Figure 2-30. A–d: Mandibular Posterior Aspects Facing TOWARD.

- Clinician seated in the 3 o’clock position.
- Chin DOWN; place the mandibular occlusal plane as parallel to the floor as possible.
- Patient head position ranges from a neutral position to turning the head slightly away from the clinician.

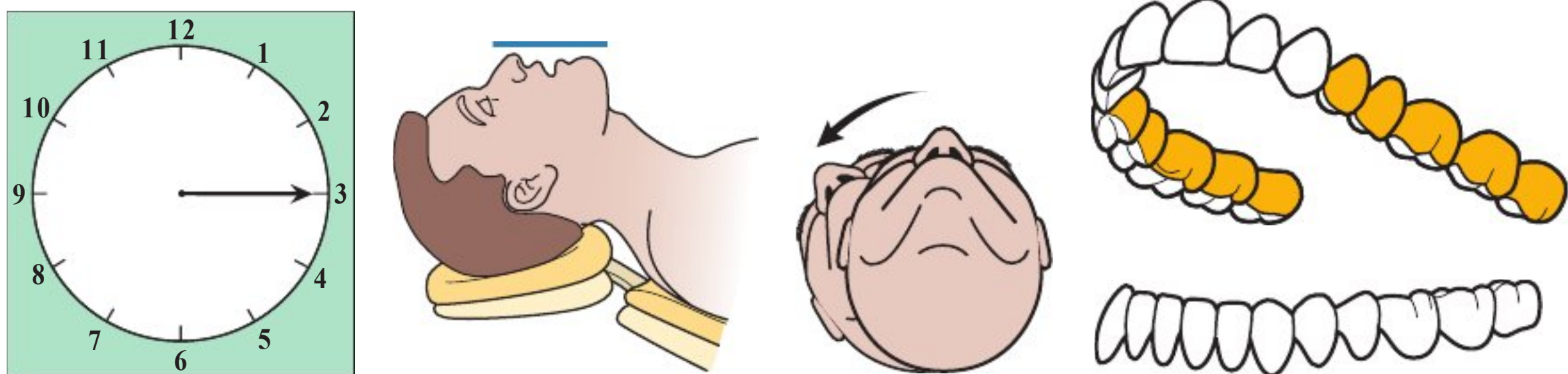


Figure 2-31. A–d: Maxillary Posterior Aspects Facing TOWARD.

- Clinician seated in the 3 o’clock position.
- Chin UP; place the maxillary occlusal plane perpendicular to the floor.
- Patient head position ranges from a neutral position to turning the head slightly away from the clinician.



SKILL BUILDING

Clock Positions for the Posterior Sextants, Aspects Facing Away From the Clinician

Directions: Practice the recommended clinician clock and patient head positions for the posterior sextants “FACING AWAY FROM” the clinician by following the illustrations shown below in Figures 2-32 and 2-33.

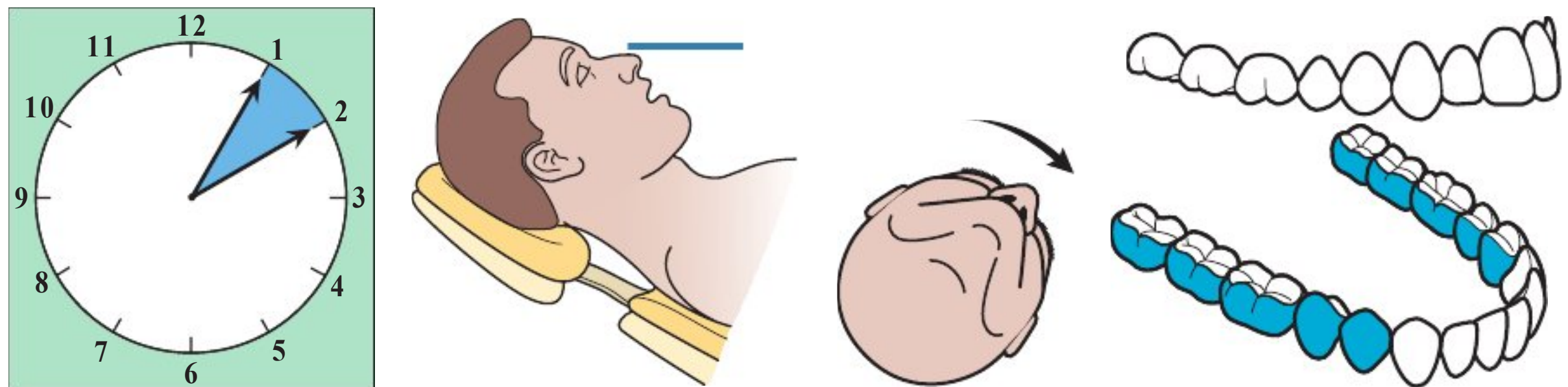


Figure 2-32. Mandibular Posterior Aspects Facing AWAY.

- Clinician seated in the 1 to 2 o'clock position.
- Chin DOWN; place the mandibular occlusal plane as parallel to the floor as possible.
- Patient head position is turned toward the clinician.

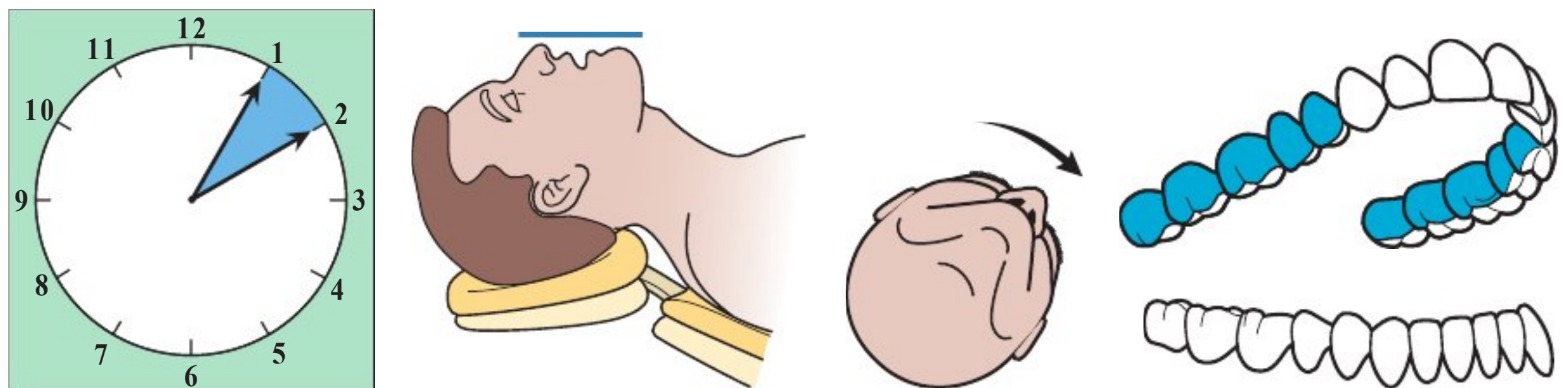


Figure 2-33. Maxillary Posterior Aspects Facing AWAY.

- Clinician seated in the 1 to 2 o'clock position.
- Chin UP; place the maxillary occlusal plane perpendicular to the floor.
- Patient head position is turned toward the clinician.

REFERENCE SHEET: POSITION FOR THE LEFT-HANDED CLINICIAN

Table 2-2 summarizes the clock positions for the left-handed clinician. Photocopy this page and use it for quick reference as you practice your positioning skills. Place the photocopied reference sheet in a plastic page protector for longer use.

TABLE 2-2. CLOCK POSITIONS—POSITIONING SUMMARY

Treatment Area	Clock Position	Patient Head Position
Mandibular arch—Anterior surfaces toward	3–4	Chin-down; neutral to turned right or left
Maxillary arch—Anterior surfaces toward	3–4	Chin-up; neutral to turned right or left
Mandibular arch—Anterior surfaces away	11–1	Chin-down; neutral to turned right or left
Maxillary arch—Anterior surfaces away	11–1	Chin-up; neutral to turned right or left
Mandibular arch—Posterior aspects toward	3	Chin-down; neutral
Maxillary arch—Posterior aspects toward	3	Chin-up; neutral to turned slightly away
Mandibular arch—Posterior aspects away	1–2	Chin-down; toward
Maxillary arch—Posterior aspects away	1–2	Chin-up; toward

Section 4

Modified Positioning: Working from a Standing Position

At times, it may be helpful for the clinician to use a standing, rather than a seated position, for periodontal instrumentation. A standing position can be used when there is difficulty accessing the treatment area, when the patient cannot be placed in a supine position due to medical or physical contraindications, or when working on mandibular treatment areas (Figs. 2-34 and 2-35).



Figure 2-34. A–B: Correct Standing Clinician Position.

- A standing clinician position can be used to facilitate access to a treatment area or when a supine position is contraindicated for a patient due to medical or physical limitations.
- Notice that the clinician's shoulders are relaxed, the elbow of her dominant hand is at a waist level, her torso is in neutral position, and she is not leaning over the patient.

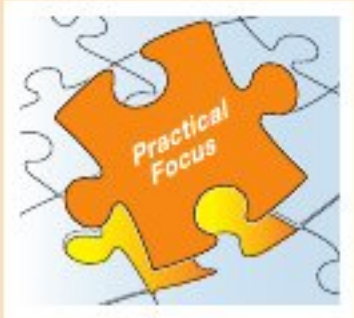


Figure 2-35. Incorrect Standing Clinician Position.

- This is an example of incorrect standing position.
- Note that the clinician's shoulders are hunched, her torso is tilted and twisted, and her elbows are raised.

Section 5

Skill Application



PRACTICAL FOCUS

Assessing Patient and Clinician Position

Evaluate the photographs shown in Figures 2-36 to 2-43:

- (1) Evaluate the clinician, patient, and equipment position in each photograph.
- (2) For each incorrect positioning element describe (a) what the problem is, (2) how the problem could be corrected, and (c) the musculoskeletal problems that could result from each positioning problem.



Figure 2-36. Photo 1



Figure 2-37. Photo 2



Figure 2-38. Photo 3



Figure 2-39. Photo 4



Figure 2-40. Photo 5

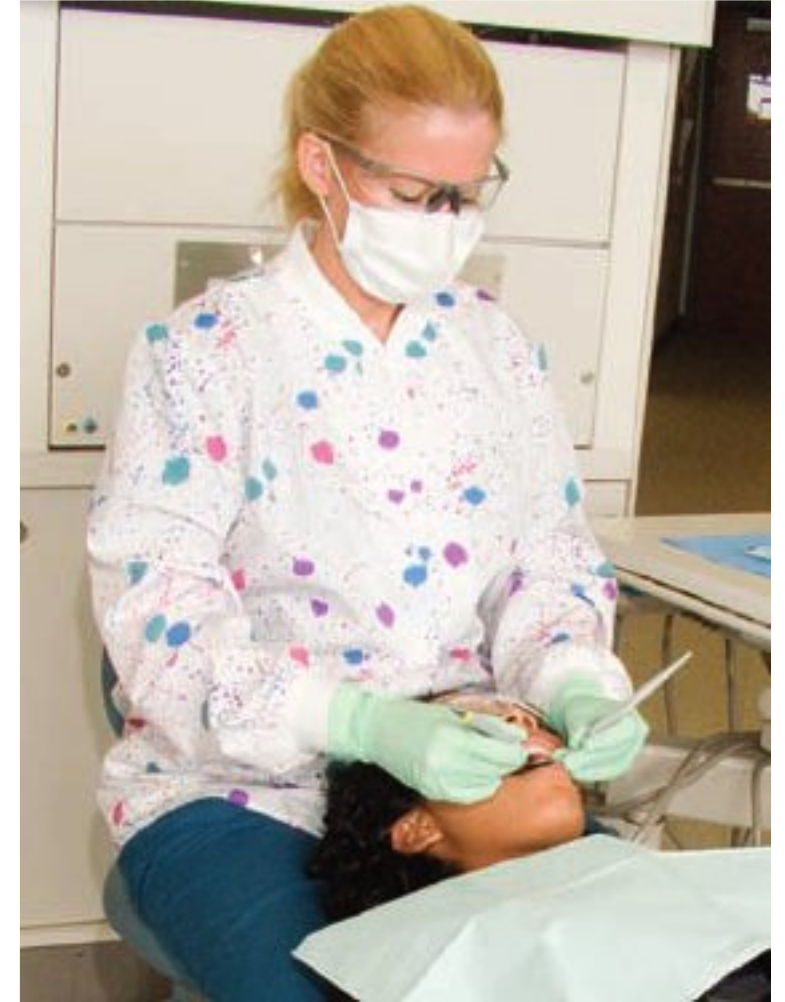


Figure 2-41. Photo 6



Figure 2-42. Photo 7



Figure 2-43. Photo 8

Student Self Evaluation Module 2: Positioning and Clock Positions

Student: _____

Date: _____

- Area 1 = anterior sextant, facial aspect
- Area 2 = anterior sextant, lingual aspect
- Area 3 = right posterior sextant, facial aspect
- Area 4 = right posterior sextant, lingual aspect
- Area 5 = left posterior sextant, facial aspect
- Area 6 = left posterior sextant, lingual aspect

Direction S: Self-evaluate your skill level in each treatment area as: **S** (satisfactory) or **u** (unsatisfactory).

Criteria: Mandibular Arch						
Positioning/Ergonomics	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6
Adjusts clinician chair correctly						
Reclines patient chair and assures that patient's head is even with top of headrest						
Positions instrument tray within easy reach for front, side, or rear delivery as appropriate for operatory configuration						
Positions unit light at arm's length or dons dental headlight and adjusts it for use						
Assumes the recommended clock position						
Positions backrest of patient chair for the specified arch and adjusts height of patient chair so that clinician's elbows remain at waist level when accessing the specified treatment area						
Asks patient to assume the head position that facilitates the clinician's view of the specified treatment area						
Maintains neutral position						
Directs light to illuminate the specified treatment area						
Criteria: Maxillary Arch						
Positioning/Ergonomics	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6
Adjusts clinician chair correctly						
Reclines patient chair and assures that patient's head is even with top of headrest						
Positions instrument tray within easy reach for front, side, or rear delivery as appropriate for operatory configuration						
Positions unit light at arm's length or dons dental headlight and adjusts it for use						
Assumes the recommended clock position						
Positions backrest of patient chair for the specified arch and adjusts height of patient chair so that clinician's elbows remain at waist level when accessing the specified treatment area						
Asks patient to assume the head position that facilitates the clinician's view of the specified treatment area						
Maintains neutral position						
Directs light to illuminate the specified treatment area						



NOTE TO COURSE INSTRUCTORS: Module Evaluation forms—in both computerized and paper formats—are available online at: <http://thepoint.lww.com/GehrigFundamentals8e>