

Fundamentals of
**Periodontal
Instrumentation**
& Advanced Root
Instrumentation

Eighth Edition

Jill S. Gehrig
Rebecca Sroda
Darlene Saccuzzo

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
Buenos Aires • Hong Kong • Sydney • Tokyo

Acquisitions Editor: Jonathan Joyce
Product Development Editor: John Larkin
Editorial Assistant: Tish Rogers
Marketing Manager: Leah Thomson
Production Project Manager: David Saltzberg
Design Coordinator: Joan Wendt
Manufacturing Coordinator: Margie Orzech
Prepress Vendor: Aptara, Inc.

Eighth edition
Copyright © 2017 Wolters Kluwer.

Copyright © 2001, 2005, 2008, 2011 Wolters Kluwer Health / Lippincott Williams & Wilkins. All rights reserved. This book is protected by copyright. No part of this book may be reproduced or transmitted in any form or by any means, including as photocopies or scanned-in or other electronic copies, or utilized by any information storage and retrieval system without written permission from the copyright owner, except for brief quotations embodied in critical articles and reviews. Materials appearing in this book prepared by individuals as part of their official duties as U.S. government employees are not covered by the above-mentioned copyright. To request permission, please contact Wolters Kluwer at Two Commerce Square, 2001 Market Street, Philadelphia, PA 19103, via email at permissions@lww.com, or via our website at lww.com (products and services).

9 8 7 6 5 4 3 2 1

Printed in China

Library of Congress Cataloging-in-Publication Data

Names: Gehrig, Jill S. (Jill Shiffer), author. | Sroda, Rebecca, author. | Saccuzzo, Darlene, author.

Title: Fundamentals of periodontal instrumentation & advanced root instrumentation / Jill S. Gehrig, Rebecca Sroda, Darlene Saccuzzo.

Other titles: Fundamentals of periodontal instrumentation and advanced root instrumentation

Description: Eighth edition. | Philadelphia : Wolters Kluwer, 2016. |

Includes bibliographical references and index.

Identifiers: LCCN 2015037519 | ISBN 9781496320209

Subjects: | MESH: Dental Prophylaxis—instrumentation. | Dental Prophylaxis—methods. | Root Planing—instrumentation. | Root Planing—methods.

Classification: LCC RK681 | NLM WU 113 | DDC 617.6/01—dc23

LC record available at <http://lcn.loc.gov/2015037519>

This work is provided “as is,” and the publisher disclaims any and all warranties, express or implied, including any warranties as to accuracy, comprehensiveness, or currency of the content of this work.

This work is no substitute for individual patient assessment based upon healthcare professionals’ examination of each patient and consideration of, among other things, age, weight, gender, current or prior medical conditions, medication history, laboratory data and other factors unique to the patient. The publisher does not provide medical advice or guidance and this work is merely a reference tool. Healthcare professionals, and not the publisher, are solely responsible for the use of this work including all medical judgments and for any resulting diagnosis and treatments.

Given continuous, rapid advances in medical science and health information, independent professional verification of medical diagnoses, indications, appropriate pharmaceutical selections and dosages, and treatment options should be made and healthcare professionals should consult a variety of sources. When prescribing medication, healthcare professionals are advised to consult the product information sheet (the manufacturer’s package insert) accompanying each drug to verify, among other things, conditions of use, warnings and side effects and identify any changes in dosage schedule or contraindications, particularly if the medication to be administered is new, infrequently used or has a narrow therapeutic range. To the maximum extent permitted under applicable law, no responsibility is assumed by the publisher for any injury and/or damage to persons or property, as a matter of products liability, negligence law or otherwise, or from any reference to or use by any person of this work.

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

Acknowledgments

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:

- **Charles D. Whitehead** and **Holly R. Fischer**, MFA, the highly skilled medical illustrators, who created all the wonderful illustrations for the book.
- **Kevin Dietz**, a colleague and friend for his vision and guidance for this book.
- And finally, and with great thanks, my wonderful team at Lippincott Williams and Wilkins, without whose guidance and support this book would not have been possible: **Jonathan Joyce**, **John Larkin**, and **Jennifer Clements**.

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 RUMEnt 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 EMEnt An D ORiEnt 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).

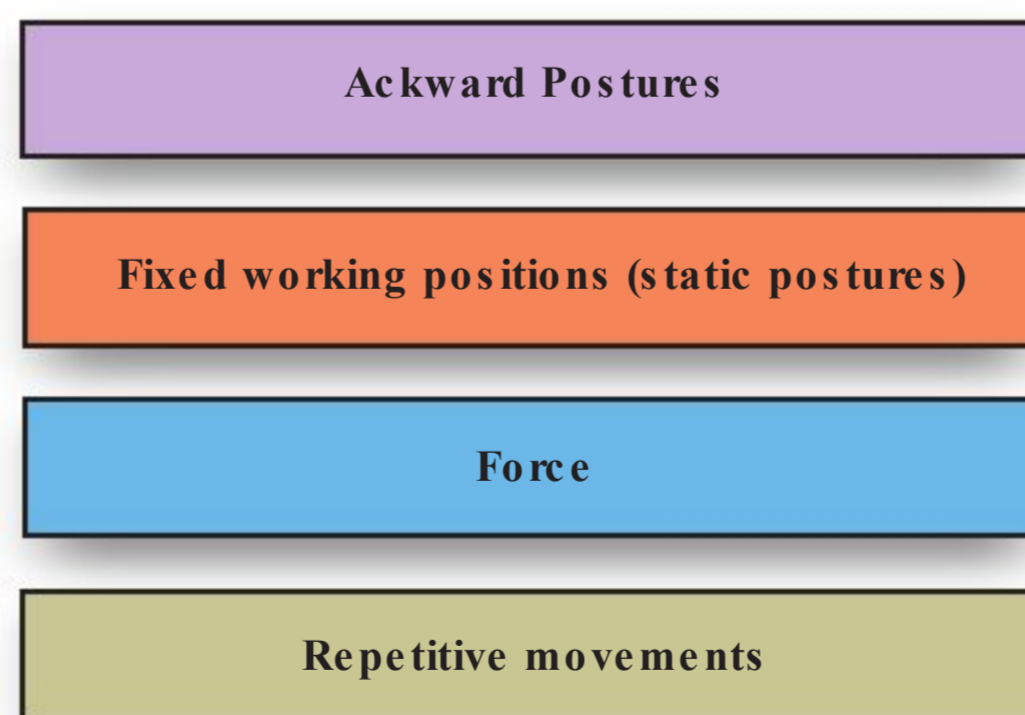


Figure 1-1. Ergonomic Hazards for Dental Hygienists. The dental hygienist has a high risk of musculoskeletal injury when awkward postures, static postures, and repetitive motions are combined with forceful movements (42–45).

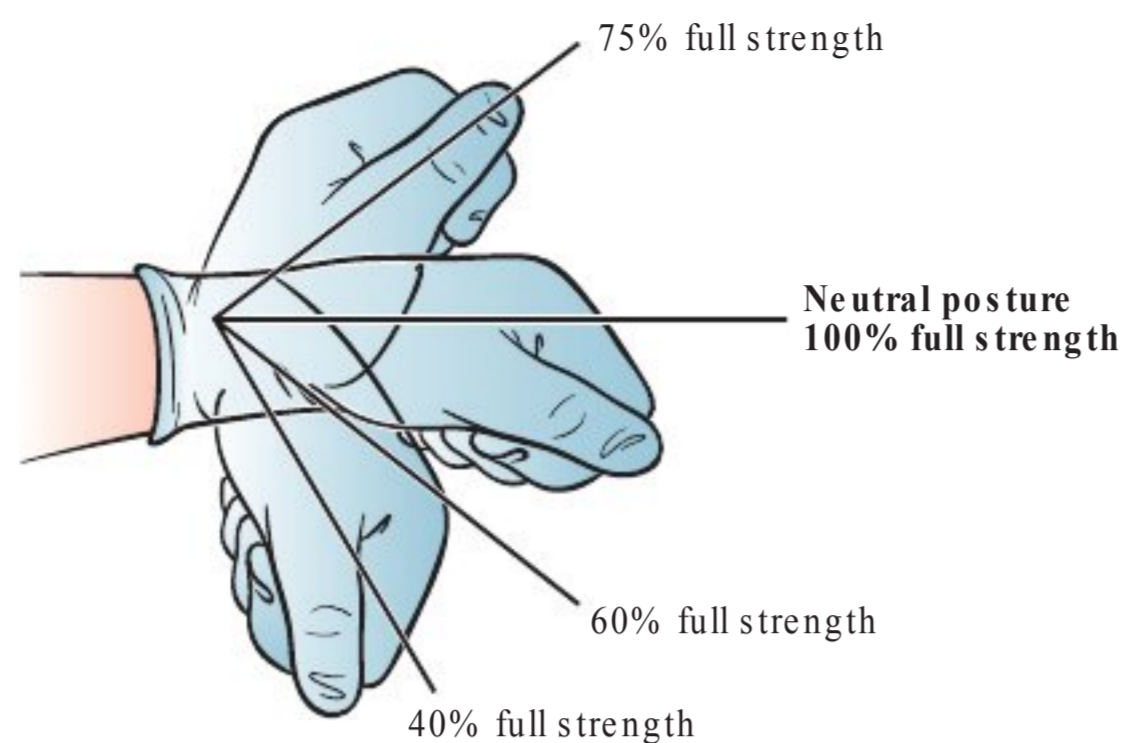


Figure 1-2. Effect of Poor Positioning on Wrist Strength. This illustration shows the reduction in strength that occurs as the wrist deviates away from its neutral position (37).

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.