

SIXTH EDITION

DENTAL ASSISTING

A Comprehensive Approach



Vaishali Singhal
Susan Kantz
Melissa Damatta
Donna Phinney
Judy Halstead



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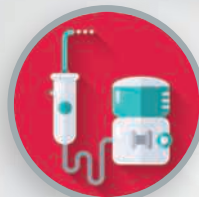
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Dental Assisting, A Comprehensive Approach,
6th Edition
Vaishali Singhal, Susan Kantz, Melissa
Damatta

SVP, Higher Education & Skills Product: Erin Joyner

VP, Higher Education & Skills Product: Thais Alencar

Product Director: Jason Fremder

Product Manager: Lauren Whalen

Product Assistant: Dallas Wilkes

Learning Designer: Mary Convertino

Senior Content Manager: Thomas Heffernan

Digital Delivery Lead: David O'Connor

Director, Marketing: Neena Bali

Marketing Manager: Courtney Cozzy

IP Analyst: Ashley Maynard

IP Project Manager: Kelli Besse

Production Service: Lumina Datamatics, Inc.

Designer: Felicia Bennett

Cover Image(s): istockphoto.com/XiXinXing

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WCN: 02-300

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Library of Congress Control Number: 2021914839

ISBN: 978-0-357-45652-1

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Dedication

This book is dedicated to Judy Halstead and the memory of Donna Phinney. Donna and Judy's professionalism, expertise, and dedication to their students were the backbone of the first five editions. Their shared passion for Dental Assisting education created and sustained this text over the years, and we are proud to continue their legacy.

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NEW TO THIS EDITION

General Updates

- Key Terms feature has been updated throughout the text to include phonetic pronunciation, the meaning of root and word parts, and the definition for each key term
- Dental operator steps were added to each step-by-step procedure, as applicable
- New images have been added throughout the text, including new step-by-step procedure photos, to enhance the topics discussed

Chapter 2

- Added/expanded discussion of:
 - Several health behavior theories in addition to Maslow's and how each can be utilized to improve the oral health of the patient
 - Characteristics of children, older adults, and Generation Alpha
 - Preparing dental presentations
- Expanded on the topic of written communication to include office letters and other forms of written communication, including electronic communication

Chapter 3

- Added/expanded discussion of:
 - Ethical principles
 - Ethical dilemmas
 - The differences between criminal law and tort law
 - Regulatory and nonregulatory agencies involved in dentistry
 - HIPAA responsibilities in various areas of dentistry, including technology
- Added image of a sample patient consent
- Added image of a sample acknowledgement of HIPAA policy
- Moved CDT codes to Chapter 44

Chapter 4

- Formerly Chapter 6
- Added/expanded discussion of:
 - Information on the cell and organization of the human body
 - The urinary system
 - The brain
 - The interrelationship between oral health and the various systems
- Added anatomical images including on the cell

Chapter 5

- Removed the section "Landmarks of the Face and Oral Cavity" and moved it to a new Chapter 6
- Added a new table that includes descriptions of all the cranial nerves

- Added several tables to provide concise information about nerves, arteries and veins, as well as their branches that supply the head and neck

Chapter 6

- This is a newly added chapter
- Added/expanded discussion of:
 - Regions of the face
 - Healthy and unhealthy gingiva

Chapter 7

- Reduced the Stages of Pregnancy topic/content
- Added histological images of tooth development
- Added several images to enhance the topics discussed in the chapter

Chapter 8

- Formerly Chapter 9
- Added/expanded discussion of:
 - Tooth landmarks from each aspect
 - Tooth characteristics and distinguishing features to assist in identifying teeth
 - Primary and permanent teeth
 - Universal Numbering System
- Added color images of tooth landmarks from each aspect

Chapter 9

- Moved chapter from Dental Specialties section to Dental Sciences section
- Added/expanded discussion of:
 - Tools available for oral cancer detection
 - Educating patients to perform an oral cancer screening on themselves
- Added tables that provide standard terms used to describe lesions
- Moved dental caries topic to this chapter and added detailed information in a table format regarding stages of decay
- Added step-by-step procedure for performing an intraoral and extraoral exam

Chapter 11

- Added/expanded discussion of:
 - Covid-related infection control procedures
 - Different surfaces in the dental office, with new images
 - Sanitizing surfaces, with new images
 - The Bloodborne Pathogens Standard and Hazard Communication Standard
- Additional images added for procedure related to handwashing

- Added new step-by-step procedures for:
 - Alcohol-based hand hygiene
 - Surgical hand scrub
 - Donning surgical gloves
 - Operating an ultrasonic cleaner
 - Operating an autoclave
- Expanded procedure related to treating a contaminated tray, with new images

Chapter 14

- Added/expanded discussion of:
 - Importance of knowing about drugs and how drugs are tested
 - Drug names
 - Routes of administration
 - Administration, distribution, metabolism, and excretion
 - Substance use disorder, including preventing drug diversion, identifying the patient with a substance use disorder, and medications used to treat substance use disorders
 - Adverse drug reactions
 - Commonly used drugs administered in a dental office or prescribed by a dentist
 - 2007 American Heart Association (AHA) guidelines for prophylactic antibiotics
 - American Society of Anesthesiologists (ASA) Classification of Risk Assessment
- Added new figures to include expanded information related to common abbreviations
- Added new tables detailing conversions for prescriptions, potential teratogenic effects of drugs, dental local anesthetics available for use in the United States, comparisons of over-the-counter analgesic medications, and comparisons of prescription pain medications
- Removed content related to caffeine, herbal and alternative medications

Chapter 15

- Added/expanded discussion of:
 - The importance of the medical history in preventing a medical emergency
 - The importance of vital signs
 - The most recent AHA blood pressure classifications and dental management protocol
 - Identification and management of the apprehensive patient
 - Stress reduction protocol
 - American Society of Anesthesiologist (ASA) classification
 - Medical consultation
 - The emergency kit

- Each emergency that may occur in a dental office including prevention, management, medical history questions, predisposing factors, signs and symptoms, and ASA classifications

- Added new step-by-step procedures for:
 - Taking blood pressure
 - Obtaining pulse and respiration
- Added a sample medical history form
- Added a sample medical consultation
- Added tables that describe the drugs in the emergency kit along with images of drugs
- Categorized emergencies into syncope, respiratory disorders, adrenal disorders, thyroid disorders, diabetes, angina and MI, congestive heart failure, seizures, cerebrovascular accident, allergies, and airway obstruction
- Added several images to enhance the topics discussed in the chapter
- Moved discussion of dental emergencies to a separate chapter
- Removed CPR/BLS section

Chapter 23

- Added/expanded discussion of:
 - Noninjectable anesthetics
 - Complications related to local anesthesia
 - Postexposure management
- Added tables that provide coverage of:
 - Short, intermediate, and long-acting local anesthetics
 - Injection name, area anesthetized, needle insertion site, length and gauge of needle used, and depth of insertion
 - Prevention of dental local anesthetic related emergencies
 - Systemic adverse reactions of dental local anesthetics

Chapter 24

- This is a new Chapter highlighting preventative dental treatment
- Includes three new step-by-step procedures relating to preventative care: periodontal charting, oral prophylaxis, and scaling and root planning
- Formatted to focus on the ADHA standards for clinical dental hygiene practice

Chapter 25

- Added/expanded discussion of:
 - Silver Diamine Fluoride
 - Ergonomics during preventative care
 - Air-powder polishing
 - Stain
- Added a step-by-step procedure on air-powder polishing

Chapter 27

- Added/expanded discussion of:
 - Direct and indirect damage by an x-ray photon, including images
 - Shadow casting and the principles of shadow casting
 - Inverse square law
 - Linear nonthreshold curve, including image
- Added description and table with images of types of interactions with radiation
- Added table with information related to radioresistant and radiosensitive cells
- Included use of term “image receptor” to be inclusive of films and digital sensors unless specifically referring to traditional film

Chapter 28

- Updated the title for this chapter
- Added/expanded discussion of:
 - Infection control as it specifically relates to dental radiology equipment, digital systems, image receptors, supplies and processing for traditional films
 - Infection control before, during, and after exposures
 - Standard exposure sequence for paralleling and bisecting techniques
 - Anatomical landmarks to be used for bisecting technique
 - Object localization using SLOB rule and the right angle technique
- Included use of term “image receptor” to be inclusive of films and digital sensors unless specifically referring to traditional film
- Moved digital imaging from Chapter 23 to this chapter
- Added table and diagrams that specify maxillary and mandibular entry points for primary beam when using the bisecting technique
- Added step-by-step procedure for bisecting the angle technique

Chapter 29

- Updated the title for this chapter
- Added/expanded discussion of:
 - The coronal, axial and sagittal views of 3D imaging
 - Radiographic appearance of decay, with images
 - Radiographic pulpal and periapical lesions, with images
 - Radiographic appearance of periodontal disease, with images
 - Radiographic appearance of dental anomalies, with images
 - Radiographic appearance of dental materials, with images
- Added direct and indirect digital panoramic options to the panoramic exposure procedure

- Added tables that summarize radiopaque and radiolucent maxillary landmarks and radiopaque and radiolucent mandibular landmarks

Chapter 33

- Updated step-by-step procedures to include automix cartridges with extruder guns
- Due to the eradication of polysulfide impressions, this step-by-step procedure was updated with taking a polyether impression

Chapter 38

- Added/expanded discussion of:
 - The classifications of periodontal disease based on the most recent American Academy of Periodontology guidelines
 - Periodontal risk assessment
 - Adjunctive periodontal therapies
 - Peridex®
- Added tables that cover:
 - The risk factors for periodontal disease
 - Glickman’s classification of furcation involvement
 - Healthy gingiva and changes that take place related to periodontal disease
 - Locally applied antimicrobial agents

Chapter 39

- Added/expanded discussion of:
 - Indications and contraindications to dental implants
 - Patient selection for dental implants
 - The role of the implant coordinator

Chapter 40

- Added/expanded discussion of:
 - Clinical considerations for bridges
 - Shade selection
 - Digital communication
- Added table covering symbols and abbreviations used in fixed prosthodontics
- Added image of digital patient charting with fixed prosthodontic procedures

Chapter 41

- Added discussion on advantages and disadvantages of CAD/CAM technology

Chapter 42

- Added/expanded discussion of:
 - Transitional partial dentures as a type of partial denture
 - Nesbit partial denture as a type of partial denture
 - Kennedy classification for edentulous arches, with image

- Patient instructions for care of partial dentures
- Surfaces of a full denture
- Post palatal seal of a maxillary denture
- Xerostomia and impact on dentures
- Denture adhesives
- Denture sore spots
- Added image of an electronic patient charting record with removable procedures charted
- Added table covering abbreviations and symbols used in removable prosthodontics

Chapter 44

- Reorganized the chapter content for a better learning experience
- Added/expanded discussion of:
 - Language barriers
 - Teledentistry visits
 - CDT codes

PREFACE

The world of health care changes rapidly. The twenty-first century presents health care professionals with more challenges than ever before—but with challenge comes opportunity. Job prospects for dental assistants have never been better. The Bureau of Labor Statistics expects employment in our field to grow faster than the average for all occupations through the year 2030. Population growth, an increase in the aging population, and greater retention of natural teeth will fuel demands for dental services. As the health care industry requires more services to be completed by dentists, the dental assistant will be more valuable and needed than ever before. Many states are passing legislation allowing for an expansion in the skills that dental assistants can provide—with additional training. Placing restorations, obtaining virtual impressions, and monitoring general sedation are a few examples. As a dental assistant, you'll be expected to take on an increasing number of clinical and administrative responsibilities to stay competitive. Now is the time to equip yourselves with the range of skills and competencies you'll need to excel in the field. Now is the time to maximize your potential, to expand your base of knowledge, and to dedicate yourself to becoming the multifaceted dental assistant required in the twenty-first century. This text and complete learning system, *Dental Assisting: A Comprehensive Approach*, sixth edition, will guide you as a dental assisting student on this journey. The result of years of research, writing, and testing, this system is designed to prepare you for the Dental Assisting National Board (DANB) certification examination, some state credentialing, and the workplace. It presents information in a unique manner, using a variety of formats that account for the diverse ways in which today's students learn. To receive the full value of *Dental Assisting: A Comprehensive Approach*, sixth edition, it is important to understand the structure of the text, chapters, MindTap, and accompanying workbook as well as other supplements, and how they are all integrated into a complete learning system. Together, these materials will make your dental assisting education comprehensive and meaningful, providing you with the skills, knowledge, principles, values, and understanding needed to excel in your chosen profession.

Why We Wrote This Book Three dental educators, Vaishali Singhal, Susan Kantz, and Melissa Damatta, are the lead authors who developed the sixth edition of this textbook. Additionally, the book includes a team of contributing authors that includes notable educators and practitioners with expertise and national involvement in all phases and levels of dental assisting. We developed this edition according to the Commission on Dental Accreditation (CODA) Standards for Dental Assisting as well as the American Dental Association (ADA) content areas. The expansive table of contents for this textbook addresses some of the problems we identified with other dental assisting textbooks currently on the market; for example, educators have complained, “we were still fervently shopping for supplemental texts and media to improve our programs; most available videos were outdated and expensive, and often did not match the text; the

chapters of the existing texts were extremely large and were often not in a sequence suitable for our programs; and as a result the texts inhibited the flexibility of instruction.” Thus, the goal of this text is to provide all inclusive text and supporting materials for dental assisting program instructors—to provide a comprehensive educational program rather than simply a text. This comprehensive program is structured to provide built-in flexibility to support the individual academic freedom of faculty. The chapters are ordered to allow for performance-based sequencing of procedures arranged from basic to complex and from general to specialty practice.

The Learning System

The components of the learning system were developed with today's learner in mind. The authors and Cengage recognize that students learn in different ways—they read, write, listen, watch, interact, and practice. For this reason, we've created a variety of products learners can use to fully comprehend and retain what they are taught. An instructor's manual ties the components together, making classroom integration easy and fun.

• The Text

This text delivers comprehensive coverage of dental assisting theory and practice, supported by full-color illustrations and photographs throughout with 169 step-by-step procedures in nine sections. Section I, *Dentistry as a Profession*, introduces learners to the profession and its history as well as communication and legal issues. Section II, *Dental Sciences*, covers the basics of general anatomy, head and neck anatomy, embryology, histology, tooth anatomy, and oral pathology, creating a foundation on which learners can move forward in skills training. Section III, *Preclinical Dental Sciences*, covers microbiology and infection control in dentistry, managing hazardous materials that may be found in a dental office, managing patients who are medically compromised or have special needs, preventing and managing common medical emergencies that may occur in a dental office, and pharmacology, all of which are critical elements to the profession. This textbook contains the latest and most up-to-date infection control protocol related to the recent COVID-19 pandemic. Section IV, *Prevention and Nutrition*, discusses general techniques to maintain health and wellness of the oral cavity and the dentition. Section V, *Assist with Diagnosis and Prevention*, introduces the learner to the dental office and equipment, chairside assisting, instruments, management of pain and anxiety, and preventive techniques in dentistry. This section also includes information on advanced functions such as coronal polish and dental sealants. Section VI, *Dental Radiography*, provides updated information on radiographic techniques and procedures, including the latest on digital and three-dimensional radiography. Section VII, *Assist with Restorative Procedures and Dental Materials*, introduces

the learner to commonly used dental materials, assisting in procedures related to amalgam, dental cements, and composite as well as the management of dental emergencies. Section VIII, *Assist with Comprehensive Patient Care*, introduces learners to the specialized areas of dentistry and the importance of comprehensive care, as well as advanced skills of retraction cord placement and tooth whitening. Section IX, *Dental Practice Management*, contains coverage of dental office management, dental computer software, dental insurance, employment portfolios, and legal and ethical considerations, which are important components for managing a dental practice properly. New features such as patient dialogues and professional encounters have been added to the sixth edition. The professional encounter feature provides real-life scenarios regarding communication with a patient, offering the learner professional experiences of those in the field. Each chapter includes the following pedagogical features as applicable:

- Specific instructional objectives
- New feature: Comprehensive approach to building medical and dental terminology using root words along with key terms
- Introduction
- Step-by-step procedures with icons indicating handwashing, gloves, masks, protective clothing and protective eyewear, basic setup, and expanded functions (see icons below)
- In-text icons identifying legal and safety areas (see icons below)
- Boxed information containing tips and summaries
- New feature: Special features in online Instructor Manual that include documentation, patient dialogue, and professional encounters
- Chapter summary
- Case studies
- Review questions, including critical thinking questions
- New feature: Most up-to-date infection control protocol related to the COVID-19 pandemic



HANDWASHING



GLOVES



LEGAL

MASK AND PROTECTIVE
EYEWEAR

CLOTHING



SAFETY

● MindTap

It's 1 A.M. There are 20 tabs open on your computer. You lost your flashcards for the test, and you're so tired you can't even read. It would be nice if someone came up with a more efficient way of studying. Luckily, someone did. With a single login for MindTap® for *Dental Assisting: A Comprehensive Approach*, sixth edition, you can connect with your instructor, organize coursework, and have access to a range of study tools, including the ebook and apps, all in one place!

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- The **MindTap eReader** takes the textbook experience to a whole new level with the ability to have the material read to you with **Readspeaker**, print the material and take it with you for on-the-go preparation, and take notes or highlights within the eReader, which feeds to the StudyHub App for easy study guide creation.
- The **New MindTap Mobile App** not only includes access to the e-book both online and offline, but keeps you connected to your instructor and your course with alerts and notifications. It also arms you with on-the-go study tools like flashcards and quizzing, helping you to manage your limited time efficiently.
- **Flashcards** are prepopulated to provide a jump-start on your course preparation and studying. You can also create your own customized cards as you move through the course material, with the ability to go directly to definitions by clicking on colored key terms within the text.

● Instructor Resources

Additional instructor resources for this product are available online. Instructor assets include an Instructor's Manual, Educator's Guide, PowerPoint® slides, and a test bank powered by Cognero®. Sign up or sign in at www.cengage.com to search for and access this product and its online resources.

Components available on the Instructor Resource Center include:

- A computerized test bank, with questions geared to text chapters and mapped to CODA accreditation standards; available for download in many different LMS options
- Instructor presentations on PowerPoint™ with talking points, designed to support and facilitate classroom instruction
- An electronic version of the *Instructor's Manual* so that notes and ideas can be customized
- assisting materials to create a dynamic learning system

- A transition guide to help make a smooth transition from the fifth to the sixth edition
- Skill checklists to use for student evaluation.
- Resources guide containing books, articles, and useful links, sorted by chapter.

● Student Workbook

The workbook, which corresponds to the text, contains chapter objectives and exercises in a variety of formats. Each workbook chapter was standardized to include a variety of activities such as matching, true/false, fill in the blank, multiple choice, certification review, critical thinking questions, and case studies to allow each student to learn the concepts in a manner that is best suited to their individual learning style. The questions are mapped to the objectives, providing a holistic exposure to the content of each chapter.

When you use all of these components together, you'll discover an innovative, comprehensive system of teaching and learning that prepares students for success in the twenty-first century.

About the Authors

Vaishali Singhal is an associate professor at Rutgers University's School of Health Professions (SHP) and Rutgers School of Dental Medicine (RSDM) in Newark, New Jersey. Teaching at the university since 2001, she currently serves as program director of the Bachelor of Sciences in Health Sciences Program as well as course director for Practice Management and Ethics and Jurisprudence at the RSDM. At the faculty practice of RSDM, Dr. Singhal specializes in treating patients with serious mental illness. In 2019 she completed her doctoral thesis at SHP, evaluating ways to improve the oral health of patients with serious mental illness. She completed a Master of Science in Health Sciences at Rutgers University in 2011 and received her DMD from the RSDM in 1993. Her PhD and MS programs included specialized courses in education, which is Dr. Singhal's passion.

Susan Kantz is the former Dental Assisting Program Director for a private college and a high school career center. During her career as an educator, Ms. Kantz was dedicated to helping each student achieve their greatest potential. She was an active HOSA (Health Occupations Students of America) local advisor, and her students consistently placed in the top 10, with a sound record of placing in the top 3 at National HOSA Leadership Conference. Ms. Kantz received Teacher of the Year and Indiana HOSA Advisor of the Year during her career as a high school instructor at a career center. Prior to teaching, she worked as an EFDA in pediatric and general dentistry private practice, at the Indiana University School of Dentistry in endodontics and Riley Children's Hospital Dental Clinic in pediatrics, orthodontics and as an operating room dental surgical assistant. Ms. Kantz was the curriculum developer for the Indianapolis Public Schools Health Professions Center. She was a member of the Indiana Department of Education cadre to teach writing duties/task lists and articulation agreements to vocational instructors throughout the state. After retirement, she worked as a dental assisting/dental hygiene adjunct instructor

at Ivy Tech Community College. Ms. Kantz completed her dental assisting and expanded dental assistant program at Indiana University School of Dentistry, earned a MS in allied health education from Indiana University and attended Indiana Wesleyan University Education Leadership Program.

Melissa Damatta began her career as a dental assistant at a young age. Her love of dentistry motivated her to return to school and pursue dental hygiene. Upon graduation, she immediately returned to school to pursue her second love: education. She began her education career at Rutgers School of Health Professions as an adjunct in the department of Allied Dental Education, where she taught both clinical and didactic courses. During that time she sought out her Certified Dental Assistant (CDA) certification. Ms. Damatta went on to teach in the dental hygiene program for Burlington County College in New Jersey. Currently, she is an associate professor for the dental hygiene program at Community College of Philadelphia, where she serves as clinic coordinator for second-year students and teaches radiology and a preclinical course to first-year students. Ms. Damatta has practiced dental hygiene for 18 years, with experiences in periodontal, pediatric, and general dentistry. A former president of Central New Jersey Dental Hygiene Association (CNDHA), she holds memberships in the American Dental Hygiene Association (ADHA) and the American Dental Education Association (ADEA). She continues to practice as a clinical dental hygienist for a private practice in New Jersey. Ms. Damatta completed her associate's degree in applied science in dental hygiene from Middlesex County College in New Jersey, her Bachelors of Science in Health Science—education track from The University of Medicine and Dentistry of New Jersey (now part of Rutgers University), and her Masters of Science in Dental Hygiene with an education concentration from the University of Bridgeport in Connecticut.

Donna J. Phinney was the program director for Spokane Community College's Dental Assisting Program. She spent more than 25 years in the dental field as a dental assistant, a dental office consultant, an office manager, and an educator. Ms. Phinney held a bachelor of arts from Eastern Washington University, a master's degree in education from Whitworth College, and an associate of science and certificate in dental assisting from Spokane Community College. A certified dental assistant, she was active in the Washington State Dental Assisting Association, where she served as president from 1992 to 1993. She obtained her fellowship from the American Dental Assisting Association in 2002. Donna was a consultant for the American Dental Association, was commissioner on dental accreditation for 17 years, was on the Dental Assisting Review Committee, and was a commissioner for the American Dental Association, appointed by the American Dental Assistants Association.

Judy H. Halstead is professor emeritus at Spokane Community College. She has more than 25 years' experience teaching and more than 10 years' experience as a dental assistant. She was a program director for dental assisting in a private college and for a high school skills center. Ms. Halstead holds a bachelor of arts from

Eastern Washington University, is a certified dental assistant, and has an expanded functions certificate. She has been a member of local, state, and national dental assistants associations for the past 25 years. She served as president of the Washington State Dental Assisting Association from 1994 to 1995. Ms. Halstead has presented lectures and workshops at local, state, and regional dental conferences.

Acknowledgments

The authors would like to thank the following individuals and institutions for providing valuable assistance in the development and production of the sixth edition:

Amy Mangan MS, BS, RDH

Amy Palagano, BS, RDH, CDA

Beatriz Fernandez, DMD

Caitlin LaFonte, BA, RDH

Cathy Alexander, CDA

Christine Casile MS, RDH, CDA

Cindy Schroeder MA, RDH, CDA

Damian Funke, MS, science instructor

Debbie Bordeaux

Gail Vasilenko MA, RDH, CDA

Jennifer Morelli MS, BS, RDH

Karen Finnerty MS, RDH, CDA

Keith Turner, CDT

Kim McMahon MS, RDH, RDA

Lawrence Schneider, DDS

Lucia Gonzales, CDA

Maxine Feinberg, DDS

Myke Carey AS, 3D Design and Animation

Rishi Singhal, BS, medical student

Rutgers School of Dental Medicine

Rutgers School of Health Professions

Steven R. Fink, DMD

Tracy Djani, RDH, MAED/e-Education, MH, ND

Usha Rana, DMD

Contributors

Michelle Ashley, RDH

Chapter 1: Introduction to the Dental Profession
Chapter 31: Amalgam Procedures and Materials

Dr. Cynthia Baker, DDS

Chapter 14: Pharmacology

Kathleen Baleno, RDH

Chapter 10: Microbiology
Chapter 11: Infection Control

Darci Barr, CDA

Chapter 3: Ethics, Jurisprudence, and the Health Information Portability and Accountability Act

Dr. Sabiha Bunek, DDS

Chapter 30: Dental Emergency Procedures and Dental Cements
Chapter 31: Amalgam Procedures and Materials
Chapter 32: Composite Procedures and Materials
Chapter 41: Computerized Impression and Restorative Systems
Chapter 43: Cosmetic Dentistry and Teeth Whitening

Joyce Hudson

Chapter 22: New Patient Examination
Chapter 24: Oral Prophylaxis and Recare Appointment
Chapter 25: Coronal Polishing and Topical Fluoride Application

Janet Jaccarino, CDA, RDH, MA

Chapter 2: Psychology, Communication, and Multicultural Interaction
Chapter 13: The Special Needs and Medically Compromised Patient
Chapter 16: Oral Health and Preventive Techniques
Chapter 17: Nutrition

Carrie Jacques

Chapter 4: General Anatomy and Physiology

Donna Kempf

Chapter 37: Endodontics
Chapter 44: Dental Practice Management

Jennifer Maggard

Chapter 27: Introduction to Dental Radiography, Radiographic Equipment, and Radiation Safety
Chapter 28: Dental Radiology Infection Control, Exposure, Processing and Evaluation of Dental Radiographs, and Mounting of Dental Radiographs
Chapter 29: Extraoral Radiography, Digital Radiography, and Radiographic Interpretation

Dr. Rebecca Poling, DDS, MSD

Dr. Rebecca Poling is the Primary Author for www.OrthoTraining.com, an online Orthodontic Education company. Dr. Poling wrote the content and provided the images for Chapter 35: Orthodontics. All Chapter 35 procedures were written by co-author Susan Kantz.

Dr. John Powers, PhD

Chapter 30: Dental Emergency Procedures and Dental Cements
Chapter 31: Amalgam Procedures and Materials
Chapter 32: Composite Procedures and Materials
Chapter 41: Computerized Impression and Restorative Systems
Chapter 43: Cosmetic Dentistry and Teeth Whitening

Shelley Rice, RDH

Chapter 27: Introduction to Dental Radiography, Radiographic Equipment, and Radiation Safety
Chapter 28: Dental Radiology Infection Control, Exposure, Processing and Evaluation of Dental Radiographs, and Mounting of Dental Radiographs
Chapter 29: Extraoral Radiography, Digital Radiography, and Radiographic Interpretation

Cathy Roberts, MADAA, EFDA, AGS

Chapter 34: Pediatric Dentistry

Christy Ross

Chapter 18: The Dental Office
Chapter 19: Dental Instruments and Tray Systems
Chapter 20: Ergonomics and Instrument Transfer
Chapter 22: New Patient Examination
Chapter 23: Anesthesia and Sedation
Chapter 26: Dental Sealants
Chapter 32: Composite Procedures and Materials

Minas Sarakinakis, CDA

Chapter 36: Oral and Maxillofacial Surgery

Cathy Sykes

Chapter 38: Periodontics

Dr. Janette Whisenhunt, CDA, RDH, BS, MEd, PhD

Chapter 5: Head and Neck Anatomy

Chapter 6: Landmarks of the Face and Oral Cavity

Chapter 7: Embryology and Histology

Chapter 8: Dental Anatomy

Chapter 9: Oral Pathology

Dr. Stacey Young, DC

Chapter 4: General Anatomy and Physiology

REVIEWERS**Reviewers of the Sixth Edition****Kathy Coy, CDA, RDH, BS**

Wallace State Community College

Lindsey Evans, CDA, RDH, BS

Central Georgia Technical College

Gloria Pacheco, CDA, MA

Luna Community College

Teresa Ray-Connell

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ATA Career Education

Reviewers of the Fifth Edition**Terri Bannor**

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Institute of Medical Careers

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Tija Hunter, CDA, EFDA, CDIA, FADAA

Dental Careers Institute

Yolanda Johnson Gray

Fortis College

Shauna Phillips

Fortis College

Judith Shannon, CDA, RDH

Massasoit Community College

Donna Zagame, AS

Milwaukee Career College

Reviewers of the First, Second, Third and Fourth Editions**Robert Bennett, DMD**

Texas State Technical College

Michelle Bissonette, CDA, EFDA, BS

Indiana University School of Dentistry

Valerie Blackenship, CDA, RDA

Simi Valley Adult School and Career Institute

Jill Brunson, CDA, RDA

Texas State Technical College Harlingen

Denis Campopiano, CDA, RDH, BS

Ogeechee Technical College

Robin Caplan, CDA

Medsafe, Inc.

Cynthia S. Cronick, CDA, AAS, BS

Southeast Community College

Terry R. Dean, DMD

Western Kentucky University

Jan DeBell, CDA, EFDA, BS

Front Range Community College

Heidi Denson

Ogden Weber Applied Technology

Marie Desmarais Cecil, CDA, MA

Central Community College

Sharon K. Dickinson, CDA, CDPMA, RDA

El Paso Community College

Jennifer Dumdei, LDARF, CDA

South Central College

Kerri H. Friel, RDH, COA, CDA, MA

Community College of Rhode Island

Kathy Foust, CDA, MS

Western Wisconsin Technical College

Dennis Garcia, DMD, RDA

Corinthian Colleges, Inc.

Lea Anna Harding, CDA, B.S.Ed

Gwinnett Technical College

Linda Kay Hughes, RDA, NRDA

PDE/Excelle College

Paulette Kehm-Yelton, CDA, EFDA, MPA

Northeast State Community College

Vivian Koistinen, ASDA

High Tech Institute, Inc.

Betty Ladley Finkbeiner, CDA, RDA, BS, MS

Washtenaw Community College

Deborah K. LeBeau, AACOM, CDA

Fortis College

Sandra Lo, DDS

Sacramento City College

Professor Teresa A. Macauley, CDA, EFDA, MS

Ivy Tech Community College of Indiana

Rebecca Mattney, CDA, RDA

Vatterott College

Judith A. McCauley, RDH, MA

Palm Beach State College

Connie Myers Kracher, PhD, MSD

Indiana University-Purdue University Fort Wayne

Stephanie Olson, BA, CDA

University of Alaska Anchorage

Krista M. Rodriguez, RDH, CDA, BA, NYCDA, FADAA

Monroe Community College

Stephanie Joyce Schmidt, CDA, CPFDA, CDT, RDAEF2, MS

Pasadena City College

Le Ann Schoelne, CDA, RDA, RF, BS

Central Lakes College

Jenny Schuler, CDA, BS

Bellingham Technical College

Bobby A. Sconyers, BA, CDA, CPFDA

South Florida State College

Annette Scranton, EFDA

Remington College/West Campus

Sheila Semler, CDA, RDH, MS, PhD

San Juan College

Lynette Sichelbaugh, CDA

Washington Local Adult Education

Karen F. Sperry, CDA, RDA, BVE

College of the Redwoods

Diana M. Sullivan

Dakota County Technical College

Kelly Svanda, CDA

Southeast Community College

Susan Thaemert, CDA, RDA, BS

Hennepin Technical College

Lynn Tyler

The American Institute of Medical-Dental Technology

Joyce T. Uyeda Yamada, CDA, RDH, MS

University of Hawaii Maui College

Tracie E. West

Remington College-Cleveland West

Janet Wilburn, BS, CDA

Phoenix College

Pamela G. Zarb, CDA, RDA, RDH, MA

Wayne County Community College

Language of Dentistry



Specific Instructional Objectives

At the completion of this section, you will be able to meet these objectives:

1. Defend the importance of being fluent in dental/medical terminology.
2. Analyze the structure of the dental terms.
3. Define dental terms.
4. Pronounce dental terms.
5. Apply rules in making words plural.
6. Recognize acronyms, eponyms, and homonyms.
7. Use terms presented in this chapter.

Dental Terminology

If you were going to a foreign country, you would need to learn its language to be able to communicate. In dentistry, you may find the words to be as foreign as another country's language. If you looked at some of the terms and said, "This looks like Greek to me," you would be right! Many of the terms used in **dentistry** and medicine come from Greek and Latin. Before you can study dentistry, you need to learn the dental language.

Every occupation uses a special language that has its own unique slang and technical terms. Computer programmers, for example, speak of "bits" and "bytes" and "megs" and "gigs." For someone unfamiliar with computers, those professional terms seem arcane and meaningless. Similarly, for the person unfamiliar with dentistry, the terms used in dentistry can be cryptic.

Dental **terminology** is the professional language used in dentistry. Dentistry uses medical and dental terminology in describing anatomy, pathology, treatment, procedures, and many other important facts needed to communicate dental care. It is important for the dental assistant to learn the dental language to communicate with other dental professionals and to read and understand dental communications.

Dental assistants have many responsibilities that relate to the proper use of dental terminology. For example, patient records are legal documents, and the assistant must complete them using acceptable terminology. In addition, dentistry uses a very precise and scientific language that may be difficult for the patient to understand. The dental assistant needs to translate

these scientific and technical terms and procedures into terms the patient can comprehend. Accomplishing this requires mastery of dental terminology. In this chapter, you will be given the tools needed to build your dental vocabulary and converse as a dental professional.

Some dental terms may seem strange and impossible to understand at first, but learning them will be much easier if you remember a simple fact: *There are no big words; all big words consist of several small words linked together.* Much like working a jigsaw puzzle, you need to be able to understand the individual pieces and then put them together to form a complete picture. As with learning any language, it will take time to master. With dedicated effort and practice, you will find speaking and interpreting dental terminology enjoyable and a rewarding experience (Figure I-1).

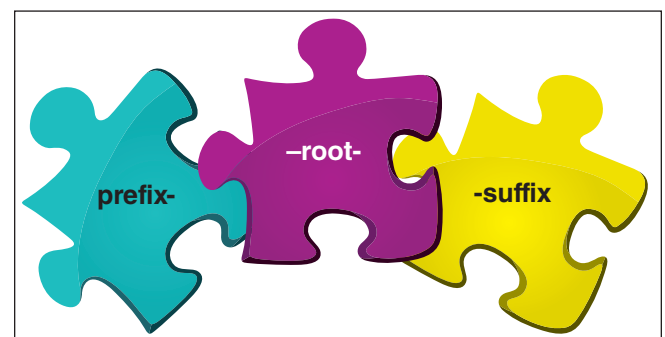


FIGURE I-1

Terminology is like pieces of a jigsaw puzzle fitting together.

Word Parts

Most words have three parts: a **root word**, a **suffix**, and a **prefix**. Some words might consist of only a root; others have several roots, or even several prefixes or suffixes. Learning how to identify roots, suffixes, and prefixes is the first step in mastering terminology in any field.

Root Words

The root is the main body or stem of the word; it is the foundation upon which all terminology is built. All words have a root word. For example, “term” is the root in the word *terminology*. The dictionary defines “term” as: “limit in time, place, set, or appointed period” and as “a word or group of words designating something, especially in a particular field.” Many times you will find more than one definition and use of the term. Some common dental root words are *dent*, *odont*, *gingiv*, *mandible*, *dens*, *oral*, *cavity*, *path*, *odyn*, *coron*, *radic*, *maxill*, and *alveoli*. (Refer to Table I-1 for their meanings and Table I-2 for how they are pronounced.)

Compound Words A compound word is a word composed of two or more root words. For example, the word *toothbrush* is a compound word made from the words *tooth* and *brush*.

TABLE I-1 Meaning of Root Terms

Root Word	Meaning of Root Term
alveol	<ol style="list-style-type: none"> 1. a little cavity, pit, or cell 2. any of the sockets in which the roots of the teeth are embedded; tooth socket 3. any of the tiny air sacs in the lungs
cavity	<ol style="list-style-type: none"> 1. a hollow space within the body, an organ, a bone 2. a hollow space or a pit in a tooth, most commonly produced by caries; a cavity may be artificially made to support dental restorations
coron	<ol style="list-style-type: none"> 1. a crown 2. part of a tooth above the gum
dent	<ol style="list-style-type: none"> 1. a tooth 2. toothlike part
gingiv	<ol style="list-style-type: none"> 1. technical name for gum 2. epithelial tissue attached to the bones of the jaw; surrounds and supports the bases of the teeth
maxill	<ol style="list-style-type: none"> 1. upper jaw
mandibl	<ol style="list-style-type: none"> 1. lower jaw
odont	<ol style="list-style-type: none"> 1. tooth 2. having teeth
odyn	<ol style="list-style-type: none"> 1. pain 2. painful
or	<ol style="list-style-type: none"> 1. mouth 2. opening, entrance
path	<ol style="list-style-type: none"> 1. disease or condition 2. a route, course, or track on which something moves
radic	<ol style="list-style-type: none"> 1. part of a tooth within the tooth socket 2. the rootlike beginning or appearance
stoma	<ol style="list-style-type: none"> 1. surgery, an artificial opening 2. anatomy, a mouth or mouthlike part

TABLE I-2 Pronunciation of Root Words

Dental/Medical Term	Pronunciation of Root Term
alveol	(al- vee -ohl)
cavity	(kav -i-tee)
coron	(<i>kuh</i> - rohn)
dent	(dent)
gingiv	(jin- jahy -v)
maxill	(mak- sil)
mandibl	(man - <i>duh</i> - buhl)
odont	(oh- dohnt)
odyn	(oh- din)
or	(ohr)
path	(pahth)
radic	(rad -ik)
stoma	(stoh -muh)

Affixes

A root word can take on different meanings by adding word attachments to it called **affixes**. Affixes can modify, describe, and change the meaning of root words. They can also give direction and tell what is happening or when it is happening. When a word part is affixed (added) to the end of the word, it is called a suffix. A word part affixed to the beginning of the word is called a prefix.

Combining Forms Sometimes when combining roots and affixes, the word parts have to change to make the term easier to read and pronounce. The new, changed form of the word is called a combining form.

No combining form is needed when combining two words parts in which the second word part begins with a vowel. For example, the word *gingivitis* (meaning inflammation of the gums) is formed by combining the root word *gingiv* (meaning gum) with the suffix *itis* (meaning inflammation). Since the second word part, *itis*, begins in a vowel, no combining form is needed.

When a word part that follows another word part begins with a consonant, you must add a **vowel** (a, e, i, o, u, and y) to make a **combining form**. For example, the word *thermometer* combines the prefix *therm* (meaning heat) with the root word, *meter*, which is an instrument used for measuring. To make the combining form, we add “o” to make “thermometer”—an instrument used to measure a patient’s body heat; “o” is the most commonly used combining vowel.

Suffixes

Suffixes are attachments added to the end of the root word to modify, change, or add to the meaning to form another word. Although prefixes are added to the beginnings of words and suffixes are added to the end, we will discuss suffixes first because they show how a word is used in a sentence and what part of speech the word represents. In dental terminology, suffixes are

used to identify diseases, conditions, and diagnostic, operative, and surgical procedures. A dental term will have only one suffix.

Let's see how suffixes change the meaning of words by adding suffixes to the word defined previously: *term*. You learned that the word *term* has two meanings; limit in time, place, set, or period, and a word descriptive in a particular field. The combining form is *termin*. Here are some suffixes that can be attached: -al, -ate, -ology. The new words are the following:

- **Terminal:** an adjective meaning "leading to an ultimate end, or death." A terminal illness would be an illness that is ultimately fatal. Terminal can also be a noun that means "either end of a transportation line" such as a bus terminal.
- **Terminate:** a verb meaning "to dismiss from a job, to end, to come to an end of time, or to kill."
- **Terminology:** a noun meaning "the study of specialized words related to a particular subject."

When a suffix is written alone, it is usually preceded by a hyphen (for example, "-ed") indicating that a word part precedes it to form a complete word. Tables I-3 through Table I-6 define common suffixes indicating parts of speech. Table I-7 and

Table I-8 list some common suffixes used in dental diagnosis and treatment.

Prefixes

Prefixes are attachments added before the root word to make the meaning more precise. Most prefixes can be added to the root word without changing the form of the prefix or the root word. When a prefix is written alone, it is usually followed by a hyphen indicating that a word part is added after the prefix (pre-) to form a complete word. A dental term may have more than one prefix to describe it.

Prefixes Describing Diagnosis Anatomical structures, diseases, and conditions are examined for diagnostic findings. They are often described by color and comparison to what is normal. The most common colors used in dentistry are listed in Table I-9, and Table I-10 describes findings from diagnosis.

Prefixes Describing Location When describing anatomy, diseases, and conditions, the exact location must be recorded.

TABLE I-3 Suffixes Used to Form Nouns

-a = singular ending of noun	-acy = like, state, or quality, pertaining to	-ine = belonging to	-ness = condition
-age = belonging to, related to	-dom = place or state of being	-ist = doer	-on = chemical substance
-ance = state or quality of	-er = a person or thing	-ism = state, belief, condition	-or = a person or thing
-ase = names enzymes	-hood = state or condition of being	-ity = state, quality	-tion = act of -sion
-ation = act of	-ia = condition or quality	-ium = membrane -eum	-ure = action, result
-ax = anatomical structure ending	-ion = action state	-ment = state, act	-y = to form familiar names

TABLE I-4 Suffixes Used to Form Adjectives

-able = capable of being	-eal = pertaining to	-ible = capable of being	-oid = resembling, like
-ac, -al, -an, -ar, -ary, -eal, -ic, -ive, -tic = pertaining to; having quality of	-en = resembling, made of	-ic = pertaining to; -ical having quality of	-ous = like, full of -ious
-an = belonging to -ian	-ent = full of	-il = pertaining to, capable of -ile	-tic = pertaining to
-ant = full of	-eous = composed of	-ish = like	-y = characterized by
-ar = pertaining to; having quality of	-form = having the shape or form	-ive = having the nature of	
-ary = like, connected with	-ful = characterized	-less = without	

TABLE I-5 Suffixes Used to Form Adverbs

-ably = capable of	-less = lacking	-ward = indication direction
-acious = full of -icious	-like = similar to	-wide = a given space
-fold = having so many parts	-ly = in a certain manner	-wise = direction, manner
-ily = in a certain manner	-most = quality, order	
-ive = tendency, inclination	-ular = relating to, resembling	

TABLE I-6 Suffixes Used to Form Verbs

-ate = process	-ify = to make, create
-ed = past action	-ing = action of
-en = to be, to become	-ise = to become, to agree with
-fy = to make, cause to be	-ize = to affect, resemble
-iate = to begin, process	-lyse = loose, dissolve, break into

TABLE I-7 Suffixes Used in Diagnosis

-algia = pain	-ology = study of
-dynia = pain	-oma = tumor
-edema = swelling	-opsy = view
-gnosis = able to discern, come to know	-osis = abnormal condition
-ia = condition	-path = disease
-iasis = pathological condition	-phylaxis = watching, guarding
-itis = inflammation	-rrhage = excessive bleeding, hemorrhage -rrhagia

TABLE I-8 Suffixes Used in Dental Procedures

-centesis = surgical fixation	-plasty = surgical repair
-ectomy = excision, surgical removal, cutting out	-rrhaphy = suture
-ive = function	-stomy = formation of an opening
-pexy = surgical fixation	-tomy = incision, cutting into

TABLE I-9 Prefixes Describing Color

alb-, albin- = white, referring to lack of pigment	erythr- = red
chlor- = green	leuk- = white
chrom- = color chromat-	melan- = black
cyan- = blue	xantho- = yellow

Common prefixes used to describe specific location, position, and direction are listed in Table I-11.

Prefixes Describing Amounts In describing anatomical structures, diseases, and conditions, the dental professional has to know and explain how many, how much, and what size. Prefixes can describe numbers, quantity, size, and degree of change. See how many of these prefixes you already know in Table I-12.

Strategy for Building Dental Vocabulary

After what you've just read, do you think you would be more or less likely to suffer from *hippopotomonstrosesquipedaliophobia*? You may be thinking, "What does that mean and how do you expect me to answer the question?" Remember, however, there are no big words, just combinations of several smaller word parts. This is the first place to start when determining the meaning of a word.

TABLE I-10 Prefixes Describing Findings

brady- = slow movement	gloss- = tongue (referring to condition)	onc- = tumor, mass swelling
cheil- = lips (referring to condition)	hemo- = blood	pharyn- = throat, windpipe
dia- = thorough, complete knowledge	labi- = lips (referring to location) lingual- = tongue (referring to location)	prog- = probable outcome, course
dys = bad, abnormal, impaired	lymph- = clear fluid that bathes and nourishes tissues of body; lymphatic system	sial- = saliva, salivary gland
eu- = normal	mal- = bad, wrongful, ill mis- = bad, wrong,	tachy- = rapid, accelerated

TABLE I-11 Prefixes Describing Location

ab- = away from abs-	ex- = beyond	post- = after, behind
ad- = toward	infra- = beneath, below	pre- = before, in front of
ante- = before, forward anter- = front	inter- = between	proxim- = near, adjacent
dextr- = right side	intra- = within	sub- = under
de- = away from, ending	later- = toward the side	super- = above supra-
dist- = directed away from midline	mes- = middle med-	sy-, syl-, sym-, syn- sys- = together
en- = inside, within, inner end- ent-	peri- = around	trans- = across, through

TABLE I-12 Prefixes Describing Amounts

a- = without, not an-	iso- = equal, like	poly- = many, excessive
bi- = two	macro- = large, long, big	quad- = four quadr-
di- = two diplo- = double	meg- = great, large mega- megal-	semi- = half
hemi- = half	micro- = small	tetra- = four
homo- = same	mon- = one	tri- = three
hyper- = above, beyond, excessive	multi- = many	uni- = one
hypo- = under, deficient	non- = not, lack of	sext- = six

Break the Word into Its Parts

To break the word into its various word parts, first identify any affixes (prefixes and suffixes) as well as any combining vowels, remembering that the most common combining vowel is “o.” For example, this word (*hippopotomonstrosesquipedaliophobia*) contains no prefixes and one suffix (-ia). It also has four combining vowels—three “o’s” and one “i.” From this information, we can identify five root words: *hippopoto-*, *monstro-*, *sesqui-*, *pedalio-*, and *phob-*, as well as the suffix *-ia*.

Define the Meaning of Each Word Part

Next define the meaning of each root word and affix. If you are not sure of the meaning, look it up in a dictionary:

hippopoto = hippopotamus; very large, massive mammal;
second-largest land mammal

monstro = monstrous; abnormal, hideous, or unnatural in size,
frightful in appearance

sesqui = one and a half; half as much again; many syllables

pedalio = relating to foot

phob = an intense, abnormal, or illogical fear of a specified thing;
irrational fear of a specific object, activity, or situation
that leads to a compelling desire to avoid it

-ia = disease; pathological, abnormal condition or mental disorder

Try to define the word.

Put the Parts Together

Now put the word parts together. Remember that the root word attached to the suffix is the stem upon which the word is built and is therefore the key to its meaning. In this case, the key to

this word is *phobia*, which means a mental disorder caused by an intense fear of something. The rest of the word parts tell what that something is.

You have the meaning of the word parts. Can you define it now?

Assemble the Meaning

The term will not make sense until you put together the meanings of each of the word parts that compose it. Generally, you start with the suffix and key root word, and then you return to the start of the word and define the meanings of the rest of the word parts in order. In this case, that would produce: *A mental disorder, caused by irrational fear of something large and monstrous, with many syllables, a foot and a half long.* Or, as the dictionary defines *hippopotomonstrosesquipedaliophobia*: a fear of long words (words a foot and a half long with many syllables).

Use Your Senses

Cognitive research has proven that the best way to learn is to involve as many senses as possible. A popular quote says, “We learn 10% of what we read, 20% of what we hear, 30% of what we see, 50% of what we see and hear, 70% of what we discuss with others, 80% of what we experience, and 95% of what we teach to someone.” Try to involve as many senses as possible in learning a new term.

For example, try to make a mental picture of what the word means. Imagine a person’s reaction to a phobia: shortness of breath, smothering sensations, pounding heart, shaking, sweating, and nausea. Studying models or diagrams of technical terms, or drawing pictures, can help you commit terminology to memory models or diagrams and you can draw a picture of it.

Saying new words aloud also will help you retain new information. Dictionaries list the phonetic spelling of every word before defining it and usually provide a guide to the less familiar symbols often used in phonetic spellings. There are also online “talking dictionaries” that will pronounce any word aloud for you.

Make It Meaningful

Whenever possible, find the item you are learning and handle it; nothing can substitute for hands-on learning. This kind of “effortful processing” leads to more stable learning. According to the Association for Psychological Science, we encode based on meaning—we remember what is meaningful to us.

Meaningful repetition is the key to long-term memory, so make reviewing terms a part of your daily studies. However, do not simply memorize words; interact with and use them actively. Start a log of vocabulary words and practice using dental language every day. Take advantage of your learning environment and offer to peer-tutor a classmate who is struggling to learn the information. Explain to your friends and family what you are learning. This is good practice for teaching your patients in

the dental office. Remember, we learn 95% of what we teach to someone. Think that might be why your teachers remember so much detail?

Pronunciation

When you look up a word in the dictionary to find its meaning, you will notice that the word’s **pronunciation** is also provided. It is important to learn how to say the word correctly (pronounce) to understand and remember what you have read. Your memory improves with the more senses you use. By pronouncing the word, you use your ears and mouth to speak the word. It is also important to pronounce words correctly so other dental professionals will know what you are saying.

Pronunciation is defined as the act of producing sounds of speech within the reference of a standard of correctness or acceptability. There is supposedly a correct manner of pronouncing sounds in any given language. In medical/dental terminology, there is often more than one correct way to pronounce the term. The most accepted pronunciation is generally listed first in the dictionary. However, certain terms do have more than one acceptable pronunciation. This is often due to different parts of the country and even the world. But, there is only one proper spelling of a term. Any change or error in spelling can totally change the meaning of a word; it may have an entirely different meaning that may result in improper diagnosis or treatment.

In this chapter, you will study how to pronounce a word using the **phonetic** transcription of a word. Dental term pronunciations are spelled out within parentheses and are broken into phonetic syllables. A syllable is a basic unit of speech generally containing only one vowel sound. For example, the word *base* contains one **syllable** and *basic* contains two syllables. Phonetics is what the term sounds like by an accepted standard of the human speech sounds and stress patterns of a syllable. Each term is broken into “sounds-like” syllables. The word *base* is phonetically translated as “beys” written as one syllable. *Basic* is phonetically translated into two syllables “**bey**-sik.” Notice that the syllables are separated by a dash and the first syllable is in bold font. The bold font is used to show stress patterns of the syllables.

Syllables in bold font receive the most stress (emphasis, spoken louder) than the other syllables. If another syllable has intermediate stress (slightly louder), quotation marks follow the syllable. Otherwise, all syllables are equally stressed. Can you pronounce pronunciation (*pruh-nuhn’-see-ey-shuh n*)? Just say it as it is spelled out.

In Table I-2, the root words defined now have the phonetic pronunciation. Practice saying these words.

Some combinations of letters are misleading in figuring out how to pronounce them. These combinations include *ps* (psych—only the *s* is pronounced); *pn* (pneum—only the *n* is pronounced); *gn* (gnath—only the *n* is pronounced); and *ph* (physio—*ph* sounds like *f*). Be aware of these misleading pronunciations as you study terms.

Plurals

There are several basic rules for creating the plural forms of words. Add *es* for nouns that end in *s*, *ch*, or *sh*. If the word ends in *y* and has a preceding consonant (such as allergy), change the *y* to *i* and add *es* (allergies). When looking up terms, the plural form is often provided. It will be indicated by the abbreviation *pl* before the plural form. To learn more about the rules for forming more plurals, study Table I-13.

Acronyms/Eponyms/Homononyms

Not all dental language consists of word parts. Some of the terms are composed of letters representing a phrase. Others may be named after a person or place. There are even words that are spelled differently, but sound the same. As a dental professional, you need to know how to interpret all forms of dental terminology.

Acronyms

An **acronym** is a word formed from the initial letter or groups of letters or words in a set phrase or series. In the technology and health industry, there is always some new acronym. In making an acronym, the industry tries to choose a catchy, pronounceable series of letters and make a name out of it. Some of the more common acronyms that are related to dentistry are listed in Table I-14.

Eponyms

Eponyms are terms used in medicine and dentistry that are named after people, places, or things. Because of the nature of medicine, new discoveries are often attached to the people who made the discovery. The names of drugs, diseases, and treatments are named after scientists and doctors who discovered or invented them. Sometimes the name is derived from

the proper name of a real or mythical person or place. Since eponyms are named after proper names, the term needs to be capitalized.

It usually involves a lot of research and publishing an article in a respected medical journal to have a medical eponym awarded. Down's syndrome is an eponym for the English physician, John Down, who described the syndrome. Down's syndrome is a genetic condition that is characterized by the presence of an extra copy of genetic material on the twenty-first chromosome. The syndrome may have some impairment of cognitive ability and physical growth and specific facial characteristics.

On occasion, an eponymous disease is named after a famous patient. Lou Gehrig's disease was named after Lou Gehrig, who was an American Major League Baseball player nicknamed "The Iron Horse" for his durability. Many eponymic diseases also have a more descriptive name. Lou Gehrig's disease is also called ALS (amyotrophic lateral sclerosis). ALS is a progressive neurodegenerative disease that affects nerve cells in the brain and the spinal cord. This disease's progressive degeneration of the motor neurons eventually leads to paralysis and to the patient's death.

Legionnaires' disease was given the name when an outbreak of pneumonia occurred among people attending an American Legion convention. Some famous medical signs and drugs are eponyms. The sounds heard when checking blood pressure called the Korotkoff sounds were discovered by Nikolai Korotkov, a cardiologist. Charles Mantoux, physician, is the developer of the eponymous serological test for tuberculosis, known as the Mantoux test.

TABLE I-13 Rules of Making Plurals

Singular Ending	Plural Ending	Examples
a	ae	gingiva, <i>pl</i> gingivae
ax	aces	thorax, <i>pl</i> thoraces
ex	ices	apex, <i>pl</i> apices
itis	ides	pulpitis, <i>pl</i> pulpitides
ix	ices	cervix, <i>pl</i> cervices
ma	s or mata	stoma, <i>pl</i> stomas stoma, <i>pl</i> stomata
nx	nges	pharynx, <i>pl</i> pharnges
oma	s	odontoma, <i>pl</i> odontomas
on	a	protozoon, <i>pl</i> protozoa
sis	oses	diagnosis, <i>pl</i> diagnoses
um	a	bacterium, <i>pl</i> bacteria
us	i	alveolus, <i>pl</i> alveoli
y	ies	biopsy, <i>pl</i> biopsies

TABLE I-14 Acronyms

Acronym	Translation
ADA	American Dental Association
ADAA	American Dental Assistants Association
ADHA	American Dental Hygiene Association
ALARA	As Low As Reasonably Achievable
CDA	Certified Dental Assistant
CDC	Centers for Disease Control
CODA	Commission on Dental Accreditation
DANB	Dental Assisting National Board
DDS	Doctor of Dental Surgery
DMD	Doctor of Dental Medicine
BA	Bachelor of Arts
BS	Bachelor of Science
MS	Master of Science
MA	Master of Arts
OSHA	Occupational Safety and Health Administration
PPE	Personal Protection Equipment
RDA	Registered Dental Assistant
EFDA	Expanded Function Dental Assistant
RDH	Registered Dental Hygienist
LDH	Licensed Dental Hygienist

Many human anatomical parts are named after people. One of the founders of the science of human anatomy, Bartolomeo Eustachi, gained the reputation of having created the science of human anatomy because of the number of anatomical structures he discovered and wrote about. One of such structures, named after him, is the eustachian tube. The Achilles tendon was named after the Greek mythological character, Achilles.

Homonyms

Homonyms are words that sound the same, but the spelling is different and so is the meaning. These words can cause confusion in understanding the spoken word. Care should be taken to check the spelling and meaning of such words to prevent making this mistake. Some of the more common homonyms are listed in Table I-15.

Word Usage Reflects on the Dentist

Patient records are legal documents and can be the dentist's best defense in court if an incident results in litigation. All office records must be completed in detail using acceptable terminology and proper grammar.

Following is an example of an assistant's documentation of a patient's reaction after anesthetic. See if you can identify where the assistant had problems with homonyms.

The patient had sweet poring down her forehead. When asked if she had ever experienced this before, she said she felt she had a blood sugar problem and ate a very rich, sweat desert before coming for her appointment. The dentist told her she should follow up with her physician and eat well balanced meals especially on daze of her appointment. Unprofessional patient records can be the offense's best evidence.

Have you ever heard that a person's grammar reflects a person's level of education? Mastering dental terminology mirrors the assistant's knowledge of dentistry and reflects on the dentist.

TABLE I-15 Homonyms

Homonyms	Definitions
auxiliary axillary	a person that helps near the armpit
bite byte	a mouthful 8 bits
die die dye	exact replication of a structure; used as pattern to make dental appliance cease to live to color or stain
elicit illicit	to draw unlawful
esthetics aesthesia	concept of beauty; also spelled aesthetics ability to feel
facial fascial	relating to the face a band of tissue supporting internal parts of the body
heal heel	to cure of disease hind part of foot
know no	to be fully aware of meaning and implications denial or refusal
oral aural aural	pertaining to the mouth pertaining to the ear pertaining to an aura; sensation preceding a migraine or epileptic attack <i>two different meanings for same spelling</i>
pain pane	it hurts a single panel of glass
palpation palpitation	examine by touch abnormally rapid and violent beating of the heart
plural pleural	more than one related to lung
pore pore pour poor	minute opening to read or study carefully to cause flow of liquid to have little or no money
right right write rite	what is good, proper, and just side opposite location of the heart form letters with pen, pencil, etc formal act or ceremony
site cite sight	location to refer vision
suture suture	line of junction of two bones joining edges of open by stitches
week weak	a period of successive days not strong

Key Terms: Definitions and Pronunciation

Each chapter will end with a Key Terms feature. New terms introduced in the chapter appear in the first (far-left) column of the Key Terms table. Below each term is the phonetic spelling to help with the pronunciation. The middle column breaks the term into word parts along with the definition of each part. The last column lists the dictionary definition of the term. The terms in the Key

Terms chart appear in blue font within each chapter. Key Terms features and charts help you learn the meanings of the terms in each chapter before you start reading, so you can more easily build your dental and medical terminology.

It will be helpful to learn a few word parts at a time and recognize them when you see them in a term. It is much better to understand the meaning of the word parts and learn how to build words than to try to memorize, look up, or skip over every new word you encounter.

Review Questions

Multiple Choice

- What word part is the foundation and main meaning of the word?
 - prefix
 - root
 - suffix
 - combining vowel
- What word part is *sub* in the word *submandibular*?
 - prefix
 - root
 - suffix
 - combining vowel
- What word part is *ular* in the word *submandibular*?
 - prefix
 - root
 - suffix
 - combining vowel
- Which dental term means “below the lower jaw”?
 - alveolectomy
 - gingivitis
 - submandibular
 - supramaxilla
- Which dental term means “inflammation of the gums”?
 - alveolectomy
 - gingivitis
 - periodontitis
 - supramaxilla
- A _____ is the basic unit of speech generally having only one vowel sound.
 - pronunciation
 - phonetic
 - syllable
 - simple term
- What is the descriptive word for “sounds like” that is used to help the reader say the word correctly?
 - pronunciation
 - phonetic
 - syllable
 - simple term
- Which is the plural for prognosis?
 - prognosex
 - prognosises
 - prognoses
 - prognosisies
- Which is the plural for maxilla?
 - maxillas
 - maxillamata
 - maxillae
 - maxillaces
- For what is the following sentence an example?
The dental auxiliary was requested to take the patient’s axillary. The patient told the dentist about their heart palpitations during the palpation examination.
 - acronym
 - eponym
 - homonym
 - compound

Critical Thinking

- Why does the assistant need to know terminology when talking to the patient?
- How will lack of knowledge of dental terminology affect the assistant’s ability to communicate?
- Place a slash (/) between the word parts for the following terms. Which term has a combining vowel?

a. periodontal	c. alveolectomy
b. gingivitis	d. supramaxillary
- Why is it important to say a word correctly?
- Referring to the sentence below, what is the acronym and what is the eponym?
A patient was diagnosed with Vincent’s disease, which is also referred to as ANUG.