

DENTAL ASSISTING

A COMPREHENSIVE APPROACH

Fifth Edition



DONNA J. PHINNEY • JUDY H. HALSTEAD

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Library of Congress Control Number: 2016961828

Book Only ISBN: 978-1-305-96763-2

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In Memory

This fifth edition was completed and is dedicated to Donna's memory. Never did I ever think I would be writing this dedication. There really are not words or maybe there are just too many. I have been so blessed to have had Donna in my life as a coworker, team mate, coauthor, friend and "sister." Donna and I took a journey together that took us in many amazing directions. We shared a love of dental assisting, the dental profession and especially of teaching dental assisting students. The biggest and best opportunity and adventure was authoring this textbook for dental assistants together. Through this experience we kept our love for dental assisting education and yet entered a whole new world of publishing. We have worked together for many years on the original textbook and then on each new edition. I am so grateful to have had this opportunity to work with my best friend-sister. She was dedicated, positive, supportive, forward

thinking, and just plain fun. Now as I look back I can clearly see the wonderful journey Donna and I had. I miss her greatly and this textbook will be our bond forever. Many thanks to Darcy and all from Cengage Learning for their patience and assistance in completing this fifth edition, it has been difficult to say the least, but I know Donna would be proud of the results. Thank you.

Judy

I met and began working with Donna over 11 years ago when we began the revision of the third edition of the book. We developed a great relationship both professionally and personally. We would often exchange book suggestions, comparisons of the weather here in the east versus out west, and exchange stories about what was happening in our lives. I especially loved hearing about the wildlife that would end up in her yard—most particularly the moose. Trips out to Spokane for photo shoots were always a treat due to her hospitality. She enjoyed sharing the history and sites of a very lovely city. She tried many a time to get me out on a jet ski and I am sorry to say that never happened. To say it has been very difficult to complete the fifth edition of the book would be an understatement.

Donna touched the lives of so many people. She treated her students like family. When working with all of them at the school their respect and admiration of her was always quite apparent. She cared and went above and beyond in providing the support and assistance they needed. She had a quiet, soft-spoken manner and a smile that brightened a room. She will be missed as an author, an educator, a mother, and a wife. Donna, thank you for enriching my life and for sharing your knowledge, skills, and compassion with so many of us.

Darcy and all of us at Cengage Learning

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NEW TO THIS EDITION

Chapter 1

- Added discussion of:
 - Dr. Samuel D. Harris
 - Expanded Function Dental Assistant
 - Sterilization Assistant

Chapter 2

- Added discussion of:
 - Dental phobias and patient concerns
 - Generation “Z”
 - Stress in the dental office
 - Conflict resolution

Chapter 3

- Added discussion of emotional abuse, domestic violence, and elder abuse
- Some additional minor updates and points of clarification

Chapter 4

- Added discussion of:
 - Updates related to the latest advances in mechanical toothbrushes
 - Fluoride varnish, including the procedure for application
- Revised content on age characteristics into tabular form for ease of comprehension

Chapter 5

- Added discussion of:
 - Technology-related health and fitness devices, such as the FitBit, as well as a variety of fitness and weight loss apps.
 - Trend of consumption of energy drinks and shots
 - Add more on diet and culture and how it relates to oral health

Chapter 10

- Added discussion of:
 - MRSA
 - Swine Influenza
 - Ebola
 - Pandemic

Chapter 11

- Added discussion of:
 - National Institute of Health

- National Institute of Occupational Safety and Health
- Recommendations for environmental infection control
- Greener infection control
- Surface disinfectants
- Sanitation and disinfection wipes
- Mechanical sterilization monitoring
- Updated CDC regulations/recommendations throughout
- Expanded content on dental unit waterlines
- Procedure for treatment of dental unit waterlines

Chapter 12

- Includes updates to the Hazardous Materials Standard including
 - Switch from MSDS to SDS
 - Hazard communication pictograms
 - Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Chapter 15

- Includes an added discussion of pharmacokinetics

Chapter 16

- Added the following procedures:
 - Treating the patient with asthma
 - Treating the hyperventilating patient
 - Treating patients experiencing a seizure
 - Treating a hypoglycemic patient
 - Treating the patient with angina

Chapter 17

- Minor updates throughout, particularly of updates to equipment

Chapter 18

- Added three procedures: identification of cutting, non-cutting, and rotary instruments.
- Added discussion on the ultrasonic and laser handpiece.

Chapter 19

- Content on the dental dam, formerly covered in Chapter 34, has been moved to this chapter.

Chapter 21

- Updates throughout the chapter

Chapter 22

- Added procedure for the assembly of film positioning devices
- Added discussion of care for visually and hearing impaired patients
- Added discussion on the communication of radiation risks

Chapter 23

- Updated to include more content and discussion related to digital radiography

Chapter 24

- Added more information on the endodontic microscope

Chapter 25

- Added discussion of surgical rotary instruments
- Content on dental implants has been moved to its own chapter (see Chapter 26).
- Added discussion of paresthesia as a complication of dental surgery

Chapter 26

- Content on dental implants has been moved to its own chapter; this was formerly covered in Chapter 25.

Chapter 27

- Formerly Chapter 26
- Added discussion of thrush, cellulitis, oral cancer, and leukemia

Chapter 28

- Formerly Chapter 27
- Added discussion of short-term orthodontic treatment for cosmetic reasons

Chapter 29

- Formerly Chapter 28
- Added discussion of patients with special needs
- Added discussion of diet and its relationship to pediatric dentition
- Content on dental sealants has been moved to its own chapter (see Chapter 30)

Chapter 30

- Content on dental sealants has been moved to its own chapter; this was formerly covered in Chapter 28.
- Content has been expanded to cover more detail in types of materials and techniques.

Chapter 31

- Formerly Chapter 29
- Expanded discussion of the use of lasers
- Added discussion of additional types of graft surgeries
- Added discussion of periodontal plastic surgery
- Content on coronal polish has been moved to its own chapter (see Chapter 32).

Chapter 32

- Content on coronal polish, formerly covered in Chapter 29, has been moved to its own chapter, this was formerly covered in Chapter 29.

Chapter 33

- Formerly Chapter 30
- Added information on digital shade guides
- Added discussion of the steps for fixed prosthesis procedures

Chapter 34

- New chapter covering CAD/CAM systems
- Expanded on information and added a procedure

Chapter 35

- Formerly Chapter 31
- Added content on in office whitening with the laser
- More information on patient preparation and maintenance.

Chapter 36

- Formerly Chapter 32
- Added discussion of home care instructions

Chapter 37

- Formerly Chapter 33
- Added discussion of fluoride varnish
- Added procedure for placement of desensitizing agents
- More content on the types of glass ionomer cements

Chapter 38

- Formerly Chapter 34
- Dental dam content moved to its own chapter (see Chapter 19)

Chapter 39

- Formerly Chapter 35
- Updates to materials where appropriate
- Content on CAD/CAM moved to Chapter 34

Chapter 40

- Formerly Chapter 36
- Added discussion of online marketing, websites, and social media, as well as paperless practices
- Eliminated content on paging systems
- Minimized content on pegboard systems and expanded content on computerized billing systems

Chapter 41

- Formerly Chapter 37
- Added discussion of state requirements

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 much faster than the average for all occupations through the year 2024. Population growth 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 dental assistants, 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 become the multi-faceted dental assistant required in the twenty-first century.

This text and complete learning system, *Dental Assisting: A Comprehensive Approach*, fifth 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 the dental assisting student 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 many ways in which today's students learn.

To receive the full value of *Dental Assisting: A Comprehensive Approach*, fifth edition, it's important to understand the structure of the text, chapters, and 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.

The Learning System

The components of the learning system were developed with today's learner in mind. The authors and Cengage Learning 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—*Introduction*—introduces learners to the profession and its history as well as communication and legal issues. Section II—*Prevention and Nutrition*—covers general techniques to maintain health and wellness of the oral cavity and the dentition. Section III—*Basic Dental Sciences*—covers the basics of general anatomy, head and neck anatomy, embryology, histology, tooth morphology, charting, and microbiology, creating a foundation on which learners can move forward in skills training. Section IV—*Preclinical Dental Skills*—prepares students in the areas of infection control, hazardous materials management, patient care, pharmacology, and emergency management, which are critical elements to the profession. Section V—*Clinical Dental Procedures*—the introduction to the dental office and equipment, covers chairside assisting, instruments, and the management of pain and anxiety. Section VI—*Dental Radiography*—provides updated information on radiographic techniques and procedures, including the latest on digital and 3-D radiography. Section VII—*Dental Specialties*—introduces learners to the specialized areas of endodontics, oral maxillofacial surgery, dental implants, oral pathology, cosmetic dentistry, orthodontics, pediatric dentistry, periodontics, fixed prosthodontics, computerized impression and restorative systems, and removable prosthodontics. This section also includes information on advanced functions, such as coronal polish, dental sealants, and tooth whitening and retraction cord placement. Section VIII—*Restorative and Laboratory Materials and Techniques*—covers chairside restorative materials and techniques, and laboratory and impression materials and techniques. 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.



HANDWASHING



GLOVES

MASK AND PROTECTIVE
EYEWEAR

BASIC SETUP



EXPANDED FUNCTIONS



LEGAL



SAFETY



TECHNOLOGY

GLOBAL/CULTURAL
ISSUES

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- Pronunciation of difficult terms the first time they appear in the text
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- Step-by-step procedures with icons indicating handwashing, gloves, mask and protective eyewear, basic setup, and expanded functions
- In-text icons identifying legal, safety, technology, and global/cultural issues, as well as DANB exam components
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- Additional handouts on Key Terms Review and additional activities such as crossword puzzles, word searches, matching, and labeling exercises
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- **Student Workbook (Order #978-1-3059-6764-9)**

The workbook, which corresponds to the text, contains chapter objectives, summaries, exercises in a variety of formats, and skill sheets to test competencies. The workbook contains a section with activities that allow you to practice with the Dentrax software.

- **Other Supporting Materials Include:**

- Dental Terminology, 3rd Edition (Charline Dofka) (Order #978-1-13301-9718)
- Dental Assisting Coloring Book (Donna Phinney and Judy Halstead) (Order #978-1-4390-5931-9)
- Dental Assisting Instrument Guide (Donna Phinney and Judy Halstead) (Order #978-1-1336-9159-4)
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- Dental Assisting Video Series (Order #978-1-4180-2963-0)

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

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Acknowledgments

The authors would like to thank Cengage Learning and its staff, whose assistance and encouragement in this pursuit are greatly appreciated.

We would also like to thank the many dentists with whom we have had the opportunity to work and who made dental assisting a career to be proud of.

We would like to thank our peers across the nation, especially the Allied Health Department and staff and friends at Spokane Community College, who encouraged us throughout this endeavor. The students, who in the end make everything worthwhile, are to be thanked for their desire to learn and the ongoing challenge they present to their instructors.

We would like to thank our daughters, Heidi and Traci, who continue to love and support us and who took part in this revision.

Last, but not least, we would like to thank our husbands, Dwayne and Chuck, and our families, who supported and encouraged us throughout this project. Their understanding, patience, and love allowed us to stay on track and to complete the task at hand. Thank you!

We also want to thank the following individuals and facilities for providing valuable assistance in the development and production of this project:

- Pat Norman, CDA, who continues to give so much; we appreciate all her help in revising the chapters on radiography and orthodontics.
- Helen Fairchild, RDA, for revising chapters on Management of Hazardous Materials and Laboratory Materials and Techniques.
- Cynthia Lamkin, RDA, RDH, for revising the chapter on Dental Office Management.
- Julie Davitt, CDA, who supported and encouraged us throughout this project.
- Peg Jacobs Bloy, CDA, RDH, MS, and Middlesex Community College, for their coordination and assistance while allowing us to photograph in their facility.

- Rita Johnson, CDA, COA, RDH, MA, and Dr. Vincent DeAngelis, who provided assistance and many pictures for the text.
- Dr. Clifton Caldwell, who continues to help us with our endeavors both in student education and in publishing.
- Dr. Dale Ruemping, Dr. Steven Crump, Dr. Ola England, Dr. George Velis, Dr. Gary Shellerud, Dr. Dwight Damon, Dr. Earl Ness, Drs. Rodney Braun and Chris Chaffin, and Dr. Steven Gregg, who continue to help us with student education, and provided pictures for the text.
- The reviewers who spent their time and energy to make this a better text.
- Anderson's Dental Laboratory, for continuing to help us with student education, and providing pictures and models for the text.
- Dr. Joseph Konzelman, who provided many pictures for the text.
- Dr. Steven Bates, Dr. Greg Miller, and their staff for assisting us with numerous photos of their office.
- Nici Roberts, CDA, who assisted with photos and time.
- Kathy Thurber, Dental Assistant, who assisted with photos and time.
- Dr. Jay Enzler, pediatric dentist, who allowed us to take numerous photos of his entire pediatric office, including photos of his staff and patients during routine procedures.
- Dr. Duane Grummons, orthodontist, who allowed us to take photos of his office and provided us with additional photos of advanced technology for use in the textbook.
- Dr. Charles Rigalotto, general and cosmetic dentist, and his assistant Judy Miner, for assisting us with numerous photos of his office, equipment, and tray setups.
- Students in the Dental Assisting Class of 2011–2012. With special thanks to Stephanie Alcock, Ivan Chavdar, Rebekah Ehlers, Aimee Nimri, Heather Layson and Alysia Cross and her children. Johnson, Stephanie Mueller, Laura Potts, Kristine Smasel, Hong-Van tran, and Amorette Verduin for going the extra mile.
- Dr. Dale Ruemping, pediatric dentist; Dr. Kenji Higuchi, oral maxillofacial surgeon; and Dr. Steven Crump, general dentist, for providing pictures of various procedures and techniques.
- Troy Schmidt, sales representative for KaVo Technologies/Gendex Imaging.

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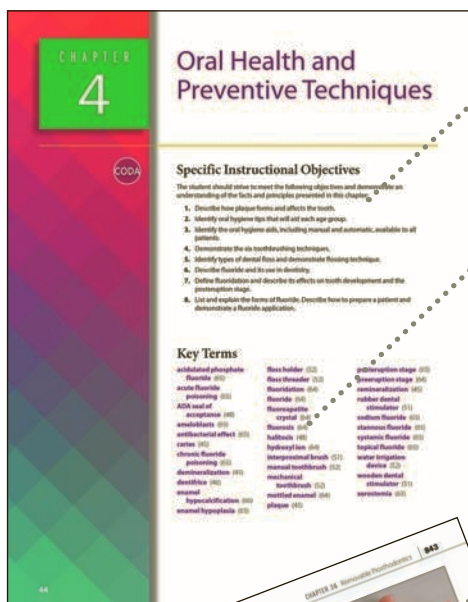
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HOW TO USE THIS TEXT

Dental assisting is an ever-evolving profession full of opportunity and challenge. *Dental Assisting: A Comprehensive Approach*, fifth edition, is designed to help you acquire the knowledge, skills, and values necessary to become a successful dental assistant. The text is organized into nine main sections that reflect the broad areas of dental assisting responsibility. These sections are then divided into a total of 41 chapters of related information. The text has many unique features that will make it easier for you to learn and integrate theory and practice, including:



Objectives

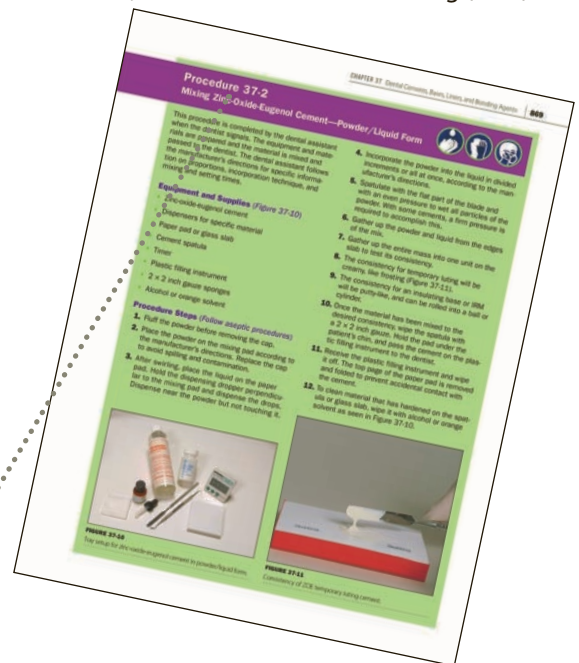
Learning objectives identify the key information to be gained from the chapter. Use these objectives with the review questions to test your understanding of the chapter's content.

Key Terms

All key terms are listed at the beginning of each chapter. Read the text to understand how the term is used in context; turn to the glossary for the term definition. In the text, the term is always blue boldface at its first occurrence, for easy identification.

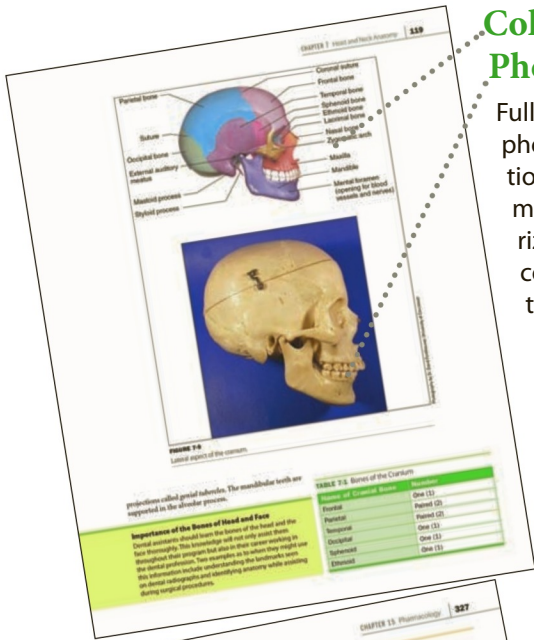
Icons

Graphic icons pinpoint information that relates to legal, safety, technology, global, or cultural issues, and certified dental assisting (CDA) competencies.



Procedures

Step-by-step procedures give detailed information on dental assisting competencies. Icons at the beginning of procedures indicate which function, instruments, and protective equipment are required for the procedure.

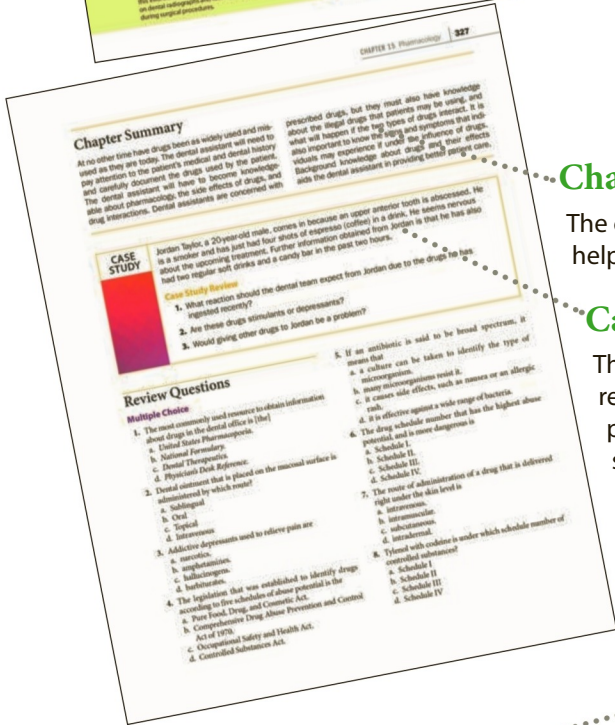


Color Illustrations, Photos, and Tables

Full-color illustrations and photos with detailed captions reinforce chapter material. Tables summarize important facts or concepts presented in the text.

TABLE 9-2 Water-Soluble Vitamins

Water-Soluble Vitamin	Food Sources	Functions	Deficiency/Toxicity
Vitamin C (ascorbic acid)	Fruits All citrus Berries Broccoli Brussels sprouts Potatoes	Prevention of scurvy Promotion of collagen Healing of wounds Reduction of stress hormones Absorption of iron	Scurvy Muscle aches Ligament pain Toxicity: None
Thiamin (Vitamin B₁)	Animal Liver Eggs Fish Pork Beer Plants White and enriched grains Legumes	Coenzyme in oxidation of glucose Prevention of beriberi	Toxicity: None
Riboflavin (Vitamin B₂)	Animal Milk Poultry Green vegetables Cereals Enriched cereal	Aids release of energy from food Aids in growth	Toxicity: None
Niacin (Vitamin B₃)	Animal Pork Milk Eggs Plants Whole-grain cereals Legumes	Synthesis of nicotinamide amino acids Conversion of tryptophan to niacin Antibody production	Deficiency: Angular cheilosis Glossitis Pharyngitis Toxicity: None
Vitamin B₆	Animal Pork Milk Eggs Plants Whole-grain cereals Legumes	Synthesis of red blood cells Maintenance of myelin sheath (nerves)	Deficiency: Dermatitis Glossitis Peripheral neuropathy Toxicity: None
Folate (folic acid)	Animal Milk Eggs Fish Poultry	Prevents hydroxylation for synthesis of ATP Prevents neurotrophic problems Prevents nervous system problems	Deficiency: Megaloblastic anemia Toxicity: None
Biotin	Animal Milk Liver Plants Legumes Mushrooms	Coenzyme in carbohydrate and amino acid metabolism Neurotransmitter synthesis Energy metabolism	Deficiency: Dermatitis None Toxicity: None



Chapter Summary

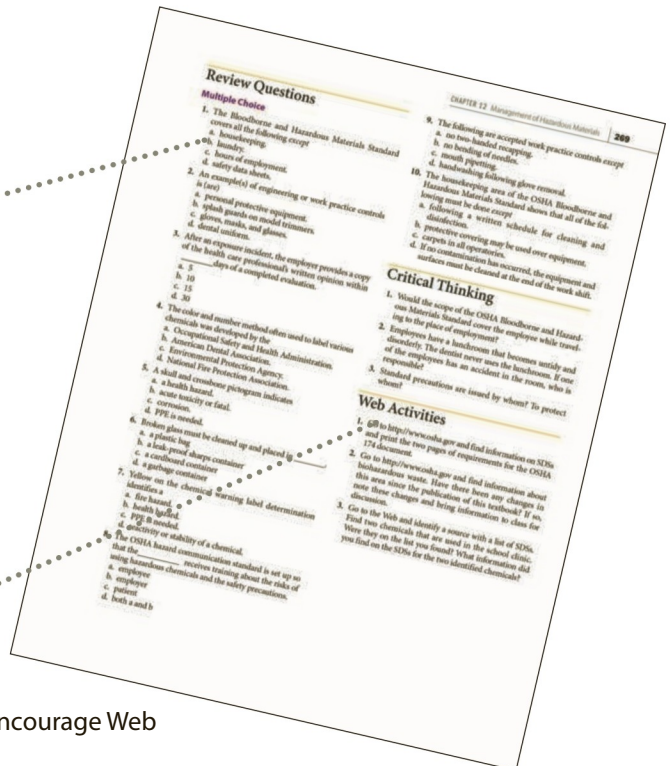
The chapter summary emphasizes key concepts from the chapter to help you focus on your study.

Case Studies

The case studies and review questions present real-life scenarios requiring a problem/solution approach. Use the case studies to put your knowledge into practice and to arrive at a deeper understanding of the dental assisting profession.

Review Questions

Test your comprehension of the chapter with structured multiple-choice questions and open-ended critical thinking questions that require you to combine an understanding of chapter material with your personal insight and judgment.



Web Activities

Internet exercises in each chapter encourage Web searches to locate information.

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Section I

Introduction

- 
- Introduction to the Dental Profession | 1**
 - Psychology, Communication, and Multicultural Interaction | 2**
 - Ethics, Jurisprudence, and the Health Information
Portability and Accountability Act | 3**

Introduction to the Dental Profession

Specific Instructional Objectives

The student should strive to meet the following objectives and demonstrate an understanding of the facts and principles presented in this chapter:

1. Review dental disease and dentistry from the “beginning of time.”
2. Identify the items on the timeline of dental history.
3. Name the individuals who had a great impact on the profession of dentistry.
4. Identify the people who promoted education and organized dentistry.
5. Explain what DDS and DMD stand for.
6. Identify the nine specialties of dentistry.
7. Describe, generally, the career skills performed by dental assistants, dental hygienists, and dental laboratory technicians.
8. List the education required for, and the professional organizations that represent, each dental career path.

Key Terms

American Dental Assistants Association (ADAA) (10)

American Dental Association (ADA) (7)

American Dental Hygienists’ Association (ADHA) (12)

American Dental Laboratory Technician Association (ADLTA) (12)

certified dental assistant (CDA) (10)

Chapin A. Harris (6)

Dental Assisting National Board, Inc. (DANB) (10)

Dental public health (9)

Dr. C. Edmund Kells (10)

Dr. Greene Vardiman Black (7)

Dr. Samuel D. Harris (6)

Expanded Function Dental Assistant (10)

forensic dentistry (9)

Guy de Chauliac (4)

Hippocrates (4)

Horace H. Hayden (6)

James B. Morrison (6)

John Greenwood (5)

Josiah Flagg (5)

Juliette Southard (10)

Lucy Beaman Hobbs Taylor (7)

Oral and maxillofacial pathology (9)

Oral and maxillofacial radiology (9)

Oral and maxillofacial surgery (9)

Orthodontics and dentofacial orthopedics (9)

Paul Revere (5)

Pediatric dentistry (9)

Periodontics (9)

Pierre Fauchard (4)

Prosthodontics (9)

Robert Woofendale (5)

sterilization assistant (10)

Wilhelm Conrad Roentgen (5)

Introduction

Humans have been plagued with dental problems from the very beginning of time. Over the years, a number of different dental treatments were tried and perfected. Tools of various types were developed and used to repair and clean teeth.

It is important to be familiar with the historic struggles that took place and contributions that were made to advance the dentistry profession into what it is today (Table 1-1).

History of Dentistry

Beginning in ancient times, dental work was done by physicians. Often, each physician specialized in only one area of care for one part of the body. In fact, during the fifth century BC, a Greek historian named Herodotus wrote that medicine had become so fragmented that each physician was a specialist in a particular disease. “All the country is full of physicians, some of the eyes, some of the teeth, some of what pertains to the belly, and some of the hidden diseases.” One Egyptian doctor of teeth named Hesi-Re, the first dentist whose name was recorded, practiced in 3000 BC.

TABLE 1-1 Timeline of Dental History

Era	Events
Beginning of time	Tooth decay is noted.
3000 BC	First dentist, Hesi-Re, is recorded.
460–322 BC	Written information about tooth decay is recorded by Aristotle and Hippocrates.
460–377 BC	Oath of Hippocrates (Hippocrates).
384–322 BC	Attention to oral hygiene (Diocles of Carystus).
1300–1368	Hygienic rules (Guy de Chauliac).
1452–1519	Tooth morphology identified (Leonardo da Vinci).
1678–1761	Founder of modern dentistry (Pierre Fauchard).
1760–1819	Josiah Flagg develops the dental chair.
1768–1770	Paul Revere places advertisements in a Boston newspaper offering his services as a dentist.
1790	James B. Morrison constructs the first known dental foot engine, which he adapted from his mother’s spinning-wheel foot treadle.
1832	James Snell invents the first reclining dental chair.
1840	Horace Hayden and Chapin Harris establish the Baltimore College of Dental Surgery.
1840	American Society of Dental Surgeons established.
1841	Alabama enacts the first dental practice act to regulate dentistry.
1844	Horace Wells, a Connecticut dentist, discovers that nitrous oxide can be used for dental pain relief.
1859	American Dental Association (ADA) created.
1866	Lucy Beaman Hobbs Taylor, the first woman to earn a dental degree, graduates from Ohio College of Dental Surgery.
1869	Dr. Robert Tanner Freeman, the first African-American to earn a dental degree, graduates from Harvard University Dental School.
1871	First commercially manufactured foot-treadle dental engine is patented by James B. Morrison.
1885	First “lady in attendance” employed by Dr. C. Edmund Kells.
1890	Dr. Ida Gray, the first African-American woman to earn a dental degree, graduates from University of Michigan School of Dentistry.
1895	X-rays discovered (Wilhelm Conrad Roentgen).
1907	“Lost wax” casting machine is invented by William Taggart.
1913	Fones School of Dental Hygiene established.
1923	American Dental Hygienists’ Association (ADHA) created.
1924	American Dental Assistants Association (ADAA) established; first president was Juliette Southard.
1930	First dental specialty board is founded, the American Board of Orthodontics.
1938	First synthetic bristle (nylon) toothbrush appears on the market.

(continues)

TABLE 1-1 Timeline of Dental History (continued)

Era	Events
1945	Water fluoridation era begins in the cities of Newburgh, New York and Grand Rapids, Michigan.
1947	Dental Assisting National Board, Inc. (DANB) is established.
1950	First fluoride toothpastes are marketed.
1960	Four-handed, sit-down dentistry is utilized.
1970	The Occupational Safety and Health Administration is created by the U.S. Congress.
1982	Hepatitis B vaccine becomes available.
1989	Tooth-whitening commercial products are marketed.
1992	Occupational Safety and Health Administration's Bloodborne Pathogens Standard becomes effective.
1997	The laser, approved by the Food and Drug Administration, is used to treat tooth decay.

Dentistry during these early times primarily consisted of removing teeth when pain occurred. Some evidence has been found on human skulls that holes were drilled near the roots to allow infection to drain so that pressure in an abscessed tooth could be relieved. Other dental problems that date from ancient times derived from food preparation techniques. Grains were ground in stone bowls with stone pestles. During this process, particles of stone mixed with the grain. This grit in the food caused severe wear of the biting (occlusal) surfaces of the teeth and possible pulp exposure.

Hippocrates (460–377 BC), the father of medicine, attempted to explain health and disease. He suggested that four main fluids in the body, namely blood, black bile, yellow bile, and phlegm, along with heat, cold, dry air, and wet air, must remain in balance. Disruption of these four fluids and four elements would result in disease. Among Hippocrates' numerous writings is a book titled *On Affections*. In this book he wrote, "Teeth are eroded and become decayed partly by the mucus, and partly by food, when they are by nature weak and badly fixed in the mouth." Even though much of what Hippocrates thought about health and teeth was inaccurate, his writings provided much-needed information for the progress of medicine. Even today, the Oath of Hippocrates is used as a basis for the code of ethics used by the medical and dental professions in regard to the solemn obligation these professionals undertake when caring for patients.

During Aristotle's time (384–322 BC), some attention was given to oral hygiene and this was reflected in his writings. An Athenian physician, Diocles of Carystus, stated that oral hygiene should get proper attention, and he even gave instructions to this end. During the next couple of centuries, more importance was placed on good oral hygiene. A number of cleaning powders were made from crushed bones, oysters, and egg shells. At times, these substances were mixed with honey to make a paste to clean with. Guests in the homes of the wealthy who were invited to dinner were given silver- and even gold-decorated toothpicks with which to clean their teeth after the meal. At the time, picking one's teeth was considered proper etiquette.

Later Progress of Dentistry

In France, a surgeon named **Guy de Chauliac** (1300–1368) became one of the fourteenth century's most influential authors on surgery. He also wrote the "Hygienic Rules for Oral Hygiene."

Hygienic Rules for Oral Hygiene,

Written by Guy de Chauliac

1. Avoid food that putrefies readily.
2. Avoid food or drink that is too hot or too cold, and especially avoid swallowing extremely cold food after extremely hot food, and vice versa.
3. Do not bite into things that are too hard.
4. Avoid foods that stick to the teeth, such as figs and confections made with honey.
5. Avoid certain foods known to be bad for the teeth (his example was leeks).
6. Clean the teeth gently with a mixture of honey and burnt salt to which some vinegar has been added.

It is now known that the information given by de Chauliac was not entirely accurate. However, because it was based on sound logic, much of it is used today. For example, it is well known that sticky, sweet foods increase dental decay. In his writings, de Chauliac noted that surgery on the teeth should be performed under the supervision of doctors but could be done by "barbers or dentatores." This notation was the first to refer to "dentatores," the specific group of practitioners caring for the oral cavity and the teeth.

During the fifteenth and sixteenth centuries, artists became more interested in human anatomy to enhance the accuracy of their artwork. Leonardo da Vinci (1452–1519) painstakingly dissected the human skull and then drew his discoveries. He was the first to make a distinction between premolars and molars. His writings further define the morphology of teeth.

Pierre Fauchard (1678–1761), a French dentist, organized all known information about dentistry in a manuscript titled

“Le Chirurgien Dentiste,” relating to a title he used to refer to himself as a surgical dentist. It was clearly written and had step-by-step pictures that depicted easy-to-follow procedures. In those times, dentistry was about removing teeth and he was one of the few who restored teeth. He rejected the idea that a tooth worm caused decay and noted that “caries” (his term for decay) were a result of a “hormonal imbalance.” Fauchard wrote of his perceived causes of decay and prevention techniques and was an early advocate of treating diseased gingival tissue. He combined early information and operative methods for replacing or transplanting teeth. He even noticed that he could straighten teeth by using gold braces that were fastened by waxed linen or silk threads and allowed the teeth to follow a pattern of wires. He went to jewelers, barbers, and watchmakers to gather ideas for instruments that could be used on teeth. Pierre Fauchard developed a manual drill for use in dentistry that was powered by a catgut twisted around a cylinder. Fauchard perfected a number of dental treatments and instruments that are still used today, almost three centuries later. Many refer to Pierre Fauchard as the “Founder of Modern Dentistry.”

Wilhelm Conrad Roentgen (1845–1923), a German physicist, discovered X-rays in 1895. This discovery allowed dentists to further their knowledge of the diseases and structures of the mouth.

Progress of Dentistry in the United States

One of the first dentists to arrive in the United States from England was **Robert Woofendale**. Woofendale placed an advertisement in the *New York Mercury* on November 17, 1766, stating that he “performs all operations upon the teeth, sockets, gums, and palate, likewise fixes artificial teeth, so as to escape discernment.” Soon after Woofendale arrived, John Baker came and started advertising in the Boston area. He spoke and wrote about fillings and artificial teeth. Baker was well known and was one of the dentists who treated George Washington. **John Greenwood** (1760–1819) was said to be the first president’s favorite dentist (Figure 1-1). Greenwood had very little formal education but was a proficient practitioner in the eighteenth century. He thought children should care for their teeth and offered parents reduced rates for children’s dental care. He also thought that tartar came from bad breath and was adamant about the regular removal of it for good oral health.

At one time or another, George Washington was probably treated by every notable dentist of the time. A number of references in his diary note continual pain and discomfort from his teeth. At the time the picture that is currently on the one-dollar bill was painted, the president had only one tooth left, a lower left bicuspid (premolar). In fact, the artist had to pad out the cheeks and lips with cotton to give the president’s sunken face a more normal appearance. Washington’s last set of dentures, made by Greenwood, were comprised of ivory and gold and had two springs holding them together (Figure 1-2). A number of dentures were made for the president; however, contrary to popular belief, they were not made of wood.

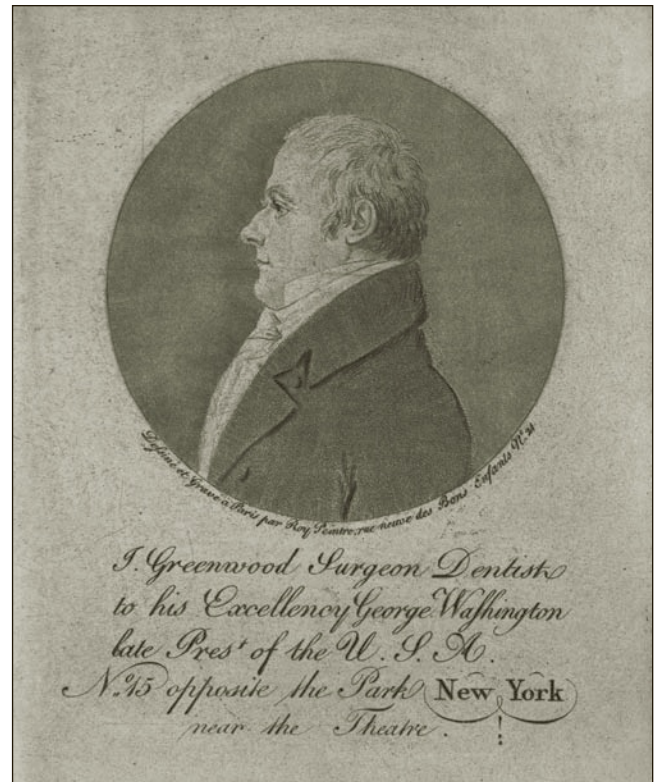


FIGURE 1-1

John Greenwood

Courtesy of the Library of Congress

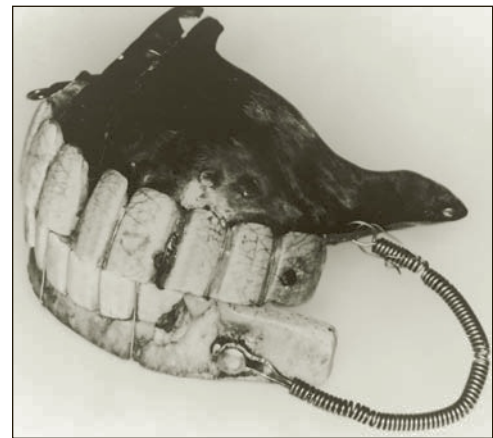


FIGURE 1-2

The last dental prosthesis worn by George Washington was made for him by John Greenwood. It is made of gold and ivory and is held together with springs.

Courtesy of the National Museum of Dentistry, Baltimore, Md

Paul Revere (1735–1818), a silversmith (Figure 1-3), was a dentist for several years, but his greatest contribution to dentistry was in his making surgical instruments and artificial teeth. He may have had a part in training a notable dentist of the late 1700s, **Josiah Flagg**. Flagg’s father was a partner to Revere. Flagg, a skilled surgeon, was accomplished in corrective procedures on cleft lips, orthodontics, endodontics, and operative dentistry. However, one of his major contributions to dentistry



Courtesy of the Paul Revere Memorial Association, Gift of Miss Marion Cole. Photo: John Miller

FIGURE 1-3

Paul Revere, shown as a silversmith.

was the construction of a dental chair. It had an extension on the arm to hold dental instruments and an adjustable head rest.

In the early 1800s, U.S. dentistry took a giant leap forward. The establishment of a popular democracy—with the opportunity for personal financial gain, free public school education, and population growth—prompted some of the most notable dentists in the world to relocate to America. The literature and knowledge base expanded a great deal during this time. Most large cities now had resident dentists rather than traveling barbers who extracted teeth and sold tooth powders. The dentists of the time were better educated and involved in the communities they served. The profession was progressing far beyond massive tooth removals and occasional cleanings. Additionally, as dental techniques improved and developed, so did dental materials. The first dental engine with a functioning handpiece, motor, and foot treadle was manufactured and patented by **James B. Morrison** in 1871. This apparatus allowed dentists to restore teeth much more quickly. Organized dentistry was rapidly approaching.

Education and Organized Dentistry

Horace H. Hayden (1769–1844) (Figure 1-4) sought dental care from John Greenwood, the dentist who cared for George Washington. Hayden was inspired and encouraged to take up dentistry as a vocation. He became very active in the dentistry profession, writing for journals and lecturing on medical and dental topics.

One of the students who studied with Hayden was **Chapin A. Harris** (1806–1860) (Figure 1-5). Harris believed in education and built an extensive library of dental literature, including his own work, *The Dental Art: A Practical Treatise on Dental Surgery*. Due to the efforts of Hayden and Harris, the first dental college in the world, the Baltimore College of Dental Surgery, was founded on March 6, 1840. It is now called the School of Dentistry at the University of Maryland, and is the home of the Dr. Samuel Harris National Museum of Dentistry.

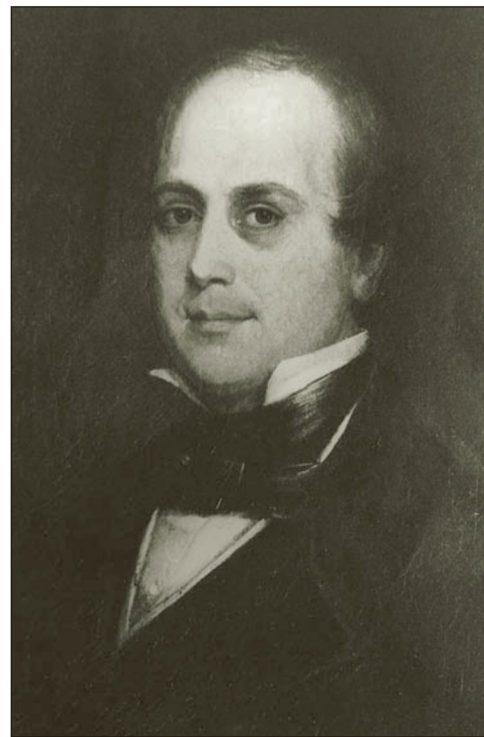
Dr. Samuel D. Harris, whom the museum was named after, was instrumental in founding the museum. It is the largest and most complete museum of dental artifacts and history (Figure 1-6). Visitors can learn about the heritage of dentistry



Courtesy of the National Museum of Dentistry, Baltimore, Md

FIGURE 1-4

Horace Hayden, one of the founders of professional dentistry in the United States, helped establish the world's first dental college.



Courtesy of the National Museum of Dentistry, Baltimore, Md

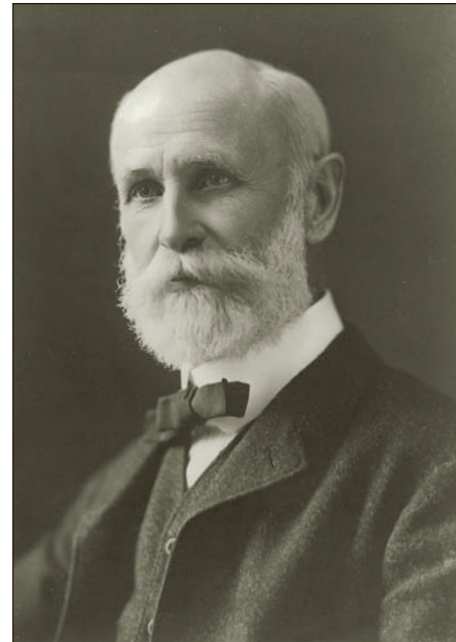
FIGURE 1-5

Chapin Harris, one of the founders of professional dentistry in America, helped establish the first dental college in the world and the first national association representing dentistry.



Courtesy of the National Museum of Dentistry, Baltimore, Md

FIGURE 1-6
National Museum of Dentistry



Courtesy of the National Museum of Dentistry, Baltimore, Md

FIGURE 1-7
Dr. Greene Vardiman Black (1836–1915), known as the “grand old man of dentistry” or as one of the “founders of modern dentistry in the United States.”

and how to maintain their oral health. They can learn if President George Washington’s teeth were really made of wood, engage in interactive exhibits, and partake in educational programs.

Dr. Greene Vardiman Black (1836–1915), known as G.V. Black (Figure 1-7), taught in dental schools such as the University of Iowa and the Northwestern University Dental School in Chicago. As the dean, he increased the library holdings

and authored more than 500 articles and several books. He invented numerous machines for testing alloys and instruments to refine cavity preparations. Black later enlarged these instruments for demonstrations to students in the classroom. Many refer to him as the “grand old man of dentistry” or as one of the “founders of Modern Dentistry in the United States.” His son, Arthur D. Black, followed in his footsteps, becoming dean of the Northwestern University Dental School in Chicago. In 1921 he developed the *Index to Dental Periodical Literature in the English Language*. Not only did this allow researchers to access the literature, but also it provided access to general practicing dentists who wanted to improve their knowledge and skills.

Lucy Beaman Hobbs Taylor, the first woman to graduate from a recognized dental college, earned her dental degree in 1866 (Figure 1-8). She was a teacher who became interested in medicine and then pursued further education. She met with resistance, but after the Iowa State Dental Society amended its constitution and bylaws, she was admitted into the dental college.

Dr. Robert Tanner Freeman (Figure 1-9), the first African-American to earn a dental degree, graduated from Harvard University Dental School in 1869. Eleven years later in 1890, Ida Gray became the first African-American woman to earn a dental degree upon graduation from the University of Michigan, School of Dentistry. George Franklin Grant (Figure 1-10), an African American, graduated from the second class in dentistry in 1870 at Harvard University. He is credited as an authority on the cleft palate, but many golfers may consider his contribution to the game of golf as his most important achievement. He invented and owned the first patent on the golf tee. Prior to his invention, the method of teeing up a ball came from bending over and pinching enough sand to make a raised area for the ball. It was both a messy and an inaccurate way of launching a ball.

American Dental Association

At a time when dentistry education and literature were developing, it was thought that organizing dentists would promote sharing of information concerned with excellence in dentistry. Horace Hayden and Chapin Harris collaborated on endeavors such as forming the first nationwide association of dentists. The American Society of Dental Surgeons was formed in 1840, but was dissolved in 1856. Harris had long believed in the need for an informative dental periodical and was instrumental in its founding in 1839. This journal was called the *American Journal of Dental Science (AJDS)*. Later, in 1859, twenty-five delegates gathered in Niagara Falls, New York, and organized the **American Dental Association (ADA)** (Figure 1-11). The association was small at first, but after grouping all local associations according to states, and



Courtesy of the Kansas State Historical Society

FIGURE 1-8

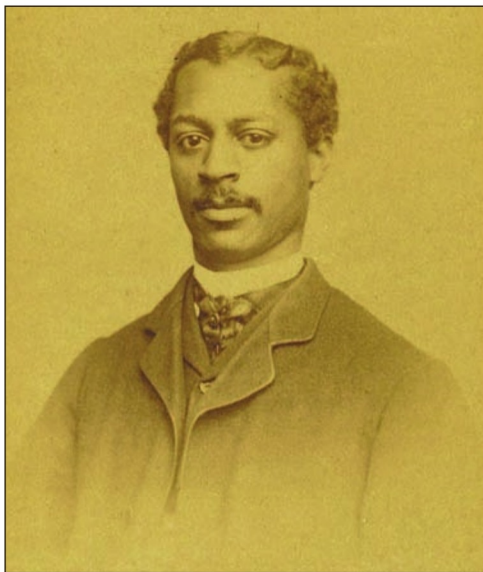
Lucy Beaman Hobbs Taylor



Courtesy of Harvard University Library

FIGURE 1-10

Dr. George Franklin Grant graduated from the second class of Harvard School of Dental Medicine.



Courtesy of Harvard University Library

FIGURE 1-9

The first African American to earn a DMD, Dr. Robert Tanner Freeman graduated from the Harvard School of Dental Medicine in 1869.



Courtesy of the American Dental Association

FIGURE 1-11

Logo for dentistry.

then giving all states representation in the national organization, membership began to increase. Today each state has its own organization with bylaws approved by the ADA, and each local (regional) organization has ADA-approved bylaws that are sent to each state organization. For example, Texas is represented to the ADA by the Texas State Dental Association, and the Texas State Dental Association comprises individual local dental associations. The official publication of the ADA is the *Journal of the American Dental Association (JADA)*. The ADA also has a Web site, <http://www.ada.org>, which provides a link to the ADA for dental professionals and dental consumers.

The Dental Team

Many people working together make up the dental health team: dentists, dental assistants, dental hygienists, dental lab technicians, and other members of the dental team (Figure 1-12). Each member of the team has specific skills, roles, and responsibilities. This team approach to dentistry improves efficiency and the overall patient experience. Dental team members often attend continued education together. All members of the dental team need to keep current on the knowledge and skills required for dentistry. Each member of the team must commit to being a lifelong learner within the ever-changing field of dentistry.



© Shutterstock/bikeriderlondon

FIGURE 1-12

Dental team.

Dentists

Once dentistry was established as a profession, the need for formal education became apparent. Only half the dentists practicing during the nineteenth century had formal educations. The requirements for state regulations began in Alabama in 1841, and by 1899 every state had enacted laws regulating the practice of dentistry. The requirements set forth for dentistry include an undergraduate education and graduation from a dental school approved by the ADA Commission on Dental Accreditation. Currently, 3 to 4 years of undergraduate work and 4 years of dental school (5 years at Harvard) are required to achieve a dental degree. Depending on program emphasis, a doctor of dental surgery (DDS) or a doctor of medical dentistry (DMD) degree is granted. Specialist training includes two or more additional years of postgraduate education in an approved, specialized training area. All dentists must take and pass both written and clinical examinations in the states in which they practice. All dental team members are responsible for following the regulations in their states. These regulations are defined in each state's dental practice act. The dental practice acts are defined to protect the public. Each state's act specifies what can be performed legally by the dental professionals in that state. Dentists supervise the dental team members in their offices.

Dental Specialists. A dentist who practices all phases of dentistry is called a general dentist. General dentists may encounter cases for which treatment is required that goes beyond the scope of their training. The general dentist would refer these cases to a dental specialist. The ADA recognizes the following nine specialties:

1. **Dental public health** is the specialty concerned with the prevention of dental disease (Chapter 4). The public health dentist works with the community to promote dental health. (www.aaphd.org)
2. **Endodontics** is concerned with the pathology and morphology of the dental pulp and surrounding tissues due to injury and disease (Chapter 24). Patients referred for root canals would see an endodontist. (www.aae.org)
3. **Oral and maxillofacial pathology** is the specialty concerned with the diagnosis and nature of the diseases affecting the oral cavity (Chapter 27). A patient who has a lesion unknown to the general dentist may be referred to the oral pathologist for further treatment and diagnosis. (www.aaomp.org)
4. **Oral and maxillofacial radiology** is the specialty of dentistry and the discipline of radiology concerned with the production and interpretation of images and data produced by all modalities of radiant energy that are used for the diagnosis and management of diseases, disorders, and conditions of the oral and maxillofacial region (Chapters 21 through 23). (www.aaomr.org)
5. **Oral and maxillofacial surgery** is concerned with the diagnosis and surgical treatment of the oral and maxillofacial region due to injury, disease, or defects (Chapter 25). A patient having third molars (wisdom teeth) removed may be referred to an oral and maxillofacial surgeon. (www.aaomos.org)
6. **Orthodontics and dentofacial orthopedics** is concerned with the diagnosis, supervision, guidance, and correction of malocclusion in the dentofacial structures (Chapter 28). Braces for straightening teeth are placed by the orthodontist. (www.aaortho.org)
7. **Pediatric dentistry** is concerned with the prevention of oral disease and the diagnosis and treatment of oral disease in children, from birth through adolescence (Chapters 29 and 30). Other patients requiring special care due to emotional, mental, or physical problems are referred to the pediatric dentist. (www.aapd.org)
8. **Periodontics** is the specialty concerned with the diagnosis and treatment of the diseases of the supporting and surrounding tissues of the tooth (Chapters 31 and 32). The periodontist is also concerned with the prevention of disease in this area. Patients who have plaque and calculus buildup and patients who have lost some of the bone around the tooth due to periodontal disease would be referred to the periodontist for further evaluation and treatment. (www.perio.org)
9. **Prosthodontics** is concerned with the diagnosis, restoration, and maintenance of oral functions (Chapters 33 and 36). This specialty is also concerned with the replacement of missing teeth through artificial means.

Another area that requires additional training but is not regarded as a specialty of dentistry is **forensic dentistry**. This is a relatively new area that deals with a wide range of services, such as the identification of bite marks on the body and/or the identification of an individual through tooth restorations and morphology using dental records.

The specialist works with the general dentist to provide the optimum oral health and patient care. During and once the specialty treatment is completed, the patient continues regular visits with the general dentist.