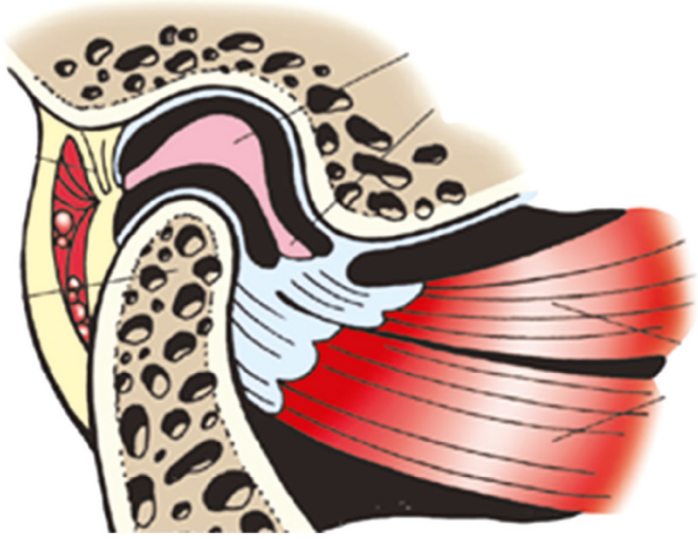
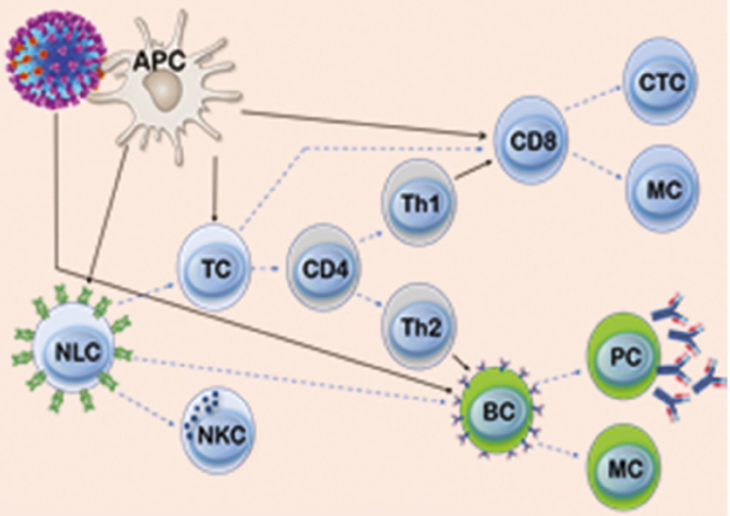
THIRTEENTH EDITION

EDITED BY
MICHAEL GLICK
MARTIN S. GREENBERG
PETER B. LOCKHART
STEPHEN J. CHALLACOMBE



BURKET'S ORAL MEDICINE



WILEY Blackwell

Burket's Oral Medicine

Thirteenth Edition

Edited by

Michael Glick, *DMD, FDS RCSEd*
Center for Integrative Global Oral Health
School of Dental Medicine
University of Pennsylvania
Philadelphia, PA, USA

Martin S. Greenberg, *DDS, FDS RCSEd*
School of Dental Medicine
University of Pennsylvania
Philadelphia, PA, USA

Peter B. Lockhart, *DDS, FDS RCSEd, FDS RCPS*
Atrium Health's Carolinas Medical Center
Charlotte, NC, USA

Stephen J. Challacombe, *PhD, DSc, FRCPath, FDS RCSEd, FDS RCS, FMedSci*
Faculty of Dentistry, Oral and Craniofacial Sciences
King's College London
London, UK

WILEY Blackwell

This thirteenth edition first published 2021

Edition History
PMPH-USA, Ltd (12e, 2015); BC Decker Inc (11e, 2008); BC Decker Inc (10e, 2003); Lippincott Williams and Wilkins (9e, 1994); Lippincott Williams and Wilkins (8e, 1984); J.D. Lippincott (7e, 1977); J.D. Lippincott (6e, 1971); J.D. Lippincott (5e, 1965); J.D. Lippincott (4e, 1961); J.D. Lippincott (3e, 1957); J.D. Lippincott (2e, 1952); J.D. Lippincott (1e, 1946)

Registered Office
John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, USA

Editorial Office
111 River Street, Hoboken, NJ 07030, USA

For details of our global editorial offices, customer services, and more information about Wiley products visit us at www.wiley.com.

Wiley also publishes its books in a variety of electronic formats and by print-on-demand. Some content that appears in standard print versions of this book may not be available in other formats.

Library of Congress Cataloging-in-Publication Data
Names: Glick, Michael, editor. | Greenberg, Martin S., 1940- editor. |
Lockhart, Peter B., editor. | Challacombe, Stephen J., editor.
Title: Burket's oral medicine / edited by Michael Glick, Martin S.
Greenberg, Peter B. Lockhart, Stephen J. Challacombe.
Other titles: Oral medicine
Description: Thirteenth edition. | Hoboken, NJ : Wiley-Blackwell, 2021. |
Includes bibliographical references and index.
Identifiers: LCCN 2021005021 (print) | LCCN 2021005022 (ebook) |
ISBN 9781119597742 (hardback) | ISBN 9781119597780 (adobe pdf) |
ISBN 9781119597810 (epub)
Subjects: MESH: Mouth Diseases–diagnosis | Mouth Diseases–therapy |
Diagnosis, Oral–methods | Dental Care for Chronically Ill
Classification: LCC RC815 (print) | LCC RC815 (ebook) | NLM WU 140 | DDC
617.5/22–dc23
LC record available at https://lccn.loc.gov/2021005021
LC ebook record available at https://lccn.loc.gov/2021005022

Cover Design: Wiley
Cover Images: © (Left-Top) Tempura/E+/Getty Images; (Left-Bottom) Courtesy of Michael Glick; (Right-Top) Courtesy of Michael Glick;
(Right-Bottom) Courtesy of Stephen J. Challacombe

Set in 9.5/12.5pt STIXTwoText by Straive, Pondicherry, India

10 9 8 7 6 5 4 3 2 1

Lester W. Burket DDS, MD
1907–1991

Dr. Lester W. Burket, widely considered the father of Oral Medicine, wrote the first edition of this groundbreaking text, Oral Medicine Diagnosis and Treatment, published in 1946.

Dr. Burket was trained in dentistry at the University of Pennsylvania and medicine at Yale. He was one of the first to stress the importance of the knowledge of medicine to the practice of dentistry, the role dentists could play in the diagnosis and management of diseases of the mouth and jaws, and the benefit to patients from close collaboration of dentists and physicians.

In addition to his devotion to teaching, he founded the Department of Oral Medicine at the School of Dental Medicine at the University of Pennsylvania, and served as Department Chair from 1944 to 1972, while also serving as Dean of the dental school from 1951 to 1972.

Dr. Burket would be pleased to see the scope of the present text as well as the international group of authors writing the thirteenth edition of his classic text.

"The good physician treats the disease; the great physician treats the patient who has the disease."

Sir William Osler

We have found Oral Medicine to be an extraordinarily rewarding career, and for this we are grateful to the pioneers of the field for their vision, creativity, and dedication to their work. They established oral medicine as a specialty at the interface of dentistry and medicine, and we owe them a huge debt. It is therefore to Lester Burket and the other leaders of the past in academics, clinical practice, and research who mentored and guided us that we dedicate this book. We also dedicate it to current and future practitioners of Oral Medicine around the world who share our professional fulfillment in this developing specialty, and especially to our families who have supported us throughout the years.

Michael Glick
Martin S. Greenberg
Peter B. Lockhart
Stephen J. Challacombe

Contents

Preface

It is with great pleasure that we share this thirteenth edition of the classic text *Burket's Oral Medicine* with students, residents, and professional colleagues around the world. This edition reflects the scope of modern oral medicine in both the content and the international nature of many new contributors.

Two experienced editors with international reputations for clinical and academic excellence, Dr. Peter Lockhart and Dr. Stephen Challacombe, have been added as Editors to this new edition, which has contributed to expanding the scope of the text and the diversity of the authors.

As the volume and availability of both basic and clinical biomedical information are growing at an ever-increasing pace, we realize that today's students, teachers, and practitioners of oral medicine must broaden the scope of their knowledge to increase their competence as clinicians, academics, and researchers. The chapters from the 12th edition describing oral mucosal and salivary gland disease, orofacial pain, TMD, and dental management of medically complex patients have been expanded and updated. In addition, the 13th edition contains chapters not found in traditional books in this discipline, including chapters on clinical research, pediatric oral medicine, psychiatry and psychology, geriatric oral medicine, laboratory medicine, and appraising and interpreting the biomedical literature.

With more than 80 authors from across the globe, we have broadened the scope and approach to ensure that this text is highly relevant to teaching and practice in many different countries and clinical settings.

Michael Glick, Martin S. Greenberg, Peter B. Lockhart, and Stephen J. Challacombe

List of Contributors

Alfredo Aguirre, DDS, MS
Professor
Department of Oral Diagnostic Sciences
School of Dental Medicine
University at Buffalo,
The State University of New York
Buffalo, NY, USA

Ivan Alajbeg, DMD, MSc, PHD
Professor
Department of Oral Medicine
School of Dental Medicine
University of Zagreb
University Hospital Center Zagreb
Zagreb, Croatia

Faizan Alawi, DDS
Professor of Pathology
School of Dental Medicine
Professor of Dermatology and Pathology and Laboratory Medicine
Perelman School of Medicine
University of Pennsylvania
Philadelphia, PA, USA

Robert Anolik, MD
President and Founding Partner, Allergy & Asthma Specialists, PC Director of Clinical Research, Allergy & Asthma Specialists, PC Clinical Associate Professor of Pediatrics, Drexel University School of Medicine
Adjunct Associate Professor, Department of Oral Medicine, University of Pennsylvania
Blue Bell, PA, USA

Rafael Benoliel, BDS (Hons)
Professor, Department of Diagnostic Sciences
Rutgers School of Dental Medicine
Rutgers, The State University of New Jersey
Newark, NJ, USA

Austin Booth, MLIS, MA
Dean of the Division of Libraries
New York University
New York, NY, USA

Leah M. Bowers, DMD
Oral and Maxillofacial Radiology
Department of Oral Medicine
School of Dentistry
University of Washington
Seattle, WA, USA

Michael T. Brennan, DDS, MHS, FDS RCSEd
Professor and Chair
Department of Oral Medicine
Atrium Health's Carolinas Medical Center
Charlotte, NC, USA

Alonso Carrasco-Labra, DDS, MSc, PhD
Senior Director
Department of Evidence Synthesis and Translation Research
ADA Science & Research Institute
Chicago, IL, USA

Stephen J. Challacombe, PhD, DSc, FRCPath, FDS RCSEd, FDS RCS, FMedSci
Martin Rushton Professor of Oral Medicine
Centre for Host Microbiome Interactions
Faculty of Dentistry, Oral and Craniofacial Sciences
King's College London
London, UK

John Christie, MD, PhD
Emeritus Professor
Department of Pathology and Laboratory Medicine
Brody School of Medicine
East Carolina University
Greenville, NC, USA

Katharine Ciarrocca, DMD, MSEd
Director, Oral Medicine & Hospital Dentistry
Clinical Associate Professor
Department of Surgery, Division of Plastic, Maxillofacial, and Oral Surgery
Duke University Hospital
Durham, NC, USA

Bobby Collins, DDS, MS
Clinical Associate Professor
Oral and Maxillofacial Pathology (retired)
Burlington, NC, USA

Heidi C. Crow, DMD, MS
Associate Professor
Department of Oral Diagnostic Sciences
School of Dental Medicine
University at Buffalo
The State University of New York
Buffalo, NY, USA

Mary A. Cutting, MS, RAC
Center for Clinical Research
Division of Extramural Research
National Institute of Dental and Craniofacial Research
Bethesda, MD, USA

Scott De Rossi, DMD, MBA
Professor
Division of Diagnostic Sciences
Dean, Adams School of Dentistry
University of North Carolina at Chapel Hill
Chapel Hill, NC, USA

Sandhya Desai, MD
Partner, Allergy & Asthma Specialists, PC
Blue Bell, PA, USA

Scott R. Diehl, BS, PhD
Professor
Department of Oral Biology
Rutgers School of Dental Medicine
Rutgers Biomedical and Health Sciences
Rutgers, The State University of New Jersey
Newark, NJ, USA

Massimiliano Di Giosia, DDS
Assistant Professor
Division of Diagnostic Sciences
Adams School of Dentistry
University of North Carolina at Chapel Hill
Chapel Hill, NC, USA

Christine Downey, DDS, MS
Clinical Associate Professor
Program Director, Advanced Education in General Dentistry
Division of Craniofacial and Surgical Care
University of North Carolina Adams School of Dentistry
Adjunct, Assistant Professor, Duke University School of Medicine
Durham, NC, USA

Michael J. Durkin, MD, MPH
Assistant Professor of Medicine
Division of Infectious Diseases
Washington University School of Medicine
St. Louis, MO, USA

Sharon Elad, DMD, MSc
Professor and Chair, Division of Oral Medicine
Principal Consultant, Hospital Dentistry
Eastman Institute for Oral Health
University of Rochester Medical Center
University of Rochester
Rochester, NY, USA

Eliav Eli, DMD, PhD
Professor and Director
Eastman Institute for Oral Health, University of Rochester
Vice Dean for Oral Health, School of Medicine and Dentistry
Vice President for Oral Health, University of Rochester Medical Center
University of Rochester
Rochester, NY, USA

Joel Epstein, DMD, MSD, FRCD(C), FDS RCS(E)
Professor and Director, Cancer Dentistry
Cedars-Sinai Health System
Samuel Oschin Comprehensive Cancer Institute
Los Angeles, CA;
Director, Dental Oncology Services
City of Hope Comprehensive Cancer Center
Duarte, CA, USA

Michael P. Escudier, MD, FRCS (Hon.), BDS, FDS RCS (Eng.), FDS (OM) RCS, FDS RCPS (Glas.), FFD RCSI, FFGDP (UK), FHEA
Professor of Oral Medicine & Education,
Deputy Executive Dean
Faculty of Dentistry, Oral & Craniofacial Sciences
King's College London
London, UK

Dena J. Fischer, DDS, MSD, MS
Center for Clinical Research
Division of Extramural Research
National Institute of Dental and Craniofacial Research
National Institutes of Health
Bethesda, MD, USA

Katherine France, DMD, MBE
Assistant Professor of Oral Medicine
Department of Oral Medicine
School of Dental Medicine
University of Pennsylvania
Philadelphia, PA, USA

Michael Glick, DMD, FDS RCSEd
Professor, Department of Oral Medicine
Executive Director, Center for Integrative Global Oral Health
School of Dental Medicine
University of Pennsylvania
Philadelphia, PA, USA

Martin S. Greenberg, DDS, FDS RCSEd
Professor Emeritus
Department of Oral Medicine
School of Dental Medicine
University of Pennsylvania
Philadelphia, PA, USA

Beth J. Guildford, DClinPsy, PGDip
Consultant Clinical Psychologist
Dental Psychology Service
Guys Dental Hospital, Tower Wing
Guy's & St Thomas' NHS Foundation Trust
London, UK

Christel M. Haberland, DDS, MS, FAAPD
Chair, Pediatric Dentistry Department
Medical University of South Carolina College of Dental Medicine
Charleston, SC;
Previously:
Johns Hopkins All Children's Hospital
St. Petersburg, FL, USA

Heidi J. Hansen, DMD
Oral Oncology and Oral Medicine
Providence Cancer Institute
Providence Health & Services
Portland, OR, USA

Thomas C. Hart, BA, DDS, PhD
Adjunct Professor
Department of Periodontology
College of Dentistry
The Ohio State University
Columbus, OH, USA

Palle Holmstrup, DrOdont, OdontDr (hc), PhD, DDS
Professor, Periodontology
Department of Odontology
Faculty of Health and Medical Sciences
University of Copenhagen
Denmark

Catherine Hong, BDS, MS, FDS RCSEd
Associate Professor
Discipline of Orthodontics and Paediatric Dentistry
National University of Singapore
Singapore

Scott Howell, DMD, MPH
Assistant Professor
Director of Public Health Dentistry & Teledentistry
A.T. Still University, Arizona School of Dentistry & Oral Health
Mesa, AZ, USA

Effie Ioannidou, DDS, MDSc
Professor
Director, Dental Clinical Research Center
Division of Periodontology
School of Dental Medicine
UCONN Health
Farmington, CT, USA

Siri Beier Jensen, DDS, PhD
Associate Professor Oral Medicine
Head of Department
Department of Dentistry and Oral Health
Faculty of Health
Aarhus University
Aarhus, Denmark

Mats Jontell, DDS, PhD, FDS RCSEd
Professor Emeritus
Department of Oral Medicine and Pathology
Institute of Odontology
Sahlgrenska Academy
University of Gothenburg
Göteborg, Sweden

A. Ross Kerr, DDS, MSD
Clinical Professor
Department of Oral & Maxillofacial Pathology, Radiology and Medicine
New York University College of Dentistry
New York, NY, USA

Junad Khan, BDS, MPH, MSD, PhD
Associate Professor, Program Director
Orofacial Pain and TMJ Disorders
Eastman Institute for Oral Health
University of Rochester
Rochester, NY, USA

Joanne Konkel, PhD
Principal Investigator
Lydia Becker Institute of Immunology and Inflammation, Faculty of Biology, Medicine and Health
Manchester Academic Health Science Centre
University of Manchester
Manchester, UK

Olga A. Korczeniewska, BA, PhD
Assistant Professor
Center for Orofacial Pain and Temporomandibular Disorders
Department of Diagnostic Sciences
Rutgers School of Dental Medicine
Rutgers Biomedical and Health Sciences
Rutgers, The State University of New Jersey
Newark, NJ, USA

Marie Laryea, BSc, MD
Associate Professor of Medicine
Associate Professor of Surgery
Hepatologist, Liver Transplant Program
University of Rochester Medical Center
Rochester, NY, USA

Lyvia Y. Leigh, MD
Associate, Allergy & Asthma Specialists, PC
Blue Bell, PA, USA

Mark Lepore, MD
Vice President, Head of Clinical Strategy and Development
Inhalation and Complex Injectable Products
Lupin Research, Inc.
Blue Bell, PA, USA

Pei Feng Lim, BDS, MS
Associate Professor
Division of Diagnostic Sciences
Adams School of Dentistry
University of North Carolina at Chapel Hill
Chapel Hill, NC, USA

Peter B. Lockhart, DDS, FDS RCSEd, FDS RCPS
Research Professor
Atrium Health's Carolinas Medical Center
Charlotte, NC, USA

Michael L. McGarvey, MD
Associate Professor of Neurology
Department of Neurology
Perelman School of Medicine
University of Pennsylvania
Philadelphia, PA, USA

Mark McLean, BMed, PhD, FRACP
Clinical Professor of Medicine – Endocrinology
Executive Director of Research
Westmead Hospital
Westmead, New South Wales, Australia

Niki M. Moutsopoulous, DDS, PhD
Senior Investigator
Chief, Oral Immunity and Inflammation Section
National Institute of Dental and Craniofacial Research
National Institutes of Health
Bethesda, MD, USA

Brian C. Muzyka, DMD, MS, MBA
Professor and Director of Hospital Dentistry
East Carolina School of Dental Medicine and Vidant Medical Center
Greenville, NC, USA

Raj Nair, MS, MRACDS (OralMed), PhD
Deputy Head of School
Griffith University
Menzies Health Institute Queensland
Oral Oncology Consultant
Department of Haematology and Oncology
Gold Coast University Hospital
Queensland Health
Queensland, Australia

Joel J. Napeñas, DDS, FDS RCSEd
Associate Professor of Oral Medicine
Director, Oral Medicine Residency Program
Chief, Site Based Medical Director
Department of Oral Medicine
Atrium Health's Carolinas Medical Center
Charlotte, NC, USA

J. Tim Newton, PhD
Professor of Psychology as Applied to Dentistry
Faculty of Dentistry, Oral & Craniofacial Sciences
Guys Dental Hospital, Tower Wing
Guy's & St Thomas' NHS Foundation Trust
London, UK

Nikolaos G. Nikitakis, MD, DDS, PhD, Dipl ABOMP
Vice Dean, Professor and Chair
Department of Oral Medicine and Pathology
School of Dentistry
National and Kapodistrian University of Athens
Athens, Greece

Richard Ohrbach, DDS, PhD, OdontDr (hc)
Professor
Department of Oral Diagnostic Sciences
School of Dental Medicine
University at Buffalo
Buffalo, NY, USA

Temitope Omolehinwa, BDS, DMD, DScD
Assistant Professor of Oral Medicine
Department of Oral Medicine
School of Dental Medicine
University of Pennsylvania
Philadelphia, PA, USA

Karo Parsegian, DMD, MDSc, PhD
Assistant Professor
Director, Undergraduate Periodontics
Department of Periodontics and Dental Hygiene
School of Dentistry
University of Texas Health Science Center
Houston, TX, USA

Ashish A. Patel, MD, DDS, FACS
Consultant and Director of Microvascular Surgery
The Head and Neck Institute
Head and Neck Surgical Associates
Attending Surgeon
Providence Cancer Institute
Providence Head and Neck Cancer Program
Medical Director
Cranio-Oral and Maxillofacial and Neck Trauma
Legacy Emanuel Medical Center
Portland, OR, USA

Lauren L. Patton, DDS, FDS RCSEd
University of North Carolina at Chapel Hill
Chapel Hill, NC, USA

Douglas E. Peterson, DMD, PhD, FDS RCSEd
Professor and Head, Oral Medicine
Department of Oral Health and Diagnostic Sciences
School of Dental Medicine
Head & Neck Cancer/Oral Oncology Program
Neag Comprehensive Cancer Center
UConn Health
Farmington, CT, USA

Jeremy Sanderson, MD, FRCP
Professor of Gastroenterology
Clinical Director, Gastrointestinal Medicine and Surgery
Guy's & St.Thomas' Hospitals NHS Foundation Trust
St. Thomas' Hospital
London, UK

Vidya Sankar, DMD, MHS
Tufts University School of Dental Medicine
Boston, MA;
Previously:
Brigham and Women's Hospital
Boston, MA, USA

Mark Schifter, BDS, MDSc (OM), MSND RCSEd, M Oral Med RCSEd, FFD RCSI (OM), FRACDS (OM)
Staff Specialist and Head
Department of Oral Medicine, Oral Pathology, and Special Needs Dentistry
Westmead Centre for Oral Health
Westmead Hospital
Westmead, New South Wales;
Clinical A/Professor
Sydney Dental School Faculty of Medicine and Health
The University of Sydney
Sydney, New South Wales, Australia

Noha Seoudi, BDS, LDS RCSEng, MDS, MFDS RCPS, PGCAP, FHEA, MInstLM, FRCPath, PhD
Senior Clinical Lecturer in Oral Microbiology at Barts and the London School of Medicine and Dentistry
Queen Mary University of London
London, UK

Jane F. Setterfield, BDS, DCH, MD, FRCP
Professor of Oral and Dermatological Medicine
Centre for Host Microbiome Interactions
King's College London
Honorary Consultant in Dermatology
Department of Oral Medicine and St John's Institute of Dermatology
Guy's and St Thomas' NHS Foundation Trust
London, UK

Thomas Sollecito, DMD, FDS RCSEd
Professor and Chair of Oral Medicine
Associate Dean of Hospital and Extramural Affairs
Chief, Oral Medicine
University of Pennsylvania Health System
Department of Oral Medicine
School of Dental Medicine
University of Pennsylvania
Philadelphia, PA, USA

Eric T. Stoopler, DMD, FDS RCS, FDS RCPS
Professor of Oral Medicine
Department of Oral Medicine
School of Dental Medicine;
Professor of Oral Medicine
Division of Geriatric Medicine
Department of Medicine
Perelman School of Medicine
University of Pennsylvania
Philadelphia, PA, USA

Suma Sukumar, BDS, DClinDent, MRACDS, FRACDS
Staff Specialist, Department of Oral Medicine
Westmead Centre for Oral Health
Westmead Hospital
Westmead, New South Wales, Australia

Yee-Ping Sun, MD, FACC
Assistant Professor of Medicine
Brigham and Women's Hospital
Harvard Medical School
Boston, MA, USA

Malavika Tampi, MPH
Manager, Department of Evidence Synthesis and Translation Research
ADA Science & Research Institute
Chicago, IL, USA

Jose Luis Tapia, DDS, MS
Clinical Assistant Professor
Department of Oral Diagnostic Sciences
School of Dental Medicine
University at Buffalo, The State University of New York
Buffalo, NY, USA

Vasileios Ionas Theofilou, DDS
Department of Oncology and Diagnostic Sciences
School of Dentistry
University of Maryland
Baltimore, MD, USA

Ruchir Trivedi, MD, MSc, MRCP (UK)
Assistant Professor
Division of Nephrology
School of Medicine
UCONN Health
Farmington, Connecticut, USA

Denise A. Trochesset, DDS
Clinical Professor
Department of Oral & Maxillofacial Pathology, Radiology and Medicine
New York University College of Dentistry
New York, NY, USA

Olivia Urquhart, MPH
Health Analyst
Department of Evidence Synthesis and Translation Research
ADA Science & Research Institute
Chicago, IL, USA

Patrick Vannelli, MD
Partner, Allergy & Asthma Specialists
PC Blue Bell, PA, USA

Alessandro Villa, DDS, PhD, MPH, FDS RCSEd
Associate Professor
University of California San Francisco
San Francisco, CA;
Previously:
Brigham and Women's Hospital
Boston, MA, USA

Arjan Vissink, DDS, MD, PhD
Professor
Department of Oral and Maxillofacial Surgery
University of Groningen and University Medical Center Groningen
Groningen, The Netherlands

Amber L. Watters, DDS, MPH, MS
Director of Oral Oncology
Providence Cancer Institute
Providence Health & Services
Portland, OR, USA

Darien Weatherspoon, DDS, MPH
Center for Clinical Research
Division of Extramural Research
National Institute of Dental and Craniofacial Research
National Institutes of Health
Bethesda, MD, USA

Sook Bin Woo, DMD, MMSc, FDSRCS (Edin)
Associate Professor
Department of Oral Medicine, Infection and Immunity
Harvard School of Dental Medicine
Boston, MA, USA

Noam Yarom, DMD
Head, Oral Medicine Unit
Sheba Medical Center, Tel-Hashomer
Clinical Associate Professor
School of Dental Medicine
Tel Aviv University
Tel-Aviv, Israel

1

Introduction to Oral Medicine and Oral Diagnosis: Patient Evaluation

Michael Glick, DMD, FDS RCSEd
Martin S. Greenberg, DDS, FDS RCSEd
Peter B. Lockhart, DDS, FDS RCSEd, FDS RCPS
Stephen J. Challacombe, PhD, FDS RCSEd FRCPath, FDSRCS

Oral medicine, as defined by the American Academy of Oral Medicine, is "the specialty of dentistry responsible for the oral health care of medically complex patients and for the diagnosis and management of medically related disorders or conditions affecting the oral and maxillofacial region." Definitions vary in different parts of the world, but most include the diagnosis and nonsurgical management of oral mucosal and salivary gland disease, orofacial pain, and dental treatment of patients with medical disorders.

The overall goal for all oral healthcare professionals is to deliver and maintain optimal health for their patients. A recent definition was approved by the World Dental Parliament in 2016, which expanded the definition to include three different domains: disease and condition status, psychosocial status, and physiologic function.[1] The inclusion of a psychosocial status and physiologic function deviates from traditional definitions that mainly focused on the presence or absence of disease, and, further, it promotes the inclusion of patient values and preferences, as well as elevates the importance of subjective findings. This approach is more aligned with a person-centered care approach that emphasizes a patient's problem in the context of behavioral, socioeconomic, and environmental aspects, and their impact on the patient and on the care that needs to be delivered.[2–4] This definition has also been the underlying framework to establish outcomes that can be used to measure the oral status of an individual.[5]

Given the nature, complexity, and potential systemic implications for some oral conditions, coupled with an aging population with multimorbidities (multimorbidities do not identify an index disease, while comorbidities focus on an index disease and other diseases) and individuals taking numerous medications, all oral healthcare clinicians are required to enhance their knowledge of many aspects of medicine. Therefore, what previously was considered the purview of oral healthcare professionals with hospital-based

Burket's Oral Medicine, Thirteenth Edition. Edited by Michael Glick, Martin S. Greenberg, Peter B. Lockhart, and Stephen J. Challacombe.

training has become increasingly more important in general and specialty dental practice.

Advances in clinical practice are influencing many aspects of patient care, from our initial contact with a patient, through medical history-taking, diagnosis, and treatment options. For example, electronic health records (EHRs) allow for sharing health information among multiple clinicians caring for the same patient and can provide point-of-care algorithms for eliciting and using health information. Modern imaging techniques, such as computerized tomography scans (CTs) and magnetic resonance imaging (MRI), provide more detailed information and are a means to acquire more sophisticated data, but require enhanced training for accurate interpretation. Nevertheless, one of the most important skills for accurate diagnosis and management remains an experienced clinician with highly developed skills of listening and examination.

The initial encounter with a patient may influence all subsequent care. The skilled, experienced practitioner has learned to elicit the subjective (i.e., history-taking) and objective (e.g., clinical, laboratory) findings and other necessary information required for an accurate diagnosis. This process is an art, as well as a skill. Although mastering a patient evaluation can be assisted by specific clinical protocols, the experienced practitioner will add their own skills and experience to the diagnostic methodology.

A variety of accessible sources of healthcare information are now readily available to patients, and many will use this information to self-diagnose, as well as demand specific treatments. As a person-centered approach is encouraged, where a patient's preferences and values will influence care, the practitioner must listen to the patient to understand their needs, fears, and wishes and address them to arrive at an appropriate treatment plan that results in informed, scientific, and evidence-based choices. Furthermore, part of a shared decision-making approach includes the responsibility of the oral healthcare professional to educate their patient about the implications and consequences of a diagnosis and subsequent treatment. Creating an environment for effective communication between provider and patient has been shown to improve health outcomes.[6]

The process of obtaining, evaluating, and assessing a patient's oral and overall health status can arbitrarily be divided into seven major, sometimes overlapping, parts:

1) History and examination.
2) Establishing a differential diagnosis.
3) Obtaining necessary consultations, as well as appropriate laboratory tests, such as specific blood investigations, a biopsy, and imaging studies, all based upon the initial differential diagnosis.
4) Final diagnosis.
5) Formulating a plan of action.
6) Initiating treatment.
7) Follow-up assessment of response to treatment.

INFORMATION GATHERING

An appropriate interpretation of the information collected through a medical history and patient examination achieves several important objectives. It affords an opportunity for:

- Gathering the information necessary for establishing a diagnosis for the patient's chief complaint.
- Assessing the influence of the patient's systemic health on their oral health.
- Detecting other systemic health conditions of which the patient may not be aware.
- Providing a basis for determining whether dental treatment might impact the patient's systemic health.
- Giving a basis for determining necessary modifications to routine dental care.
- Monitoring medical conditions of relevance to the maxillofacial condition.

Medical History

Obtaining an appropriate and accurate medical history is a critical first step for all patient care. It begins with a systematic review of the patient's chief or primary complaint, a detailed history related to this complaint, information about past and present medical conditions, pertinent social and family histories, and a review of symptoms by organ system. A medical history also includes biographic and demographic data used to identify the patient.

There is no universally agreed method for obtaining a medical history, but a systematic approach will help the practitioner to gather all necessary information without overlooking important facts. The nature of the patient's oral health visit (i.e., initial dental visit, complex diagnostic problem, emergency, elective continuous care, or recall) often dictates how the history is obtained. The two most common means of obtaining initial patient information are a patient self-administered preprinted health questionnaire, or recording information during a systematic health interview without the benefit of having the patient fill out a questionnaire. The use of self-administered screening questionnaires is the most common method in dental settings. This technique can be useful in gathering background medical information, but the accurate diagnosis of a specific oral complaint requires a history of the present illness and other verbal information. While the basic information for a past medical history may be obtained by a questionnaire, a vital

part of the evaluation of a patient with a complex diagnostic problem is the history of the present illness, which is a combination of science and art and should be taken directly by the clinician.

The challenge in any healthcare setting is to use a questionnaire that has enough items to obtain the essential medical information, but is not too long to deter a patient's willingness and ability to fill it out. These questionnaires should be constructed in a manner that allows the clinician to query the patient about the most essential and relevant required information, yet provides a starting point for a dialogue with the patient about other pertinent information not included on the health form. Preprinted self-administered or online health questionnaires are readily available, standardized, and easy to administer and do not require significant "chair time." They give the clinician a starting point for a dialogue to conduct more in-depth medical queries, but are restricted to the questions chosen on the form and are therefore limited in scope. The questions on the form can be misunderstood by the patient, resulting in inaccurate information, and they require a specific level of reading comprehension. Preprinted forms cover broad areas without necessarily focusing on particular problems pertinent to an individual patient's specific medical condition. Therefore, the use of these forms requires that the provider has sufficient background knowledge to understand the reasons for the questions on the forms. Furthermore, the provider needs to realize that a given standard history form necessitates timely and appropriate follow-up questions, especially when positive responses have been elicited. An established routine for performing and recording the history and examination should be followed conscientiously.

The oral healthcare professional has a responsibility to obtain relevant medical and dental health information, yet the patient cannot always be relied upon to know this information or to provide an accurate and comprehensive assessment of their medical or dental status.

All medical information obtained and recorded in an oral healthcare setting is considered confidential and may in many jurisdictions constitute a legal document. Although it is appropriate for the patient to fill out a history form in the waiting room, any discussion of the patient's responses must take place in a private setting. Furthermore, access to the written or electronic (if applicable) record must be limited to personnel who are directly responsible for the patient's care. Any other release of private information should be approved, in writing, by the patient and that approval retained by the dentist as part of the patient's medical record.

Given that medical status and medication regimens often change, a patient's health status or medication regimen should be reviewed at each office visit prior to initiating dental care. The monitoring of patients' compliance with suggested medical treatment guidelines and prescribed medications is part of the oral healthcare professional's responsibilities. The following strategies are common to nearly all methods of history-taking:

- Review available patient information prior to meeting the patient.
- Greet the patient; use the patient's name; ensure privacy; sit rather than stand, preferably at eye level; maintain eye contact as often as possible; listen carefully to the patient's concerns; do not rush the interview process.
- Do not concentrate chiefly on entering the information into an electronic health record, as this may distract you from listening to pertinent information.
- Use the patient's own words (in quotation marks) to describe the primary reason(s) to seek care/consultation; i.e., be absolutely clear about the patient's chief complaint(s).
- Use open-ended questions to encourage open dialogue with the patient. Although all information should be collected in a systematic fashion, the order is not as important as is initiating a dialogue with the patient about their health.
- Create a timeline of the reported patient-related events. An accurate chronology is an extremely important element to establish or deny a causative relationship.

The medical history traditionally consists of the following subcategories:

- *Identification*—name, date and time of the visit, date of birth, gender, ethnicity, occupation, contact information of a primary care provider (physician and, if applicable, dentist), referral source.
- *Chief complaint (CC)*—the main reason for the patient seeking care or consultation and the length of time these symptoms have been present, recorded in the patient's own words.
- *History of present illness (HPI)*—taking an effective HPI takes experience and is often the key to making an accurate differential diagnosis. It includes a chronologic account of events; state of health before the presentation of the present problem; description of the first signs and symptoms and how they may have changed; description of occurrences of amelioration or exacerbation; previous clinicians consulted, prior treatment, and degree of the response to previous treatment. For those who favor mnemonics, the nine dimensions of a medical problem can be easily recalled using OLD CHARTS (Onset, Location/radiation, Duration, Character, Habits, Aggravating factors, Reliving factors, Timing, and Severity).[7]
- *Review of systems (ROS)*—identifies symptoms in different body systems (Table 1-1). The ROS is a comprehensive and systematic review of *subjective* symptoms affecting different bodily systems. It is an essential component for

Table 1-1 Review of Systems (ROS): A systematic approach to ascertain mostly subjective symptoms associated with the different body systems.

General: Weight changes, malaise fatigue, night sweats
Head: Headaches, tenderness, sinus problems
Eyes: Changes in vision, photophobia, blurring, diplopia, spots, discharge
Ears: Hearing changes, tinnitus, pain, discharge, vertigo
Nose: Epistaxis, obstructions
Throat: Hoarseness, soreness
Respiratory: Chest pain, wheezing, dyspnea, cough, hemoptysis
Cardiovascular: Chest pain, dyspnea, orthopnea (number of pillows needed to sleep comfortably), edema, claudication
Dermatologic: Rashes, pruritus, lesions, skin cancer (epidermoid carcinoma, melanoma)
Gastrointestinal: Changes in appetite, dysphagia, nausea, vomiting, hematemesis, indigestion, pain, diarrhea, constipation, melena, hematochezia, bloating, hemorrhoids, jaundice
Genitourinary: Changes in urinary frequency or urgency, dysuria, hematuria, nocturia, incontinence, discharge, impotence
Gynecologic: Menstrual changes (frequency, duration, flow, last menstrual period), dysmenorrhea, menopause
Endocrine: Polyuria, polydipsia, polyphagia, temperature intolerance, pigmentations
Musculoskeletal: Muscle and joint pain, deformities, joint swellings, spasms, changes in range of motion
Hematologic: Easy bruising, epistaxis, spontaneous gingival bleeding, increased bleeding after trauma
Lymphatic: Swollen or enlarged lymph nodes
Neuropsychiatric: Syncope, seizures, weakness (unilateral and bilateral), changes in coordination, sensations, memory, mood, or sleep pattern, emotional disturbances, history of psychiatric therapy

identifying patients with a disease that may affect dental treatment or associated symptoms that will help determine the primary diagnosis. For example, a patient with skin, genital, or conjunctival lesions who also has oral mucosal disease, or a patient with anesthesia, paresthesia, or weakness who also presents with orofacial pain. The clinician records both negative and positive responses. Direct questioning of the patient should be aimed at collecting additional data to assess the severity of a patient's medical conditions, monitor changes in medical conditions, and assist in confirming or ruling out those disease processes that may be associated with patient's symptoms.

- *Past medical history (PMH)* (may not have been revealed in systems review)—general health; immunizations; major adult illnesses; any surgical operations (date, reason, and outcome); medications (prescribed medications, over-the-counter medications, supplements) and home remedies; allergies.
- *Personal and social history (SH)*—birthplace; marital status; children; habits (tobacco use, alcohol use, recreational drug use); occupation; religion (if it may have an impact on therapy); sexual history if relevant to complaint.
- *Family history (FH)*—health or cause of death of parents, siblings, and children. The FH should also include diseases important to the patient's chief compliant, including genetic disorders; and common diseases, such as cardiovascular diseases or diabetes mellitus.

Patient Examination

The examination of the patient represents the second stage of the evaluation and assessment process. An established routine for examination decreases the possibility of missing important findings (signs).

A routine head and neck examination should be carried out at least annually or at each recall visit. This includes a thorough inspection (and when appropriate palpation, auscultation, or percussion) of the exposed surface structures of the head, neck, and face and a detailed examination of the oral cavity, dentition, oropharynx, and adnexal structures. Laboratory studies and additional special examination of other organ systems may be required for the evaluation of patients with orofacial pain, oral mucosal disease, or signs and symptoms suggestive of otorhinologic or salivary gland disorders, or signs or symptoms suggestive of a systemic etiology. A less comprehensive but equally thorough inspection of the face and oral and oropharyngeal mucosae should be carried out at each visit and the tendency to focus on only the tooth or jaw quadrant in question should be strongly resisted.

Each visit should be initiated by a deliberate inspection of the entire face and oral cavity prior to intraoral examination. The importance of this approach in the early detection of head and neck cancer cannot be overstated (see Chapter 7, Oral and Oropharyngeal Cancer).

Examination carried out in the dental office (surgery) is traditionally restricted to that of the superficial tissues of the oral cavity, head, and neck and the exposed parts of the extremities. On occasion, evaluation of an oral lesion logically leads to an inquiry about similar lesions on other skin or mucosal surfaces or about the enlargement of other regional groups of lymph nodes. Although these inquiries can usually be satisfied directly by questioning the patient, the oral health professional may also quite appropriately request permission from the patient to examine axillary nodes or other skin surfaces, provided

that the examination is carried out competently and there is adequate privacy for the patient. A male oral health professional should have a female assistant present in the case of a female patient; a female oral health professional should have a male assistant present in the case of a male patient. Similar precautions should be followed when it is necessary for a patient to remove tight clothing for accurate measurement of blood pressure. A complete physical examination should not be attempted when facilities are lacking or when religious or other customs prohibit it, or when no chaperone is present.

The degree of responsibility accorded to the oral health professional in carrying out a complete physical examination varies among institutions, hospitals, states, and countries.

The examination procedure in a dental office setting may include any or all of the following six areas:

- Registration of vital signs (respiratory rate, temperature, pain level, pulse, and blood pressure).
- Examination of the head, neck, and oral cavity, including salivary glands, temporomandibular joints, and head and neck lymph nodes.
- Lesions of the oral mucosa should have a detailed description including location, size, color, ulceration and induration, and an assessment of the severity made. Detailed descriptions of specific diseases presenting as ulcers, blisters, or white or red lesions can be found in Chapters 3–7.
- Assessment of cranial nerves, particularly when the patient presents with nondental orofacial pain, weakness, anesthesia, or paresthesia.
- Examination of other organ systems, when appropriate.
- Ordering indicated laboratory studies.

Consultations

Requesting Consultations from Other Clinicians

The overall purpose of a consultation is to clarify issues or help with diagnosis or management. Oral medicine clinicians are involved with two major types of consultations: those that they initiate for their own patients as a request from another healthcare professional; and those in response to a request for help with a patient of another healthcare professional.

Consent from the patient is needed before a consultation is initiated. All verbal and written consultation should be documented in the patient's record. A consultation letter should identify the patient and contain a brief overview of the patient's pertinent medical history and a request for relevant and specific information. The written request should be brief and should specify the particular concern and items of information needed from the consultant (Box 1-1).

Patients who may need medical consultation include:

- Those with known medical problems who are scheduled for either inpatient or outpatient dental treatment and cannot adequately describe all of their medical problems.
- Those with abnormalities detected during history-taking, on physical examination, or through laboratory studies.
- Those who have a higher risk for the development of a particular medical problem (e.g., diabetes with increased risk of atherosclerotic cardiovascular disease).
- Those for whom additional medical information is required that may impact the provision of dental care or assist in the diagnosis of an orofacial problem.
- Those with an orofacial disorder, which may also affect other parts of the body. For example, oral lesions may also involve the skin and conjunctiva.
- Those who are being considered for a medication that may have an adverse effect on another medical problem, such as diabetes or hypertension, or drug interactions.

Requests for consultation should include the problem and the specific questions to be answered and should be transmitted to the consultant in writing. Adequate details of the planned oral or dental procedure, include, as appropriate:

- Estimated risk of clinically significant bleeding.
- Assessment of time and stress to the patient.
- Expected period of post-treatment disability.
- Details of the particular symptom, sign, or laboratory abnormality that gave rise to the consultation.

Medically complex patients may have a medical condition that suggests the need for an opinion from the patient's physician as to risks involved in an invasive or stressful dental procedure, too often referred to as "clearing the patient for dental care."[8] In many cases, the physician is provided with too little information about the nature of the proposed dental treatment (type of treatment, amount of local anesthetics, anticipated bleeding, etc.) to help in this regard. Physicians cannot be expected to understand the nature of dental procedures and they should not be asked to "clear" patients for dental treatment. They should be contacted for pertinent medical information that will help the oral healthcare provider make the decision as to the appropriateness of the dental treatment plan. The response of a given patient to specific dental interventions may be unpredictable, particularly patients with comorbidities and those taking one or more medications. A physician's advice and recommendation may be helpful in managing a patient, but the responsibility to provide safe and appropriate care lies ultimately with the clinician performing the procedure.[9] Another health professional cannot from a legal standpoint "clear" a patient for any dental procedure and thus a request for "medical clearance" should be avoided.[8]

Box 1-1 Oral Medicine Inpatient Consultation

Patient: BRADLEY, BOB **MRN:** 0002222222
Age: 36 years **Sex:** Male **DOB:** 5/4/1983
Oral Medicine Resident: Dr. Alexandra Howell

Requesting Service: Hematology **Attending Physician:** INPATIENT HEMATOLOGY
Reason for Admission: LEUKOCYTOSIS; THROMBOCYTOPENIA
Date of Admission: 01/24/2020 **Hospital Day:** 2

Reason for Consult: Hospital dentistry consult requested by Dr. Green for oral evaluation and to rule out oral infection prior to immunosuppressive chemotherapy.
Source of History: Patient and medical record.

Chief Complaint: Patient not aware of any problems with his mouth in the past 6 months. He denies active dental pain but says that his "enamel keeps chipping off."

History of Present Illness:
Patient is a 36 y/o male with past medical history of chronic acid reflux who presented to our Emergency Room on January 24 with right-sided abdominal & flank pain and decreased urine output. He was found to have an acute kidney injury with hyperkalemia. CT of his abdomen/pelvis showed hydronephrosis/hydroureter and splenomegaly. CBC revealed white blood cell count of 53.9, hemoglobin of 10, and platelets 29,000. He was transferred to the inpatient hematology service for further evaluation and management of acute T-cell ALL and tumor lysis.

Health Status
Allergies: None known
Current Medications:
allopurinol 300mg per 1 tablet ORAL daily
hydroxyurea (Hydrea) 1,000 mg per 2 capsules ORAL q8h
sevelamer (sevelamer carbonate 800 mg oral tablet) 800 mg per 1 tablet ORAL TIDWM (3 times a day with meals)
Labs from 01/25/2020: ANC = 3150; INR=1.2; aPTT = 32.8; ALT/AST = 26/28.

Past Medical History: No active or resolved past medical history items have been selected or recorded. Patient states he has not seen a dentist in 10+ years.

Family History: Cancer—mother. Diabetes mellitus—father.

Extraoral examination: No trismus or swelling noted. Significant lymphadenopathy in postauricular area bilaterally.

Intraoral examination: Very poor oral hygiene with heavy plaque and calculus. Rampant dental caries with several retained root tips and fractured teeth. Noted a draining sinus tract/fistula on the buccal gingiva of lower left first molar (root tip) with moderate swelling and erythema. Also noted possible sinus tract above tooth #8.

Review/Management: Reviewed soft tissue neck CT. Relevant dental findings include numerous dental caries and extensive periodontal disease with periapical lucencies involving the mandibular left second molar, mandibular left first molar, mandibular right first molar, and multiple maxillary and mandibular incisors. Multiple root tips, and grossly enlarged and erythematous gingiva.

Impression: Diagnosis: dental caries, root tips, and advanced periodontal disease. Multiple draining sinus tracts/fistulas of the buccal gingiva. Posterior auricular bilateral lymphadenopathy R>L, moderate sized.

Recommendations: Patient does have clear signs of active dental infection. Recommend patient be transported to the dental clinic by wheelchair for a comprehensive clinical examination, full mouth series of radiographs and a Panorex for full treatment planning. We have tentatively scheduled him for the dental clinic on Monday morning, 1/27/20 at 10:00 am, pending medical stability. Treatment recommendations will be available following our department case conference on Tues 1/28/20.

Responding to Consult Requests from Other Clinicians

There are three major categories of oral medicine consultations:

- Diagnosis and nonsurgical treatment of orofacial disorders, including oral mucosal disease, temporomandibular and myofascial dysfunction, chronic lesions involving the maxilla and the mandible, orofacial pain, dental anomalies, maxillary and mandibular bone lesions, salivary gland disorders, and disorders of oral sensation, such as dysgeusia, dysesthesia, and glossodynia.
- Dental treatment of patients with medical problems that affect the oral cavity or for whom modification of standard dental treatment is required to avoid adverse events.
- Opinion on the management of dental disease that does not respond to standard treatment, such as rampant dental caries or periodontal disease in which there is a likelihood of a systemic etiologic cofactor.

In response to a consultation request, the diagnostic procedures outlined in this chapter may be followed, with the referral problem listed as the chief complaint and with supplementary questioning (i.e., history of the present illness) directed to the exact nature, mode of development, prior diagnostic evaluation/treatment, and associated symptomatology of the primary complaint. An examination of the head, neck, and oral cavity is important and should be fully documented, and the ROS should include an exploration of any associated symptoms and including pertinent negatives. When pertinent, existing laboratory, radiographic, and medical records should be reviewed and documented in the consultation record, and any additional testing or specialized examinations should be ordered.

A comprehensive consultation always includes a written report of the consultant's examination, usually preceded by a history of the problem under investigation and any items from the medical or dental history that may be relevant to the problem. A formal diagnostic summary follows, together with the consultant's opinion on appropriate treatment and management of the issue. Other previously unrecognized abnormalities or significant health disorders should also be communicated to the referring clinician. When a biopsy or initial treatment is required before a definitive diagnosis is possible, and when the terms of the consultation request are not clear, a discussion of the initial findings with the referring clinician is appropriate before proceeding. Likewise, the consultant usually discusses the details of their report with the patient, unless the referring dentist specifies otherwise. In community practice, patients are sometimes referred for consultation by telephone or are simply directed to arrange an appointment with a consultant and acquaint them with the details of the problem at that time; a written report is still necessary to clearly identify the consultant's recommendations, which otherwise may not be transmitted accurately by the patient. The details of an oral consultation must be documented on the patient's chart.

An important responsibility for hospital-based dentists is responding to consults from medical and surgical services. It is not at all uncommon for hospitalized patients to have routine maxillofacial problems (e.g., toothache) that have nothing to do with their reason for hospitalization. More commonly, patients may have a wide variety of problems that are directly related to their medical condition or its treatment (e.g., mucositis secondary to cancer chemotherapy) or require a dental exam to eliminate a possible source of infection during cancer chemotherapy.[9]

In hospital practice, the dental consultant is always advisory to the patient's attending physician; the recommendations listed at the end of the consultation report are suggestions and not *orders,* and are not implemented unless authorized by the attending physician. For some oral lesions and mucosal abnormalities, a brief history and examination of the lesion will readily identify the problem, and only a short report is required; this accelerated procedure is referred to as a limited consultation (Box 1-2).

Both custom and health insurance reimbursement systems recognize the need of individual practitioners to request the assistance of a colleague who may have more experience with the treatment of a particular clinical problem or who has received advanced training in a medical or dental specialty pertinent to the patient's problem. However, this practice of specialist consultation is usually limited to defined problems, with the expectation that the patient will return to the referring primary care clinician once the nature of the problem has been identified (diagnostic consultation) and appropriate treatment has been prescribed or performed (consultation for diagnosis and treatment).

ESTABLISHING A DIFFERENTIAL AND FINAL DIAGNOSIS

Before establishing a final diagnosis, the clinician often needs to formulate a differential diagnosis based on the history and physical examination findings. The disorders included in the differential diagnosis will determine which laboratory tests, such as biopsies, blood tests, or imaging studies, are required to reach a final diagnosis.

Box 1-2 Outpatient Oral Medicine Consultation

Date: _____

To: John Doe MD

From: Robert Dent DMD

Patient Name and Date of Birth

The patient is a 19-year-old female sent for a consultation for evaluation of recurring oral ulcerations, which have been increasing in severity for the past 5 months.

The patient has a history of occasional oral ulcers since age 10 with 2 to 3 ulcers occurring 3 to 4 times yearly and lasting 8 to 10 days. Five months ago, she began to experience 5 to 10 ulcers each month lasting 2 to 3 weeks. Each episode has been treated with prednisone 30 mg once daily for 5 to 7 days. The lesions heal with this regimen, but recur in 3 to 4 weeks.

The patient denies conjunctival lesions, although on 2 occasions during the past 3 months she had a vaginal ulcer. She has acne-type facial lesions since taking prednisone monthly.

Her past medical history is remarkable for depression. She denies hospitalizations or surgery and has no known drug allergies.

She takes Lexapro for depression, but no medications other than prednisone for oral ulcers.

Her review of systems is remarkable for weekly episodes of intestinal cramping and diarrhea. She denies GI bleeding or black tarry stools. The remainder of the review of systems is noncontributory except for the skin and vaginal lesions noted above.

The family history is significant for her mother and maternal grandmother having a history of recurring oral ulcers during adolescence. Her father is of Japanese descent and her mother is Caucasian.

She is currently a college student and denies smoking or use of recreational drugs.

The examination showed multiple acne-like lesions of the skin of the face.

There was no cervical lymphadenopathy or salivary gland enlargement.

Cranial nerves II–XII were grossly intact.

The oral mucosa had 5 shallow ulcers 5 mm to 8 mm in diameter surrounded by inflammation: two involving the left lateral tongue, one on the dorsal tongue, and one involving the left buccal mucosa. No vesicles or white lesions were present.

Impressions

1) Recurrent aphthous ulcers; increasing in severity during the past 5 months
2) R/O Behçet's disease
3) R/O Lupus
4) R/O celiac disease
5) R/O blood dyscrasia

Plan:

1) Order the following laboratory studies: CBC, CMP, ANA, ESR, tTG-IgA
2) Dermatology consult for evaluation of skin and vaginal lesions, and pathergy test
3) Ophthalmology consult to rule out uveitis or retinal vasculitis suggestive of Behçet's disease
4) GI consultation
5) Biopsies of oral ulcer for routine histology and lupus band test
6) Begin treatment with Clobetasol propionate gel, 0.05% directly to lesions tid
7) If the above laboratory tests and consultations are normal and there is inadequate benefit from topical steroids, consider a trial of pentoxifylline or colchicine

The rapidity and accuracy with which a diagnosis or set of diagnoses can be achieved depend on the history and examination data that have been collected and on the clinician's knowledge and ability to match these clinical data with suspected disease processes. Experienced clinicians with a more extensive knowledge of physiology and maxillofacial disease, and a broader knowledge of the relevant literature, can more rapidly establish a differential and diagnosis. Such "mental models" of disease syndromes also increase the efficiency with which experienced clinicians gather and evaluate clinical data and focus supplemental questioning and testing at all stages of the diagnostic process.

For effective treatment, as well as for health insurance and medicolegal reasons, it is important that a diagnosis (or diagnostic summary) is entered into the patient's record, following the detailed history and physical, radiographic, and laboratory examination findings. This may be a provisional diagnosis dependent on the results of investigation. When more than one health problem is identified, the diagnosis for the primary complaint is usually listed first. Previously diagnosed conditions that remain as actual or potential problems are also included, with the qualification "by history," "previously diagnosed," or "treated" to indicate their status. Problems that were identified but not clearly diagnosed during the current evaluation can also be listed with the comment "to be ruled out." Since oral medicine is concerned with problems that may be modified or linked to concurrent systemic diseases, it is common for the list of diagnoses to include both the oral problem such as a lesion or pain and systemic problems of actual or potential significance in the etiology or management of the oral problem. Items in the medical history that do not relate to the current problem and are not of major health significance usually are not included in the diagnostic summary. For example, for a presenting complaint of pain and swelling in the left side of the face in a 62-year-old female, a diagnosis list might read as follows:

Current:	1)	Alveolar abscess, mandibular left first molar
	2)	Rampant generalized dental caries secondary to radiation-induced salivary hypofunction
	3)	Hyperglycemia; R/O diabetes
Previous	4)	Carcinoma of the tonsillar fossa, by history, excised and treated with 65 Gy 2 years ago
	5)	Cirrhosis and prolonged prothrombin time, by history

A definite diagnosis cannot always be made, despite a careful review of all history, clinical, and laboratory data. In such cases, a descriptive term (rather than a formal diagnosis) may be used for the patient's symptoms or lesion, with the added word "idiopathic," "unexplained," or (in the case of symptoms without apparent physical abnormality) "functional" or "symptomatic." If a note is written prior to a definitive diagnosis, a clinician may list a descriptive term such as chronic oral ulcer with the diseases that must be "ruled out" (R/O) listed, from most to least likely. For example:

oral ulcer from chronic trauma
R/O squamous cell carcinoma
R/O granulomatous disease

The clinician must decide which terminology to use in conversing with the patient and whether to clearly identify this diagnosis as "undetermined." It is important to recognize the undiagnosed nature of the patient's problem and to schedule additional evaluation, by referral to another consultant, additional testing, or placement of the patient on recall for follow-up studies.

Unfortunately, there is no generally accepted system for identifying and classifying diseases, and diagnoses are often written with concerns related to third-party reimbursement and to medicolegal and local peer review, as well as for the purpose of accurately describing and communicating the patient's disease status. Within different specialties, attempts have been made to achieve conformity of professional expressions and language.

Some standardization of diagnoses has been achieved in the United States as a result of the introduction in 1983 of the diagnosis-related group (DRG) system as an obligatory cost-containment measure for the reimbursement of hospitals for inpatient care. However, groupings are mostly based on medical diagnoses, such as the *International Classification of Diseases, Tenth Revision* (ICD-11).[10] The DRG system is designed for fiscal use rather than as a system for the accurate classification of disease. It also emphasizes procedures rather than diseases and has a number of serious flaws in its classification and coding system. The ICD system, by contrast, was developed from attempts at establishing an internationally accepted list of causes of death and has undergone numerous revisions in the past 160 years since it was first suggested by Florence Nightingale; it is maintained by the World Health Organization. It relates to the various emphases placed on clinical, anatomic, biochemical, and perceived etiologic classification of disease at different times and different locations. However, the categories for symptoms, lesions, and procedures applicable to oral cavity conditions are limited and often outdated.

The patient (or, when appropriate, a responsible family member or guardian) should also be informed of the diagnosis, as well as the results of the examinations and tests carried out. Because patients' anxieties frequently emphasize the possibility of a potentially serious diagnosis, it is important to point out (when the facts allow) that the biopsy specimen revealed no evidence of a malignant growth, the blood test revealed no abnormality, and no evidence of

diseases, such as diabetes, anemia, leukemia, or other cancer, was found. Equally important is the necessity to explain to the patient the nature, significance, and treatment of any lesion or disease that has been diagnosed.

FORMULATING A PLAN OF ACTION

Medical Risk Assessment

Medical risk assessment of patients before oral or dental treatment offers the opportunity for greatly improving dental services for patients with complex health conditions. It requires considerable clinical training and understanding of the natural history and clinical features of systemic disease. It is hoped that revisions in dental pre-doctoral training will recognize this need and provide greater emphasis on both the pathophysiology of systemic disease and the practical clinical evaluation and management of medically complex patients.

The information gathering described above is also designed to help the oral health professional:

- Recognize a general health status that may affect dental treatment.
- Make informed judgments on the risk of dental procedures.
- Identify the need for medical consultation to provide assistance in ascertaining the presence of a systemic disease that may be associated with an oral pathology or that may adversely impact on the proposed dental treatment.

Reaching the end point of the diagnostic process and the formulation of a plan of action are usually not a simple process. In order to minimize any adverse events, an assessment of any special risks associated with a patient's compromised medical status that could be triggered by the planned anesthetic, diagnostic, or medical or surgical treatment procedure must be entered in the patient record, usually as an addendum to the plan of treatment. This process of medical risk assessment is the responsibility of all clinicians prior to initiating any treatment or intervention and applies to outpatient as well as inpatient situations.

A routine of initial history-taking and physical examination is essential for all dental patients, as even the apparently healthy individual may, on evaluation, be found to have a history or examination findings of sufficient significance to require a modification to the plan of treatment, a change to a medication, or deferring dental treatment until additional diagnostic data are available. To respect the familiar medical axiom *primum non nocere* (first, do no harm), all procedures carried out and all prescriptions given to a patient should be preceded by conscious consideration of the potential risk of the planned procedure. Establishing a formal medical risk assessment ensures a continuous evaluation process. A summary of the medical risk assessment, delineating potential risks from the proposed plan of action, should be entered in the patient record.

The Medical Complexity Status (MCS) was specifically developed for dental patients and has been used successfully for patients with medical problems ranging from nonsignificant to very complex diseases and conditions.[11] The MCS protocol is based on the premise that complications will rarely arise during provision of routine dental care in an outpatient setting to patients with stable or controlled medical conditions. However, modification of dental care may still be necessary in some circumstances and should be based on the level of the anticipated complication. The MCS classification and protocol, with examples, are described in more detail in Table 1-2.

Modification of Dental Care for Medically Complex Patients

Although there are many different medical conditions that may require modification of dental care, and protocols for a wide variety of situations, the assessment of risk to medically complex patients follows similar guidelines. It is helpful to focus on the following three questions, which will change according to the severity of the underlying disease or condition:

- What is the likelihood that the patient will experience an adverse event due to dental treatment?
- What are the nature and severity of the potential adverse event?
- What is the most appropriate setting in which to treat the patient?

Each of these questions can be subdivided into smaller entities, which will facilitate the assessment of the patient.

The four major concerns that must be addressed when assessing the likelihood of the patient experiencing an adverse event are:

- Potential for impaired hemostasis from medications or disease.
- Potential susceptibility to infection, both maxillofacial and distant to the oral cavity (e.g., infective endocarditis).
- Drug actions and interactions.
- Patient's ability to tolerate the stress and trauma of the dental procedure.

Patients are designated to an MCS category at their initial dental visit, which may be modified during subsequent visits