Seventh Edition

Oral Medicine and Medically Complex Patients

Edited by

Peter B. Lockhart • Lauren L. Patton
Michael Glick • Perry H. Dubin

WILEY Blackwell

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Published by John Wiley & Sons, Inc., Hoboken, New Jersey.
Published simultaneously in Canada.

The manufacturer's authorized representative according to the EU General Product Safety Regulation is Wiley-VCH GmbH, Boschstr. 12, 69469 Weinheim, Germany, e-mail: Product_Safety@wiley.com.

Library of Congress Cataloging-in-Publication Data applied for

Hardback ISBN: 9781119984351

Cover Design: Wiley
Cover Images: © FreshSplash/Getty Images, © S Eirich/Shutterstock, Wiley

Set in 10/12pt Sabon by Straive, Pondicherry, India

Dedication

We dedicate this book to our families for their support and for maintaining an environment conducive to this effort.

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Abbreviations

AAMC	Association of American Medical Colleges
AAO-HNS	American Academy of Otolaryngology and Head and Neck Surgery
AAOMS	American Association of Oral and Maxillofacial Surgeons
AAOS	American Association of Orthopedic Surgeons
ABCDs	Airway, breathing, circulation, disability
ACLS	Advanced Cardiac Life Support
ACS	Acute coronary syndrome
ACTH	Adrenocorticotropic hormone
ADA	American Dental Association
ADHD	Attention deficit hyperactivity disorder
ADP	Adenosine diphosphate
AED	Automated electronic defibrillator
AHA	American Heart Association
AHRQ	Agency for Healthcare Research and Quality
AIDS	Acquired immunodeficiency syndrome
AJCC	American Joint Committee on Cancer
AKI	Acute kidney injury
ALL	Acute lymphoblastic leukemia
ANC	Absolute neutrophil count
ANUG	Acute necrotizing ulcerative gingivitis
A/P	Assessment/Plan
AP	Antibiotic prophylaxis
aPTT	Activated partial thromboplastin time
ASA	American Society of Anesthesiologists
ASD	Autism spectrum disorders
AVR	Aortic valve replacement
BLS	Basic life support
BMI	Body mass index
BMS	Burning mouth syndrome
BP	Blood pressure
BRONJ	Bisphosphonate-related osteonecrosis of the jaw
BUN	Blood urea nitrogen

CAD–CAM	Computer-assisted design and computer-assisted manufacturing
CBC	Complete blood count
CC	Chief complaint
CDC	Centers for Disease Control and Prevention
CEJ	Cemento-enamel junction
CKD	Chronic kidney disease
CMV	Cytomegalovirus
CN	Cranial nerves
COPD	Chronic Obstructive Pulmonary Disease
CPR	Cardiopulmonary resuscitation
CRF	Chronic renal failure
CT	Computed tomography
CVA	Cardiovascular accident
C&S	*Culture and Sensitivity*
DBP	Diastolic blood pressure
DDAVP	Desmopressin acetate (generic name)
DKA	Diabetic ketoacidosis
DM	Diabetes mellitus
DMARDS	Disease-modifying antirheumatic drugs
DOAC	Direct oral anticoagulants
DSM-5	The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
DVT	Deep venous thrombosis
EACA	Epsilon amino-caproic acid
EBL	Estimated blood loss
EBV	Epstein–Barr virus
ECG	Electrocardiogram
ED	Emergency department
EEG	Electroencephalogram
EM	Erythema multiforme
EMS	Emergency medical services
ENE	Extra nodal extension
EPT	Electric pulp test
ESR	Erythrocyte sedimentation rate
ESRD	End stage renal disease
ETT	Endotracheal Tube
FDA	Food and Drug Administration
FEV1	Forced Expiratory Volume in 1 second
FH	Family history
FUO	Fever of unknown origin
GDD	Global developmental delay
GERD	Gastroesophageal reflux disease
GI	Gastrointestinal
GOLD	Global Initiative for Chronic Obstructive Lung Disease
GSD	Glycogen storage diseases
GVHD	Graft-versus-host disease
HAART	Highly active antiretroviral therapy
HAV	Hepatitis A virus
HBOT	Hyperbaric Oxygen Therapy
HbS	Hemoglobin-S

HBV	Hepatitis B virus
HCT	Hematocrit
HCV	Hepatitis C virus
HDV	Hepatitis D virus
HEENT	Head, Eyes, Ears, Nose, Throat
HIV	Human immunodeficiency virus
HMW	High molecular weight
HNNK	Hyperglycemic hyperosmolar nonketotic coma
HPI	History of the Present Illness
HSCT	Hematopoietic stem cell transplant
HSV	Herpes simplex viruses
HTN	Hypertension
ICH	Intracranial hemorrhage
ICU	Intensive care unit
IE	Infective endocarditis
IMPT	Intensity modulated proton therapy
IMRT	Intensity modulated radiation therapy
INR	International normalized ratio
INSTIs	Integrase strand transfer inhibitors
IV	Intravenous
JIA	Juvenile idiopathic arthritis
JVD	Jugular venous distention
KS	Kaposi Sarcoma
KVO	Keep vein open
LE	Lupus erythematosus
LVAD	Left ventricular assist device
MAP	Mean arterial pressure
MAT	Medication-assisted treatment
MDR	Multidrug-resistant
MFP	Maxillofacial prosthetics
MI	Myocardial infarction
MMF	Maxillomandibular fixation
MMSE	Mini-Mental State Exam
MRI	Magnetic resonance imaging
MRONJ	Medication-related osteonecrosis of the jaw
MS	Multiple sclerosis
MTA	Mineral trioxide aggregate
MVC	Motor vehicle collision
NAM	Nasoalveolar molding
NNRTIs	Non-nucleoside reverse transcriptase inhibitors
NPO	Nothing by mouth
NRTIs/NtRTIs	nucleoside/nucleotide reverse transcriptase inhibitors
NSAIDS	Nonsteroidal anti-inflammatory drugs
NUG	Necrotizing ulcerative gingivitis
NUP	Necrotizing ulcerative periodontitis
OHCP	Oral health care professional
OI	Osteogenesis imperfecta
OLP	Oral lichen planus
OR	Operating room
ORIF	Open reduction with internal fixation

ORN	Osteoradionecrosis
OUD	Opioid use disorder
PA	Posterior–anterior
PCP	*Pneumocystis carinii* pneumonia
PD	Parkinson's disease
PDH	Past dental history
PERRLA	Pupils equal, round, react to light and accommodation
PET	Position emission tomography
PIs	Protease inhibitors
PJI	Prosthetic joint infection
PMH	Past medical history
PMI	Point of maximal impulse
PT	Physical therapy; prothrombin time
PTSD	Post-traumatic stress disorder
PTT	Partial thromboplastin time
QD	Every day
RAS	Recurrent aphthous stomatitis
RBC	Red blood cell
RIF	Rigid internal fixation
ROS	Review of systems
RRMS	Relapsing-remitting multiple sclerosis
RRT	Rapid response team
RT	Radiation therapy
RT-PCR	Reverse transcriptase polymerase chain reaction
RAU	Recurrent aphthous ulcers
SBP	Systolic blood pressure
SCC	Squamous cell carcinoma
SH	Social history
SNRIs	Selective serotonin reuptake inhibitors
SOB	Shortness of breath
T3	Triiodothyronine
T4	Thyroxin
TD	Tardive dyskinesia
TID	Three times per day
TMJ	Temporomandibular joint
TUG	Traumatic ulcerative granulomas
TUGSE	Traumatic ulcerative granuloma with stromal eosinophilia
TXA	Tranexamic acid
URI	Upper respiratory infection
VPD	Velopharyngeal dysfunction
VTE	Venous thromboembolism
vWD	von Willebrand's disease
vWF	von Willebrand's factor
vWD	von Willebrand's disease
VZV	Varicella Zoster virus infection
WBC	White blood count
YO	Year old

Acknowledgments

We wish to acknowledge Anne Olson for her skills as a medical artist, Dr. Peter Jacobsen for his contributions to appendices related to his field of expertise, past contributors to this book, and our students and residents over the years who challenge and inspire us.

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Introduction

In 2021, the National Institute of Dental and Craniofacial Research (NIDCR) released *Oral Health in America: Advances and Challenge*, which was an update to the *Oral Health in America*: *A Report of the Surgeon General* published in 2000. This latest publication reiterated that oral health is inextricably linked to general health and well-being, and reviewed advances and ongoing challenges in oral health with an emphasis on disparities and inequalities of burden of disease and access and affordability of oral health care. There is an ongoing concern about the availability of oral health care for people with complex medical and physical conditions, and those with nonsurgical problems of the maxillofacial region. Some patient populations have better access than others to oral health care services, as well as sources of funding and advocacy groups. Access is further complicated by a longstanding shortage of dentists trained to manage these problems and patient populations. Dental students generally have minimal exposure to medically complex patients and clinical problems that define the specialty area of oral medicine in the United States. Thus, there is an increasing need for medical center-based training programs in hospital dentistry and oral medicine. These pre- and postdoctoral trainees will be called upon to manage oral health for the growing population of both ambulatory and hospitalized medically complex patients and provide appropriate care for those with oral mucosal diseases. This book provides support for these health professionals in all stages of learning and professional development.

Providing dental care to people with disabilities and a wide variety of medical illnesses is practiced by a relatively small but dedicated group of clinicians. Some have postdoctoral training in medical center-based residencies, and some may have acquired these skills during their careers. Patients with special needs make up a broad range of medical, physical, and emotional conditions, many of whom require dental care in the nontraditional settings of a hospital-based emergency department, an operating room under sedation or general anesthesia, and/or as an inpatient at the bedside. Clinical space, specialized equipment, and trained support staff are also important elements to facilitate access to oral care for patients with special needs. Larger hospitals may have fully staffed and equipped dental departments that provide care for hospitalized patients, as well as for ambulatory medically complex patients from the surrounding community. Most hospitals in the United States, however, offer neither inpatient nor outpatient special needs dental services,

and in these communities, people with complex medical conditions must seek oral health care from a wide variety of community-based medical and dental practitioners.

Formal, hospital-based advanced educational programs for recent dental school graduates began in the United States in the 1930s with one-year, elective "rotating dental internships." Over the following decades, these residencies gained popularity among dental students who recognized their lack of training in this discipline. This then helped to create demand for expansion in the number of these programs. One and two-year general practice residencies (GPRs) became more uniformly structured and formal accreditation guidelines by the American Dental Association's Commission on Dental Accreditation (ADA CODA) set standards for these programs (available online at: https://coda.ada.org/standards). ADA CODA standards also exist to support specialty advanced education programs in oral medicine.

Many GPR programs integrate dental residents into a medical center such that they have parity with their medical and surgical colleagues in training structure and exposure to hospital-based care. They focus on aspects of clinical and didactic training beyond that available at the pre-doctoral or dental school level to include exposure to difficult cases of infection, trauma, bleeding, and pain, as well as to a wide spectrum of nonsurgical problems of the maxillofacial region. Such complex oral health care services require at least a basic understanding of physical risk assessment, general medicine, principles of anesthesia, and exposure to a variety of other disciplines and skills. Medically complex patients also require the integration and coordination of dental and medical care plans through interdisciplinary consultation and teamwork.

In the United States, there are two professional groups that have been in existence for over 80 years to support oral health professionals with a commitment to these patient populations. The Special Care Dentistry Organization (SCDA; https://www.scdaonline.org) which, in addition to hospital dentistry, also represents the fields of geriatric dentistry and dentistry for persons with disabilities. The other group is the American Academy of Oral Medicine (AAOM; https://www.aaom.com), which has a focus on two major groups, medically complex patients and the people with nonsurgical problems of the maxillofacial region. These two clinical disciplines are organized and practiced somewhat differently throughout the world. In some countries, medically complex patients and oral medicine are separate disciplines, and in others they are combined under one dental specialty, as is the case in the United States. In 2020, the National Commission on Recognition of Dental Specialties and Certifying Boards recognized Oral Medicine as the 11th ADA-recognized dental specialty in the United States and is defined as "the specialty of dentistry responsible for the oral health care of medically complex patients and for the diagnosis and management of medically-related diseases, disorders and conditions affecting the oral and maxillofacial region" (https://ncrdscb.ada.org/recodnized-dental-specialties). Like-minded individuals are encouraged to explore membership opportunities in these professional groups that hold annual scientific conferences with continuing education offerings.

Future challenges include defining and approving an internationally accepted baseline training for oral medicine at both the dental school and postdoctoral level, further integrating medicine and dentistry, building interdisciplinary teams, developing collaborative care systems, improving reimbursement for oral health services, and supporting research in this area. The further development of specialty examinations, credentialing, and international cooperation in the form of scientific meetings and research will translate into better care for these patient populations.

Suggested Readings

Al-Amad, S.H., Bankvall, M., Okoh, M. et al. (2023). World Workshop on Oral Medicine VIII: Barriers to Research in Oral Medicine: Results from a Global Survey. *Oral Surg Oral Med Oral Pathol Oral Radiol* 136 (5): 585–594. doi:10.1016/j.oooo.2023.06.013.

Glick, M., Greenberg, M., Lockhart, P.B., and Challacombe, S. (ed.) (2021). *Burket's Oral Medicine*, 13the. Wiley Blackwell.

Lockhart, P.B. (2020). The impact of Oral Medicine's Global Efforts on Advancing Oral Health Care, Discovery, and Dissemination of Best Practices. *Oral Surg Oral Med Oral Pathol Oral Radiol* 130 (1): 1–3. doi:10.1016/j.oooo.2020.03.045.

Patton, L.L. and Glick, M. (2016). *The ADA Practical Guide to Patients with Medical Conditions*, 2nde. Wiley-Blackwell.

Riordain, R.N., Farag, A.W., Villa, A. et al. (2023). The World Workshop on Oral Medicine Outcomes Initiative for the Direction of Research Project. *Oral Surg Oral Med Oral Pathol Oral Radiol* 135 (6): 699–702. doi:10.1016/j.oooo.2022.11.023.

Tyler, M.T., Miller, C.S., Lockhart, P.B., and Patton, L.L. (2020). American Academy of Oral Medicine: 75 Years of Bringing Medicine and Dentistry Back Together. *Oral Surg Oral Med Oral Pathol Oral Radiol* 129 (2): 91–94. doi:10.1016/j.oooo.2019.11.002.

U.S. Department of Health and Human Services. (2021). Oral health in America: Advances and Challenges. National Institutes of Health, National Institute of Dental and Craniofacial Research, Bethesda, MD. https://www.nidcr.nih.gov/sites/default/files/2021-12/Oral-Health-in-America-Advances-and-Challenges.pdf. Accessed May 8 2024.

CHAPTER 1

1 Oral Health Management of the Hospitalized Patient

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Introduction

Hospital dentistry, the practice of dentistry within a hospital setting, entails dental professionals who provide oral care to patients who may have medical or psychological conditions that require hospital system support or adjunctive anesthesiology services. This area of dentistry often collaborates closely with other medical disciplines to address the oral health needs of individuals in a hospital environment. Dentistry integrated in the health system is essential for managing various patient cases involving surgery, trauma, or patients with significant or unstable medical disease, care management challenges or requiring medical coordination of care. Hospital dental care ensures a holistic approach to healthcare. In this population, the medical/psychological health and the dental needs of patients must be considered when deciding on the need for in-hospital dental care. The scope of in-hospital dental care may include (i) Providing dental care to medically complex patients as outpatients; (ii) Providing inpatient dental consults; (iii) Providing urgent/emergent care at emergency department; (iv) Consultation to other medical services for management of medical conditions in order to provide dental care safely; (v) Hospital admission to provide dental care under general anesthesia or deep sedation.

In-hospital dental care should be considered whenever the required dental treatment could threaten the patient's well-being, or indeed life, or when the patient's medical/psychological problems may seriously compromise the dental treatment without hospital support. Some hospitals have dedicated hospital-based dental clinics to accommodate medically complex patient care. Management of those patients as outpatients is discussed in Chapter 2. Some hospitals have dental services to provide inpatient consultations, emergency department consultation and care, and consulting to other medical services for inclusion of dental care in multidisciplinary management. These consultations are discussed in Chapter 4. This chapter will discuss in-hospital care for the dental patient that requires hospital admission and/or operating room (OR) care.

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Dental Admissions

Reasons for Admission

The reasons for admission to the hospital can be categorized into two groups: emergent hospitalizations, usually from the emergency department or elective/scheduled hospitalizations for specific oral surgical or dental procedures.

Types of Admission

- Admission from home directly to an OR or hospital surgical center for dental care under general anesthesia, conscious sedation or monitored anesthesia care.
- An under 23-hour "observation" stay in the hospital after a dental care episode, typically under general anesthesia.
- Night before OR dental procedure stay to maximize health of the patient for the procedure.
- Admission for an extended stay for management of an oral health condition by the medical and dental team in consultation with or by the hospital dentistry or oral and maxillofacial surgery team, as a planned or scheduled admission or an unscheduled admission from the emergency department.

Fractures of the Mandible/Maxillofacial Structures

Admission to the hospital may be necessary for the management of multisystem injuries or injuries concomitant to mandible/maxillofacial fractures. Admission may be required for medically complex or special needs patients even if the fractures are relatively minor.

Infection

Admission is necessary if the patient has an infection that:

- Compromises nutrition or hydration (especially fluid intake, e.g., severe herpetic stomatitis in very young children, which might require hospitalization because of dehydration)
- Compromises the airway (e.g., Ludwig's angina)
- Involves secondary soft tissue planes that drain or traverse potential areas of particular hazard and so are a danger to the patient (e.g., retropharyngeal or infratemporal abscesses)

Compromised Patients

Medically, mentally, intellectually or developmentally disabled (IDD), or physically compromised patients who are insufficiently cooperative, or do not have adequate systemic reserve to be treated in an outpatient setting may be admitted to the hospital for their procedure. This category includes patients who might require general anesthesia or deep sedation and/or appropriate cardiorespiratory monitoring during treatment (e.g., intellectual disability, cardiovascular compromise).

Children

Young children who require treatment under deep sedation or general anesthesia because of the combination of poor cooperation and the need for a large number of dental procedures as a result of extensive caries and/or consequent infection may be admitted to the hospital.

Medical Consultations

The objectives of medical consultations are to:

- Determine and reduce peri- and postoperative medical risk to the patient from the planned oral surgical/dental procedures.
- Determine, and thus lessen or indeed prevent, the potential adverse effects of the proposed surgery/procedures on any medical illness and limit possible postprocedure complications by managing and treating the patient's underlying medical conditions.

The Admission Note

It is essential to assess a patient's current medical and physical status. Taking an accurate, relevant, and concise medical history requires skill. The goal is to obtain sufficient information from the patient and medical record to facilitate the physical examination and, in conjunction with the examination, to arrive at working diagnoses of the problems.

Old hospital records, if they exist, can be helpful in providing information about past hospitalizations, operations (including complications), and medications, particularly if the reliability of the patient or guardian as an informant is in question. With current electronic medical record systems, it is more common to have consolidated information on patients from multiple hospitals and clinics.

The Patient's Medical History

Key Points for Taking a Medical History

- Record the patient's positive and negative responses.
- Without explanation, the patient might not understand the need for, and value of, an accurate medical history in the dental setting.
- Be persistent and patient.
- Confirm the accuracy of the information by asking questions (e.g., if a medication is listed as allergen, ask what happened when taken).
- If the patient needs an interpreter, try as much as possible to use a professional healthcare interpreter and not members of the patient's family.
- If you need to gain consent for minors, IDD adults, or elders who cannot give consent, make sure that the person whose consent you gain (patient's parent/guardian/caregiver) has the legal authority to provide consent.

Elements of the History

The following discussion of the components of the medical history is directed at providing a full and complete history. Often, a shorter form of the medical history is sufficient for a relatively healthy patient.

Informant and Reliability

Note the name of the person or material used to obtain the pertinent information (e.g., patient, parent, relative, medical/nursing record). Also note whether the informant was reliable—were your questions understood, was the informant consistent and relevant, and how well does he or she know the patient?

Chief Complaint (CC)

Record what the patient perceives to be the problem that brought them to seek the care. The patient's own words in quotes should be used if possible.

History of Present Illness (HPI)

Make a chronologic description of the development of the chief complaint. Record the following:

- Location: Include radiating or migrating
- Quality: Character of the symptoms (e.g., sharp, dull, burning, and aching)
- Quantity/severity: Pain scale, volume of bleeding, number of teeth affected, degree of impairment, etc.
- Timing: Onset, continuous/intermittent, duration of each episode, frequency, etc.
- Setting: Things that contribute to the symptom (e.g., pain increases with chewing)
- Modifying factors: Aggravating/alleviating factors
- Associated symptoms: Anything that accompanies (e.g., fever, headache)
- Previous managements: What helped or did not help

Past Dental History

Ask the patient about relevant past history:

- Previous oral surgery, orthodontics (age, duration), periodontics, endodontics (tooth, date, reason), prosthetics, other appliances, oral mucosal problems (e.g., secondary herpes, aphthae), dental trauma
- Frequency of dental visits (regular, sporadic or emergency only)
- Frequency of dental cleanings (date of last cleaning)
- Experience/complications with local anesthesia (if problems occurred, find out what type was used), sedation and general anesthesia (e.g., allergy, syncope)
- Experience/complications with extractions (e.g., postoperative bleeding, infection, delayed healing, excessive postoperative pain, and dry socket)
- Symptoms of temporomandibular joint/masticatory muscles (e.g., history of pain, joint sounds, locking, trismus, and other functional difficulties)
- Oral habits (e.g., nail biting, thumb sucking, clenching, grinding, mouth breathing)
- Fluoride exposure (e.g., topical, systemic, water fluoridation)
- Home care (e.g., brushing method and frequency, floss or other aids, caregiver assistance required?)

- Food habits/diet (e.g., sucrose exposure, breast or bottle feeding, snacking, nutritional supplements)
- Problems with saliva (hyper-/hypo-salivation)
- Negative dental experiences

Past Medical History (PMH)

Direct questioning is probably the most practical to elicit the patient's past medical history. If the consolidated medical history is available through the electronic medical record systems, use the questions below to supplement and confirm the PMH.

Ask the patient "Are you being treated for anything by your doctor at the moment?" If the answer is "Yes," determine the severity and stability of the condition. There are those with advanced medical conditions (e.g., CAD) where it might not cause a significant hindrance to dental treatment as long as it is well managed and stable. However, a patient with an unstable medical condition, such as unstable angina, should not be treated until the condition is stable. When the dental procedure is necessary in a patient with an unstable medical condition, it should be planned with medical support (e.g., monitoring, sedation, etc.), ideally in a hospital setting.

Ask the patient "Have you been treated for any of the following?" A positive ("yes") response should be probed in depth. Using the conditions as examples below may help elicit the specific condition from the patient:

- Heart problems: Rheumatic fever, heart murmurs, infective endocarditis, angina, heart attack, an irregular heartbeat
- Bleeding problems: Hemophilia, Von Willebrand disease
- Breathing problems: Asthma, chronic obstructive pulmonary disease (COPD), such as emphysema or bronchitis, hay fever, or sinusitis
- Neurologic problems: Epilepsy, stroke, movement disorder, neuropathy
- Endocrinologic problems: Diabetes, thyroid disorders
- Gastrointestinal problems: Peptic/gastric ulcer, inflammatory bowel disease, gastroesophageal reflux disease (GERD)
- Liver problems: Hepatitis, cirrhosis
- Kidney/urinary problems: Chronic kidney disease (CKD) (on peritoneal dialysis or hemodialysis or not), obstruction, stones, infection
- Gynecologic: Pregnancy, breast feeding
- Bone or joint problems: Rheumatoid arthritis, osteoarthritis, osteoporosis
- Psychiatric problems: Anxiety, depression, eating disorders
- Skin problems: Skin lesions, rashes
- Cancer: Head and neck, hematologic, other organ, skin and if so, detailed history including stage, metastasis, treatments
- Infections: HIV, tuberculosis, hepatitis, shingles
- Ask "Do you have any prostheses?" (e.g., heart valve or total joint prosthesis implant)

If the patient is currently receiving treatment for cancer, find out the mode and schedule of treatment (surgery, chemotherapy, and/or radiotherapy). If the patient has received antiresorptive or antiangiogenic therapy, find out the type of medication, dosage, length of therapy, and date of the last dose. If the patient is on dialysis, find out types, frequency, and dialysis days on the week. Finally, ask if the patient has ever required a blood transfusion or other blood products (e.g., platelets, plasma, or clotting factors).

Review of Systems (ROS)

As part of the medical history, you need to ask the patient systematically about each of the body systems using the conditions/signs/symptoms listed below. It is often possible to obtain significant additional symptoms or information not elicited in the discussion of the patient's past and present illness. This process may uncover undiagnosed illness and help determine the need for medical specialty referral or consultation. Positive responses should be probed further in depth to define the issue. For example, if a patient responds "yes" to an ROS question about chest pain, you would then ask additional questions to further elucidate this symptom. In addition, for a patient with chest pain, an assessment of cardiac risk factors would be relevant in addition to consideration of noncardiac etiologies. Based on these questions, the clinician can come to an informed conclusion about the importance/cause of this patient's chest pain and use this to guide the subsequent decision making. Significant negatives ("no") must also be noted. Similar to previous discussion, the pertinent negatives will allow one to make an informed conclusion about the patient's overall health.

General: Weight loss/gain, fever, chills, fatigue, gait/falls
Cardiovascular: Palpitations, chest pain (radiation), orthopnea (number of pillows), edema
Respiratory: Cough, sputum production (taste, color, consistency, odor, amount/24 hours), hemoptysis, shortness of breath, wheezing
Neurologic: Dizziness, numbness, weakness, headaches, seizure, tremor, other involuntary movements, loss of smell/taste
Psychiatric: General mood, anxiety, depression, insomnia, hallucinations, delusions
Endocrine: Goiter, hot/cold intolerance, excessive thirst, excessive hunger, excessive sweat
Gastrointestinal: Abdominal pain, diarrhea, constipation, heartburn, loss of appetite, nausea, vomiting, blood in stool, black stool, jaundice, ascites
Genitourinary: Urinary frequency (day and night), urinary incontinence, blood in urine, genital sores
Gynecologic: Pregnancy, menstrual history (premenstrual tension, painful or difficult menstruation, bleeding between periods, clots of blood, excessive menses, regularity), menopause (date, symptoms, treatment, postmenopausal bleeding)
Breasts: Development, lumps, pain, discharge, and family history of breast cancer
Musculoskeletal: Joint pain, joint swelling, muscle pain, trauma, fractures, joint dislocations
Dermatologic: Hair or nail changes, dryness, pigmentation, skin lesions, hives, itching, piercing, tattoos
Hematologic: Increased bruising, bleeding problems, anemia.

Head, Eyes, Ears, Nose, Throat (HEENT)

- Head: Headache, fainting, vertigo, dizziness, pains in head or face, trauma
- Eyes: Vision, glasses, trauma, double vision, blind spots, blurring, pain, swelling, redness, tearing, dryness, burning, photophobia
- **Ears**: Decreased hearing or deafness, pain, bleeding or discharge, ruptured ear drum, clogging, ringing
- Nose: Nosebleed, discharge (amount, color, consistency), congestion, change in sense of smell or taste, polyps
- Mouth and throat: Pain, sore throat, toothache, bleeding gums, sore tongue, lesions, bad taste in mouth, loose teeth, halitosis, difficulty swallowing, difficulty opening, voice changes, lumps, and trauma

Family History

Find out what illnesses the patient's grandparents, parents, siblings, and children have/had. If any of these relatives are dead, at what age did they die and what was the cause? Ask about family history of tuberculosis, diabetes, heart disease, hypertension, allergies, bleeding problems, immunologic/rheumatologic disorders, epilepsy, genetic disorders, cancer, and psychiatric problems.

Social History

Ask about the patient's home life, education, occupational history (including military, if applicable), family closeness, domestic violence (Ask: "Do you feel safe in your home?"), normal daily activities, financial pressures, sexual relationship(s), recreational drugs use, and tobacco/nicotine (smoked, vaped, chewed), and alcohol history.

History for Pediatric Patients (Infants and Children)

Generally, history taking is similar for a pediatric patient as for an adult patient. However, unlike the adult history, much of the history for a child is taken from the parent or guardian. If the child is old enough, it is a good idea to interview the child as well. There are two basic rules when interviewing children: Do not ask too many questions too quickly and use age-appropriate language. Special emphasis should be placed on the following areas.

Prenatal and Perinatal History

Was the child full term or premature? Were there any complications during pregnancy? What was the perinatal course?

- Hospitalizations: Reasons and dates
- Operations: Procedures and dates, including anesthetic used and any complications
- Allergies: Medications, foods, tapes, soaps, and latex. Include a note on the type of reaction. Be careful to differentiate between true hypersensitivity/allergy reactions and adverse side effects
- Medications past and present: Dose and frequency, prescription, and over-the-counter (including topical agents and any parenteral medications given by medical office)
- Potential exposure to dangerous or easily transmissible infections: Tuberculosis, sexual transmitted disease, hepatitis, flu, COVID-19, HIV
- Maternal immunizations: Tetanus, rubella, and hepatitis
- Transfusions
- Trauma
- Diet while pregnant
- Maternal habits: Alcohol intake, tobacco, and recreational drugs

Postnatal History

- Immunization status: Is the child up to date with immunizations?
- Infection: Has the child had recent exposure to childhood infections (e.g., cold, flu, COVID-19, RSV, chickenpox, rubella, or mumps)?
- Nutrition/feeding: Was the child bottle- or breastfed? What was the frequency and duration of feedings? At what age was the child weaned? Does the child have any food allergies? Is there any history with fluoride?
- Complications from general anesthesia.

- Growth and development: attainment of developmental milestones (physical, cognitive, social and emotional, speech and language, and fine and gross motor skills).
- School status.
- Significant medical problems in early childhood.
- Social history: What is the home environment (e.g., smokers at home, pets, main caregiver)? What are the parental arrangements and custody, sequence of patient among siblings, siblings (number, ages, health status, and social arrangements [e.g., living at home])?

Physical Examination

Depending on training, dental practice laws, and/or hospital bylaws, dentists might be responsible for completing a full physical examination when admitting a patient. The admitting dentist will certainly be responsible for the detailed examination of the oral cavity and must be able to interpret the results of the history, physical examination, and laboratory tests. Whenever possible, the physical examination should be completed in a systematic manner so that nothing is omitted, although physical limitations of the patient might preclude this.

Elements of the Physical Examination

Start the physical examination by giving a statement of the setting in which the examination was performed and a gauge of the reliability of the examination (i.e., whether you were able to perform a full exam).

General Inspection

Note the patient's appearance, build, posture, body movement, voice, speech disturbance, and facial or skeletal deformities/asymmetries.

Vital Signs

- Pulse: If irregular heart rate, measure the apical pulse and note its beat as "regularly irregular" or "irregularly irregular."
- Blood pressure: Take sitting and supine with appropriate cuff size relative to patient body size.
- Temperature: Note the site at which the temperature was recorded. Celsius versus Fahrenheit.
- Respiratory rate.
- Height, weight (for a child record the percentile height/weight; for adults the body mass index [BMI] may be calculated and presented). Pounds versus kilograms.
- Global pain score on a scale of 1–10 (1 = no pain and 10 = worst possible pain).

Integument

Note the color/pigmentation, texture, dryness, temperature, vascular changes, lesions, scars, hair type and distribution, nail changes, tattoos, and piercings.