

# VOICE DISORDERS

Third Edition

CHRISTINE SAPIENZA • BARI HOFFMAN RUDDY



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# Voice Disorders

THIRD EDITION

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# **Voice Disorders**

**THIRD EDITION**



# Foreword

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In *Voice Disorders, Third Edition*, Christine Sapienza and Bari Hoffman Ruddy bring nearly 20 years of clinical experience to the readers. They are highly successful educators and have opened a whole new area of voice treatment with their work in respiratory and laryngeal physiology. Their latest research is now on laryngeal biomechanical modelling and patient and caregiver burden discussion. In this edition, they demonstrate empiricism in their work and practicality in their teachings, striving to educate students how to synthesize complex material and present it to patients and other clinicians.

This third edition of *Voice Disorders* builds on the earlier editions and offers the student and clinician a comprehensive study of the respiratory, laryngeal, and neurological subsystems that make up voice production. The authors balance voice science with voice treatments, examining traditional interventions as well as recent advances in cellular therapies, muscle strength training, and treatments for special populations such as singers and actors and those with complex medical conditions. With this third edition of *Voice Disorders*, the study of voice disorders comes out of its infancy and into the modern era of comprehensive care for the voice.

It is that unique mix of basic science and treatment strategies that Sapienza and Ruddy are known for. They successfully brought this mix into their first edition of *Voice Disorders* in 2009. That edition was highly successful with a large readership, and brought compliments from the instructors using it in their classroom. The second edition of *Voice Disorders* was built on that framework with its detailed descriptions of the anatomy, physiology, and clinical presentations of voice disorders. The third

edition brings the study of voice disorders up to date with additional chapters on laryngeal reflexes, immunology, and the effects of medications on the voice. After reviewing this third edition, I was not surprised to see this well-rounded textbook on voice from this pair of scientists and clinicians. In fact, to some extent, each of them is both a scientist and a clinician. They have kept abreast of the latest developments in the medical, behavioral, and patient-oriented aspects of this rapidly changing discipline. Unlike the early days of Grant Fairbanks, the clinician now needs medical, surgical, and behavioral knowledge of the vocal mechanism and of the structures and systems that contribute to voice production. Additionally, the authors update the unique role of the speech-language pathologist and his/her relationship with the other members of the voice care team—research scientist, psychologist, surgeon, singing specialist, and vocal coach etc. Each of those individuals has varying roles in the care of patients with voice disorders and it is often the speech-language pathologist who provides the leadership of the team.

The authors have again chosen to begin their text with a chapter on respiration. That unique feature makes this book quite distinctive from many other books on voice. This chapter provides an in-depth study of the respiratory system and its unique relationship with phonation. Respiratory structures, from the lungs to the subglottis, and their anatomy, physiology, and contribution to phonation are explained with wonderful drawings and graphs. The chapter is written with great detail, yet easy enough to understand, thanks to the well-written text to go along with the drawings. This book extends the study of respiratory anatomy and physiology specifically

as it relates to breathing for phonation. This chapter serves as a basis for the remainder of the book and so it should, as the respiratory system serves as the foundation for the larynx and vocal fold vibration.

There are other fabulous features about this third edition, as well. Case studies are presented to elucidate the importance of proper assessment and management. Hoffman Ruddy and Sapienza update the reader on new medications and their effects on the voice and on the treatment of voice disorders. The student will learn the classes of medications and their effects on the voice.

The third edition expands the approaches to voice therapy, and better defines clinical decision making with information about humanistic communication strategies, adherence, and the multitude of variables that influence patient outcomes. The authors have chosen to categorize therapy approaches in terms of type, such as symptomatic, combined modality, and hygienic. For each approach, they describe specific treatment methods, case examples and expected outcomes.

It is not surprising that the management of singers has its own chapter. Both Hoffman Ruddy and Sapienza are well-known to the performing community. Hoffman Ruddy's dissertation with Sapienza laid the groundwork for their partnership in the performing community early on. In the chapter on vocal performance, they describe the relationship of the vocal pathologist to the singer, performer, and other professionals who also take care of singers. This may be the only book used by the voice rehabilitation team in which descriptions of the Alexan-

der Technique and the Feldenkrais Method are found in one place. It is special sections like this that make this book a textbook for today's speech-language pathologist who wants to be up-to-date in treating voice disorders.

The authors have substantially updated the chapter on head and neck cancer, with new case study presentations statistics on the disease, information on safety for the laryngectomy patient, and more images to guide the reader in understanding the various modes of communication after laryngectomy. The authors also introduce robotic surgery in this chapter and include images from the operating room and video footage of several surgical procedures.

Although not customary in a foreword, I would like to say something about the authors. I have known Dr. Sapienza since her early postgraduate days and have been impressed with the degree of her effort and expertise that she has put in to every project, research proposal, and class syllabus. She reflects the term "teacher-scientist-clinician" perfectly. Dr. Hoffman Ruddy, the doctoral student of Dr. Sapienza, has become her own leader in the area of voice science as evidenced by her research and presence at meetings around the world. Since they are both teachers, they understand the needs of students and have developed educational approaches to nourish those needs in the classroom as well as in the research lab. Both authors exert a high level of energy into their work and this book offers a prime example. Both have transformed their keen levels of observation, testing, and analysis into a book that is rich with their experience and knowledge.

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# Preface

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The human ability to produce voice, shape it into meaningful tones and sounds, and use it for so many varied purposes is truly special. For those who have the opportunity to study voice, you will experience teachings from many disciplines, and observe outcomes both clinically and from the literature that exemplify a truly emerging relationship between knowledge and practice.

With enhancements in medical technologies and medical care, treatment plans are reaching an efficiency that optimizes vocal recovery in a favorable and timely manner. Continual education is critical to stay contemporary and abreast of new techniques/technologies and respond to the ever changing clinical environment. You will find an increasing responsibility to collaborate and communicate with all members of the patient's health care team and a need to familiarize yourself with the ever-changing medical models. You must continue to educate yourself to keep up with the advances in technology. This need may not be due solely to a rapidity of change in your discipline, but also to the swiftness of change in other disciplines (imaging, molecular biology, surgery etc.).

The physical, social, and spiritual issues surrounding your patients will require more skills and fluid knowledge in human anatomy and physiology, neuroanatomy and physiology, instrumentation, computer applications and multitudes of topics surrounding medical management issues including phonosurgical options and drug treatments. Learning how to communicate with your patient, understanding marriage and family systems and the dynamics of variables such as race, gender identity, and religion will be some of the more intricate complexities surrounding

your patient's care. Sometimes, the changes to which we, as clinicians, must adapt to, are sweeping and sometimes they occur slowly over time.

In writing this textbook we wanted you, the student, to have access to contemporary information that could be easily read. We took pride in developing the original anatomical figures for the text so they would portray the structures precisely. Additionally, we wanted to give you the opportunity to have laryngeal examinations of vocal pathology for your reference, including opportunity to view phonosurgical procedures and outcomes. In short, we wrote the book in a manner that would enable you and your instructor to have the best resources in one source.

The third edition of *Voice Disorders* is written so that you, the student, can comprehend complex material by using side outs for complex terms, providing a comprehensive glossary of terms and case examples throughout the chapters, such as those found in the vocal pathologies and voice therapy chapter, chapter on singer's voice and the comprehensive chapter on head and neck cancer. With updated statistics on the demographics of voice users, this new edition now helps you learn the clinical pathways that lead to the most efficient, cost effective outcomes. The pathophysiology of disease is thoroughly explained, helping to guide you on choices for best treatment outcomes. By clearly documenting the important anatomical and physiological properties of voice, you can determine the best course of treatment action, and the case examples, with accompanying audio samples, will help you identify and practice your assessment skills. Two newly distinct chapters are now included on laryngeal reflexive behavior



and the immune system. And, while these chapters contain high-level information, the material is a treasure of knowledge synthesized for your level of learning. Finally, we have updated our information for Web sources, and all additional resources have been updated.

Cherish your time to learn. The care of the voice has already evolved from a traditionally behaviorally oriented discipline to one that has responsibilities within the medical domain. For example, the role of the voice pathologist has broadened and includes vocal imaging specialist, researcher, therapist guiding recovery and restoration of healthy voice, trainer guiding effective voice use, counselor and/or more. Our field has developed ad hoc position statements defining the role of the *Speech-Language Pathologist and Teacher of Singing in the Remediation of Singers with Voice Disorders* (1992). We have guidelines for training in endoscopy and laryngostroboscopy and guidelines for the Role of the Speech Language Pathologist (2001), with respect to the Evaluation and Treatment of Tracheoesophageal Fistulization/Puncture and Prosthesis (2004). These position statements indicate that a certain level of skill must be obtained prior to administering particular assessment and treatment techniques.

Specific to the assessment and treatment of voice, we find ourselves challenged with cases involving syndromic complexities and are asked to delve into histories involving multiple disease processes or polypharmacies. Also, the reorganization of the health care industry has created an extensive array of changes in the organization, ownership, and regulation of health care providers and in the delivery of services. Cost concerns, increasing competition, influence of investor priorities, technological advances, changing social attitudes, and an aging and increasingly diverse population, are factors that sustain this dynamic condition.

There is a requirement to objectively document the outcomes of specific treatments

in order to provide hard evidence that can be analyzed, data based, studied, and modeled. Not all aspects of physiology can be seen. And, while technology is racing forward in the field of laryngeal imaging, subsystem processes that create, for example, the air pressure and airflow for voice are often equally important to examine. At the same time, over collection of data is not a wise way to spend time with a patient. Most of you have probably heard the saying “if it walks like a duck, quacks like a duck—it’s a duck.” Bottom line, if the collection of more data is not going to alter the treatment plan, then do not subject the patient to unnecessary procedures.

Since 1998, there have been significant advances in the following areas of medicine, all of which have impact on the care of the voice:

- pharmacogenomics
- brain damage and spinal cord injury
- cancer therapy and viruses
- antibiotics and resistant infections
- autoimmune disease
- slowing of the aging process

Within our discipline, technological advances include functional magnetic resonance imaging, high-speed video image analysis, computer assisted biofeedback techniques, advanced animal modeling techniques, enhanced surgical procedures, and many others. It wasn’t long ago that we witnessed the first laryngeal transplant performed at the Cleveland Clinic in 1999 by Dr. Marshall Strome and his team of physicians.

In order to appreciate such groundbreaking events, we need to acknowledge the fact that advances in the core science of our discipline are being made nationally and internationally at facilities dedicated to the advancement of science and medical practice. Recall one area of voice research that began in Groningen at the Institute of Physiology of

the Faculty of Medicine by van den Berg in the late 1940's. His fundamental article on the *Myoelastic-Aerodynamic Theory of Voice Production* in 1958 forever shaped our perceptions on the function of the vocal folds. There are historical lists of contributors to voice, voice care and voice science. Included in that list are the contributors referenced in this book, as well as all of our contemporary colleagues dedicated to the study of voice.

We hope this book serves you well in your graduate coursework in voice disorder. We believe it provides the core information needed for your training. For those practicing in the area of voice and its disorders, we currently expect the following academic preparation: understanding of the normal and physiologic process of voice production; understanding of the etiological bases of voice disorders; the ability to examine and interpret laryngeal structure and function; understanding of the instrumentation used to examine laryngeal structure and

function; understanding of the principles of diagnosis; understanding of the structural and functional differences across the life span; the ability to assist in differentially diagnosing the disorder and classifying it as structural, functional, idiopathic or neurological; the ability to develop a treatment plan that considers the patient's functional outcome goals; and others. Included on the *PluralPlus* companion website is a comprehensive workbook that should allow you to reflect on the reading and help you practice your knowledge and skills through test questions and problem solving assignments.

Additional courses we recommend include: issues surrounding continuum of care; interdisciplinary approaches; pharmacology; medical terminology; patient advocacy and accreditations; among others. This is not an inclusive list but one that suggests that our literature, as well as academic course work, must accommodate our needs more fully.

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“Do not follow where the path may lead. Go, instead,  
where there is no path and leave a trail.”

—Ralph Waldo Emerson

*Dr. Christine Sapienza*

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*Dr. Bari Hoffman Ruddy*

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# Companion Website

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Purchase of *Voice Disorders, Third Edition* comes with complimentary access to supplementary student and instructor materials on a PluralPlus companion website. To access the materials, log in to the website using the URL and instructions located inside the front cover of your copy of *Voice Disorders, Third Edition*.

## Student Website

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Included on the student website is a comprehensive workbook. The workbook will allow you to reflect on the reading and help you practice your knowledge and skills through test questions and problem solving assignments. Throughout the textbook you will find this icon that directs you to the workbook exercises.

Look for the multimedia icon that directs you to laryngoscopic examinations, many of which include audio of the voice quality, surgical video, surgical still images, and a number of comprehensive case studies.

Also included on the student website are all of the still images printed in the text and where applicable, available in color. Use of the combined textbook and these ancillary resources will enhance your overall learning proficiency.

## Instructor Website

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Included on the instructor website are PowerPoint slides to aid instructors in the delivery of content.



*To Dr. G. Paul Moore and Dr. Janina Casper, who in their greatness paved the pathways that we traveled on to our professional endeavors, shadowing us with guidance and mentorship.*

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# Contents

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<i>Foreword by Thomas Murry, PhD</i>	<i>xi</i>
<i>Preface</i>	<i>xiii</i>
<i>Acknowledgments</i>	<i>xvii</i>
<i>Contributors</i>	<i>xix</i>
<i>Companion Website</i>	<i>xxi</i>
<b>1 Respiratory Anatomy and Physiology</b>	<b>1</b>
The Lungs	1
The Trachea	2
The Bronchi	2
The Thorax	3
The Ribs	3
The Diaphragm	3
The Abdominal Wall	4
Sternum	5
Clavicle	5
Driving Forces of the Respiratory System	5
How Does the Human Body Generate These Respiratory Forces?	6
Passive and Active Forces of the Respiratory System	8
The Respiratory System and Voice Production	13
Relaxation Pressure Curve	13
Using the Right Terminology	18
Biofeedback Techniques	19
Summary	19
References	19
<b>2 Laryngeal Anatomy and Physiology</b>	<b>21</b>
Laryngeal Anatomy	21
Laryngeal Structure: Pieces and Parts	25
Laryngeal Muscles	29
What Are the Vocal Folds Made of, Exactly?	34
Laryngeal Ligaments and Membranes	41
Extrinsic Membranes	42
Intrinsic Membranes	42
Ligaments	43
Aryepiglottic Folds	43
Cavities	43
Arterial Supply of the Larynx	43
Laryngeal Nerve Supply	44
Laryngeal Development (Infancy to Adulthood)	46
Adult Male and Female Differences in Laryngeal Anatomy	48

Age Effects on Laryngeal Anatomy	49
Phonation	49
Mechanisms for Changing Pitch	52
What Is a Vocal Register?	53
Mechanism for Changing Loudness	54
Summary	54
References	55
<b>3 Vocal Health</b>	<b>59</b>
Phonotrauma	59
Basic Issues Related to Vocal Health	60
Recovery Process	61
Contributors to Poor Vocal Health	61
Summary	71
References	73
<b>4 Evaluation</b>	<b>75</b>
The Specialty of Otolaryngology	76
Case History	77
The Physical Examination	78
Laryngoscopic Techniques	78
Instrumental Assessment	82
Imaging	83
Digital Laryngostroboscopy	83
Videokymography	85
Aerodynamics	88
Classic Methods for Collection of Aerodynamic Signals	89
Laryngeal Aerodynamic Variations	95
Laryngeal Aerodynamics as a Function of Aging	96
Laryngeal Aerodynamic Differences as a Function of Sex	96
Laryngeal Aerodynamic Changes as a Function of Speech Task	96
Using Aerodynamics for Examination of Voice Disorders	97
Acoustic Analysis of Voice	98
Intensity	107
Voice Range Profile	108
Short-Term Perturbation	109
Relative Noise Level	111
Spectral Measures	112
Fast Fourier Transform (FFT)	112
Vowel Spectrum	113
Long-Term Average Spectrum	115
Cepstral Peak	115
Electroglottography	116
Electromyography	117
Auditory-Based Measures of Voice Quality	117
Perceptual Rating Scales	119