SPRINGER PUBLISHING

Sampath Wijesinghe

101 PRIMARY CARE CASE STUDIES

A Workbook for Clinical and Bedside Skills

Praise for *101 Primary Care Case Studies*

Dr. Wijesinghe's book is not only a great multidisciplinary learning tool, but really highlights the best of evidence-based practice and interprofessional approaches to patient care.

Dr. Beth Smolko, DMSc, PA-C
President, American Academy of Physician Assistants

Dr. Sam Wijesinghe has assembled a group of primary care providers to craft an outstanding workbook of 101 common problems in practice. Each one reads like well-presented grand rounds that are informative, current, and concise. A perfect resource for the student who is encountering a new problem for the first time. A superior way to learn.

Thomas E. Piemme, MD
Emeritus Professor, George Washington University

A multidisciplinary group of primary care providers led by Dr. Wijesinghe has put together an exceptional collection. Each scenario is well presented in a succinct format with evidence-based evaluation and treatment. Students learn well from case study presentations making this a perfect resource to build their knowledge base.

Dr. Cindy Cooke, DNP, FNP-C, FAANP
Adjunct Faculty at the University of Mary in Bismarck, North Dakota, and
AANP past president

The case study method is a time-honored approach to clinical teaching. Dr. Wijesinghe has assembled a seasoned group of expert clinicians and educators to produce a useful volume for students and practicing clinicians that provides a welcome dose of caring along with the curing.

Dr. James F. Cawley, MPH, PA-C, DHL (Hon)
Professor, School of PA Practice, Florida State University;
Visiting Professor, Scholar-in-Residence PA Leadership and
Learning Academy University of Maryland, Baltimore

These primary care–based case studies are wonderfully composed to elicit the required critical thinking skills essential for patient care. I especially enjoyed the clinician insights at the conclusion of each case study that revealed their thought processes. Include this book by Dr. Wijesinghe in your resources to learn compassionate and competent primary care.

Dr. Stephen A. Ferrara, DNP, FNP, FAANP, FNAP
Associate Professor/Executive Director,
The Nurse Practitioner Association, New York State

This compilation of cases commonly encountered by primary care providers outlines a systematic and a practical approach to evaluation and management. I have no doubt that this book will be an invaluable source of learning and reference, not only for students in medical training, but also for all primary care providers.

Leonard Ranasinghe, PhD, MD, DABEM
Professor of Medical Education and Emergency Medicine, California Northstate University
College of Medicine,
Elk Grove

101 PRIMARY CARE CASE STUDIES

Sampath ("Sam") Wijesinghe, DHSc, PA-C, AAHIVS, is a principal faculty member and clinical site director for the Central Valley California region at Stanford University School of Medicine's master's in science physician assistant program. He completed his PA education at Union College, where he received a master's degree in PA studies. He also has a master's degree in management information systems from the University of Nebraska and a doctor of health science degree with an emphasis in global health from A.T. Still University. Dr. Wijesinghe completed an HIV and AIDS clinical fellowship at University of California San Francisco, Fresno. He has been an HIV/AIDS specialist since 2014 and has worked in primary care medicine since 2010, primarily in underserved communities. He has been involved in medical education since 2013. His clinical interests include primary care medicine, HIV medicine, and global health.

Prior to joining Stanford University School of Medicine, Dr. Wijesinghe was a clinical assistant professor at University of California, Davis. Dr. Wijesinghe practices primary care medicine and HIV medicine at Adventist Health Medical Center, Fowler, a small town in California, and Madera Community Hospital in Madera, California.

Dr. Wijesinghe is passionate about teaching the next generation of clinicians. He has practiced in areas of need, including primary care and HIV medicine in underserved areas. He is passionate about medical education because it is an opportunity to improve patient outcomes and give back to the profession. A highly sought-after speaker and lecturer, Dr. Wijesinghe has presented at several national conferences and events and educates the next generation of PAs as a clinical preceptor.

Dr. Wijesinghe lives with his wife, Nuwan, and has two children, Rynee and Ryler. He loves to travel with his family, listen to music, watch sports, and play sports whenever possible.

101 PRIMARY CARE CASE STUDIES

A Workbook for Clinical and Bedside Skills

Sampath Wijesinghe, DHSc, MS, MPAS, AAHIVS, PA-C
Editor/Author

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This book is dedicated to

My mentor, Alex Moir (1962–2015), who taught me true compassion and was a mentor and role model beyond compare. It was always my dream that we'd coauthor this book, but that dream could not come true. The world lost a fine man, who could have taught compassion and competent care to generations of future clinicians.

My parents, David (1944–2015) and Rita Wijesinghe. When I was growing up, our family did not have much, but my parents' unconditional love and fight to provide a better future for me and my loving sister Mangali laid a solid foundation for our journeys. Importantly, my parents always believed in me. I love you more!

My wife, Nuwan. Meeting you in high school was the best thing that ever happened to me. Marrying you was the best decision I ever made. Everything I do personally or professionally is possible because you are in my life. I love you more than you can imagine.

My children, Rynee and Ryler. Throughout the preparation of this book, you both selflessly gave me the space and time I needed. I know I have taken too much time away from you because of this publication. Your love and support from the beginning to end has meant the world to me. You two are the reason I want to contribute and make the world a better place!

PAs, NPs, physicians, and future clinicians. We know practicing medicine and lifelong learning are inseparable. Let's continue to support each other and learn from one another. I applaud your decision to practice medicine and make a difference in many people's lives.

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CONTRIBUTORS

Valerie Berry, MD
Assistant Professor
Master of Science Physician Assistant Program
College of Health Sciences and Human Services
California State University, Monterey Bay
Salinas, California

Michael S. Burney, EdD, MS, PA-C
Program Director/Chair, Clinical Associate Professor
Chapman University PA Program
Crean College of Health and Behavioral Sciences
Irvine, California

Michael Castillo, MD
Department of Family Medicine
Kaiser Permanente
Fresno, California

Rachel Chappell, MHSc, PA-C
Program Director, Clinical Assistant Professor
Interdisciplinary Human Studies, Physician Assistant Program
School of Allied Health Professions
Louisiana State University Health Science Center
New Orleans, Louisiana

Mark P. Christiansen, PhD, PA-C
Program Director and Department Chair
Physician Assistant Program
Department of Physician Assistant Education
University of the Pacific
Sacramento, California

Dolores Davis, RN, FNP APRN-C
Madera Community Hospital, Family Health Services
VA Central California Health Care System
Fresno, California

David Duensing, DO
Pediatrics, PC
Lincoln, NE
University of Nebraska Medical Center
Adjunct Associate Professor
Department of Pediatrics
Omaha, Nebraska
Volunteer Clinical Preceptor, Advanced Practice Nursing Program
University of Nebraska Medical Center
Omaha, Nebraska
Volunteer Clinical Preceptor, Physician Assistant Program
Union College
Lincoln, Nebraska

Christopher P. Forest, DHSc, DFAAPA, PA-C
Founding PA Program Director
Master of Science Physician Assistant Program
College of Health Sciences and Human Services
California State University, Monterey Bay
Salinas, California

Tosi Gilford, MD, PA-C
Program Director, Assistant Professor
Physician Assistant Studies Program, Clinical and Diagnostic Sciences Department
University of Alabama at Birmingham
Birmingham, Alabama

Nancy Hamler, DMSc, MPA, RDN, PA-C
Assistant Professor
Physician Assistant Program
Department of Physician Assistant Education
University of the Pacific
Sacramento, California

Surani Hayre-Kwan, MBA, DNP, FNP-BC, FACHE, FAANP
Director, Professional Practice & Nursing Excellence
Sutter Health
Sacramento, California
Nurse Practitioner, Russian River Health Center
Guerneville, California

Cherilyn M. Hendrix, DHEd, MSBME, PA-C, DFAAPA
Program Director/Associate Professor
University of Maryland Baltimore/Anne Arundel Community College Collaborative Physician Assistant Program
University of Maryland Baltimore Graduate School
Baltimore, Maryland

Lisa Hood, DNP, MSN, RN, FNP-C
Family Nurse Practitioner
Family Health Services
Madera Community Hospital
Madera, California

Michael J. Huckabee, PhD, MPAS, PA-C
Director, Physician Assistant Program
Associate Professor, Senior Associate Consultant-II
College of Medicine and Sciences
Mayo Clinic
Rochester, Minnesota

Amanda J. Ingalls, MS, PA-C
Clinical Instructor of Family Medicine
Physician Assistant Program
Keck School of Medicine
University of Southern California
Alhambra, California

Johnny Jimenez, MSN, APRN, FNP-C
Nurse Practitioner, Family Medicine
Sutter Health
Memorial Hospital Los Banos
Los Banos, California

Paramjit Kaur, MSN, FNP-C
Past Family Practice Nurse Practitioner
Adventist Medical Clinic
Sanger, California

Gerald Kayingo, PhD, MMSc, PA-C
Executive Director, Assistant Dean and Professor
Physician Assistant Leadership and Learning Academy
University of Maryland Graduate School
Baltimore, Maryland

Jason R. Kessler, MD, FAAP
Medical Director/Pediatrician
Primary Health Care, Inc.
Des Moines, Iowa

Vasco Deon Kidd, DHSc, MPH, MS, PA-C
Office of Advanced Practice and UCI
Health Department of Orthopaedic Surgery
Orange, California

Timothy Kuntz, MPAS, PA-C
Assistant Professor
Physician Assistant Program
Union College
Lincoln, Nebraska

Aimee Larson, MSPA, PA-C
Program Director, Clinical Assistant Professor
School of Education and Human Services
Canisius College Physician Assistant Studies
Buffalo, New York

Susan LeLacheur, DrPH, PA-C
Professor of Physician Assistant Studies
The George Washington University School of Medicine and Health Sciences
Washington, DC

Kristy Luciano, MS, PA-C
Assistant Professor and Director of Didactic Education
Physician Assistant Program
College of Health Sciences
Midwestern University
Downers Grove, Illinois

Erin N. Lunn, PA-C, MHS
Assistant Professor, Director of Clinical Education
Department of Physician Assistant Studies
University of South Alabama
Mobile, Alabama

Hema Majeno, PA-C
Internal Medicine/Hospitalist PA-C
Mercy Hospital
Merced, California

David Malebranche, MD, MPH
Associate Professor of Medicine
Department of Medicine
Morehouse School of Medicine
Atlanta, Georgia

April H. Martin, MSPAS, PA-C
Program Director and Assistant Professor
School of Health Sciences
Francis Marion University
Florence, South Carolina

Mario Martinez, MD
Program Director
Kaweah Delta Family Medicine Residency Program
Visalia, California
Medical Director
Adventist Health Community Care Clinic, Central Valley Network
Hospitalist, Vituity-Adventist Community Hospital
Reedley, California

Lynn H. McComas, DNP, ANP-C, PHN
President/CEO, PreceptorLink
Encinitas, California

Kameko Hazley McGuire, DNP, PMHNP-BC, NP-C, RN
Visiting Professor, Chamberlain University
MSN-FNP Program
Downers Grove, Illinois
Adjunct Faculty, Regis College PMHNP Program
Weston, Massachusetts
Adjunct Faculty, South University FNP Program
Savannah, Georgia
Graduate Adjunct PMHNP Professor
Liberty University
Lynchburg, Virginia

Jennifer Momen, MD, MPH, FAAP
Assistant Professor, Program Director
Department of Human Performance
Division of Physician Assistant Studies
West Virginia University School of Medicine
Morgantown, West Virginia

Michael N. Moya, MD
Academic Hospitalist
Associate Program Director
Family Medicine Residency Program
Department Chair, Family Medicine
St. Agnes Medical Center
Fresno, California

Andrew Nevins, MD
Clinical Associate Professor
Stanford University School of Medicine
Stanford, California

Karen Paolinelli, MSN, APRN, FNP-C, PA-C, DFAAPA
CEO/President
Madera Community Hospital
Madera, California

Shantha Parameswaran, MD, FAAP
Pediatrician
One Community Health
Sacramento, California

Tushar M. Patel, MD
Pediatrician
Children's Medical Centers of Fresno
Fresno, California

Jason Radke, MMS, PA-C
Department Chair & Program Director
Assistant Professor
College of Health Professions
Rosalind Franklin University of Medicine and Science
North Chicago, Illinois

Jennifer Ramos, MPAP, PA-C
Clinical Instructor of Family Medicine
Physician Assistant Program
Keck School of Medicine
University of Southern California
Alhambra, California

Karla Reinhart DNP, FNP-C, ARNP
Murphy Creek Wellness, Nurse Practitioner/Owner
Medford, Oregon
Oregon Health & Science University
Ashland, Oregon

Sara Rygol, MPAS, PA-C
Primary Care Physician Assistant
CHI Health Clinic
Council Bluffs, Iowa

Alfred M. Sadler Jr, MD, FACP, ScD (Hon)
Master of Science Physician Assistant Program
College of Health Sciences and Human Services
California State University, Monterey Bay
Salinas, California

Anabel Segovia, RN, MSN, FNP-C
Nurse Practitioner
Sierra Kings
Reedley, California

Tana Summers, MS, PA-C
Assistant Program Director
Physician Assistant Program
Samuel Merritt University
Oakland, California

Laura L. Van Auker, DNP, APRN, FNP-BC, MSN, SN-C
Assistant Clinical Professor
Betty Irene Moore School of Nursing
University of California, Davis
Sacramento, California

James Van Rhee, MS, PA-C
Program Director/Associate Professor
Yale School of Medicine, Physician Assistant Online Program
Yale University
New Haven, Connecticut

Veronica Vo, MPAC, PA-C
Family Medicine Physician Assistant
Family Healthcare Network
Hanford, California

Anne Walsh, PA-C, MMSc, DFAAPA
Clinical Associate Professor
Chapman University PA Program
Crean College of Health and Behavioral Sciences
Irvine, California

Ariel L. Watriss, MSN, NP-C
Nurse Practitioner, Sexual Health Specialist
College of Health Nurse Practitioner
Tufts University Health Services
Medford, Massachusetts

Jennifer C. Weeks, DNP, FNP-C
Family Nurse Practitioner
MedNow Urgent and Primary Care
Augusta, Georgia

Sampath Wijesinghe, DHSc, PA-C, AAHIVS
Principal Faculty, Master of Science in Physician Assistant Studies
Stanford School of Medicine
Primary Care PA-C and HIV Specialist
at Adventist Health
Central Valley Network, California
Primary Care PA-C and HIV Specialist at Madera Community Hospital
Madera, California

REVIEWERS

Krishan Ariyarathna, MD
Internal/Hospital Medicine
Nebraska Hospitalist, LLC
Omaha, Nebraska

Alan Brokenicky, MPAS, PA-C
Academic Co-Director
Physician Assistant Studies Program
College of Medicine and Sciences
Mayo Clinic
Rochester, Minnesota

Joan Caruso, MPAS, PA-C
Physician Assistant Program Director/Chair,
Clinical Assistant Professor
Department of Physician Assistant Studies
Clarkson University
Potsdam, New York

Rachel Chappell, MHSc, PA-C
Program Director, Clinical Assistant Professor
Interdisciplinary Human Studies, Physician
Assistant Program
School of Allied Health Professions
Louisiana State University Health Science Center
New Orleans, Louisiana

Simerjit Singh Dhaliwal, PA-C, MS, RCP
Family Medicine, United Health Centers of
San Joaquin Valley
Selma, California

Christy Eskes, DHSc, MPA, PA-C
Instructor, Former Assistant Professor and Past
Program Director
Department of Physician Assistant Sciences
Loma Linda University
Loma Linda, California
Lead Advanced Practice Provider for Correctional Health
Emergent Medical Associates
Los Angeles, California

Michael Estrada, DHSc, MS, PA-C
Founding Director and Chair
Physician Assistant Program
College of Arts and Sciences
University of La Verne
La Verne, California

Susan M. Fernandes, LPD, PA-C
Associate Dean for PA Education
Clinical Professor of Pediatrics and Medicine
Stanford School of Medicine
Stanford, California

Nichole A. Flores, BA, MA. MAOB, PsyD
Director of Behavioral Health
Behavioral Health, Valley Health Team, Inc.
Kerman, California

Jordan Hairr, EdD, MSPAS, PA-C
Associate Dean
School of Allied Health Professions
Program Director
Department of PA Medicine
Greer, South Carolina

Virginia McCoy Hass, RN, DNP, FNP-C, PA-C
Associate Clinical Professor (retired)
Betty Irene Moore School of Nursing
University of California, Davis
Sacramento, California

Megan Heidtbrink, MPAS, PA-C
Program Director, Associate Professor
Union College Physician Assistant Program
Union College
Lincoln, Nebraska

Cherilyn M. Hendrix, DHEd, MSBME, PA-C, DFAAPA
Program Director/Associate Professor
University of Maryland Baltimore/Anne Arundel
Community College Collaborative Physician
Assistant Program
University of Maryland Baltimore Graduate School
Baltimore, Maryland

Trenton Honda, PhD, MMS, PA-C
Associate Professor and Division Chief
Division of PA Studies
University of Utah
Salt Lake City, Utah

Amanda J. Ingalls, MS, PA-C
Clinical Instructor of Family Medicine
Department of Family Medicine
Division of Physician Assistant Studies
University of Southern California
Alhambra, California

Jason R. Kessler, MD, FAAP
Medical Director/Pediatrician
Primary Health Care, Inc.
Des Moines, Iowa

Rhonda Larsen, MHS, PA-C
Associate Program Director
Clinical Assistant Professor
Master of Science in Physician Assistant Studies
Stanford School of Medicine
Stanford, California

Seth Lauterbach, MPAS, PA-C, CAQ-EM
Nebraska Emergency Medicine, PC, Bryan Trauma
Bryan West Medical Center
Lincoln, Nebraska

Kevin Lohenry, PhD, PA-C
Clinical Professor of Family Medicine
Director of USC Primary Care Physician Assistant Program
Vice Chair for Educational Affairs
University of Southern California
Los Angeles, California

Stephanie McGilvray, PA-C, MMS
Physician Assistant Program
Department Chair and Program Director
University of South Alabama
Mobile, Alabama

Jennifer Momen, MD, MPH, FAAP
Assistant Professor, Program Director
Department of Human Performance
Division of Physician Assistant Studies
West Virginia University School of Medicine
Morgantown, West Virginia

Nina Multak, PhD, MPAS, PA-C, DFAAPA
Associate Dean and Randolph B. Mahoney Director
School of Physician Assistant Studies
University of Florida
Gainesville, Florida

Ila Naeni, DO
Associate Program Director & HS Associate Clinical Professor
Family and Community Medicine
University of California San Francisco-Fresno
Fresno, California

Ian Nelligan, MD, MPH
Clinical Assistant Professor and Family Medicine Physician
Stanford School of Medicine
Stanford, California

Courtney Nelson, MMS, PA-C
Clinical Assistant Professor of Medicine
Master of Science in Physician Assistant Studies
Stanford School of Medicine
Stanford, California

Jennifer Ramos, MPAP, PA-C
Clinical Instructor of Family Medicine
Physician Assistant Program
Keck School of Medicine
University of Southern California
Alhambra, California

John Ramos, MMS, PA-C, EM-CAQ
Assistant Professor
Physician Assistant Studies
School of Health and Natural Sciences
Dominican University of California
San Rafael, California

Michele Toussaint, MS, PA-C
Director of Student Scholarship and Clinical
Assistant Professor of Medicine
Master of Science in Physician Assistant Studies
Stanford School of Medicine
Stanford, California

Judy Truscott, MPAS, PA-C
Program Director, Associate Professor
Physician Assistant Studies
Chatham University
Pittsburgh, Pennsylvania

Joseph Weber, DHSc, MPAS, MBA, PA-C
Physician Assistant Studies
Department Chair and Program Director
Presbyterian College
Clinton, South Carolina

Dee White, DNP, FNP
Doctor of Nurse Practitioner, Family Medicine
Adventist Health Medical Clinic
Kingsburg, California

Sampath Wijesinghe, DHSc, PA-C, AAHIVS
Principal Faculty, Master of Science in Physician Assistant Studies
Stanford School of Medicine
Primary Care PA-C and HIV Specialist at Adventist Health
Central Valley Network, California
Primary Care PA-C and HIV Specialist at Madera Community Hospital
Madera, CA

Gordon H. Worley, MSN, RN, FNP-C, ENP-C
Assistant Clinical Professor
Betty Irene Moore School of Nursing
University of California, Davis
Sacramento, California

FOREWORD

This is a remarkable collection of primary care case studies, presented in a unique and comprehensive manner. Included is a broad spectrum of cases that emphasize the scientific as well as the psychologic and emotional dimensions of care. We can all learn from each other as physicians, physician assistants, and nurse practitioners. Anyone interested in primary care will benefit from this book.

The book is arranged so you can pick and choose what interests you or relates to a specific case that you have. It is an ideal volume for those engaged in the primary care education of physicians, physician assistants, and nurse practitioners. It will also be a valuable resource for the primary care practitioner.

Besides the standard presentation of a patient problem, each case includes evidence-based information, references for additional reading, ICD-10 and CPT codes (very practical), topics for education, legal concerns, and specific items to be addressed by the broader healthcare team from receptionist to specialist. Bedside manner questions allow the educator or practitioner to expand the scope of inquiry, as time and interest permit. Finally, the narrative by the primary care provider brings the discussion from the didactic/scientific to the personal. I am not aware of any other volume that does this.

I congratulate Sampath Wijesinghe, who is a sterling example of a primary care educator and practitioner, for putting together this remarkable collection of cases and the stories that go with them. I know that the reader will find this multiauthored book invaluable and inspiring.

Alfred M. Sadler Jr MD, FACP, ScD (Hon)
Senior Advisor, California State University
Master of Science Physician Assistant Program,
Salinas, California

FOREWORD

Primary care medicine is the heart of medicine. It is a field where you never know what patient is going to walk through your door next. Frequently, what is listed on the schedule is not what you discover as you sit across from your patient and ask, "So what brings you in today?" It's also not what you discover when you dig a little deeper into a patient's story. More than once, I have called out to my puzzled medical assistant, "*Can you grab me an anoscope*?" for a patient who came in for a sore throat! Variety is part of what makes primary care so wonderful. As a clinician, you also get to build wonderful, long-term relationships, and this is my favorite part of primary care medicine. When you have seen patients year upon year, possibly even from birth, you really get to know them. In time, you recognize when there is a change in the way Mr. Jones is dressed or note that his smile is a little less bright or his steps a little more shuffled. There will likely be a day when your patient says "*You saved my life*" and rewards you with their homemade chocolates. There is never a dull day in primary care medicine, and as clinicians, we really make a difference in the population in which we serve. For these reasons, I love primary care medicine and there is no place I would rather work as a nurse practitioner.

As a new clinician, you will really find it is true when that medicine is both art and science. You will develop your individual approach to the art of medicine. As you learn and grow, you will learn how to master your "medical paintbrush." You will see 10 clinicians might treat the same patient in 10 different ways, and all of them may be correct in their approaches. Listening carefully, *really listening* to a patient, a family, caregivers, will improve your diagnostic skills. You will also learn how to most effectively and thoughtfully deliver education or bad news. Your clinical skills are absolutely vital, but your "soft skills" are invaluable. However, traditional classroom is not the most effective place to learn them. Soft skills come with time and experience and include communication skills, listening skills, and an ability to demonstrate empathy. It is your ability to "read" others. It is a vital part of our skill set as clinicians.

It is our job to earn our patients' trust and to give them the very best care. Even when our schedules are packed with back-to-back appointments and our inbox is stacked with labs and reports to be reviewed, we must remember that "the patient in Room 1" is more than just a CPT code. If primary care medicine is the heart of medicine, then our patients are its soul. We have to work collaboratively as a team—from the front office person, to the clinician, to the biller. We have to treat patients the way we would want to be treated, because some day you may be the patient.

Clinical rotations can be an overwhelming experience for any student. Despite all of your didactic preparation, you may feel completely underprepared. The first year as a new clinician is a formidable learning trajectory. Suddenly, you are making life and death decisions about *your patient. Apps and reference manuals are helpful, but what you really want is real-world advice from those in the trenches, and that is exactly what this book provides. It is a real-world, practical handbook of genuine scenarios. All the cases in the book are real-life case studies shared by the authors. Through a stepwise process, you will be challenged to critically think through the steps of clinical decision-making—from the chief complaint to billing and coding, they are all discussed. In addition to clinical decisions, you will hear each author's approach and some of the soft skills used. This book will be an invaluable asset, not only to a student or new clinician working in primary care but also to the seasoned professional who wants to gain insight by looking at other approaches in the art and science of medicine.*

Lynn H. McComas, DNP, ANP-C, PHN
President/CEO PreceptorLink, Encinitas, California

FOREWORD

Some might say there are plenty of primary care textbooks today. Why one more? I'm here to offer three reasons for *101 Primary Care Case Studies*: the art, the appeal, and the author.

This text reminds us of *the art* of medicine, beyond the requirement to practice by evidence-based medicine. Yes, each case study provides the science and relevant practice guidelines behind a particular and vital diagnosis. To practice medicine solely by evidence alone leads to a risk of recipe-card decisions rather than personalized patient care. Heuristics, when conjoined with evidence, leads to best practice. *101 Primary Care Case Studies* enhances this foundational evidence-based content, integrating the artistic touch of medicine by personalizing each case to a real patient. Each chapter includes the unique section, titled Insight from the PCP, which offers a clinician's pearls of wisdom about bedside manner and achieving optimal patient outcomes based on science and first-hand experience. The book's collection of pearls alone offers tremendous value to the reader seeking to guide patients toward the best health outcomes.

As it is written for primary care providers, this text emphasizes *the appeal* our career offers. In primary care, we have the privilege to develop patient relationships that extend across the lifespan. Representing these cradle-to-grave lives, the case studies in this book read as stories from the family. Only primary care expects a consistent patient relationship that celebrates births, school events, sporting achievements, graduations, marriages, promotions, relocations, retirements, and bereavements, with all the successes and disappointments along the journey. Clinical decisions wrestled in these pages are made with consideration of how it affects the individual life of a patient at a particular time. By reading only a handful of case studies herein, one comes away with how each patient deserves an individualized approach via team-based care with full consideration of the person's current life circumstances. That approach epitomizes why we in primary care love what we do.

Finally, to those who might say we have enough primary care textbooks, you don't know *the author*, Dr. Wijesinghe. He cares for his patients with both exceptional clinical skills and compassionate bedside manners—and emphasizes the importance of both to be a good clinician. He respects all members of the healthcare team as critical to optimal patient care, including receptionists, the cleaning crew, and the ever-important medical assistant. Dr. Wijesinghe seeks to be a part of the solution whenever possible (why he chose primary care medicine in rural clinics including HIV medicine, where healthcare professional shortages are the greatest). So, when using a textbook by an author with this indomitable spirit of integrity, the reader can expect an excellent opportunity to learn from a master among the most caring and professional of clinicians.

For learners entering the primary care professions of health delivery, or for learners with years of medical experience, your library is incomplete without this book. Nothing else combines the art of medicine with the appeal of primary care than what this author has created. We will serve our patients with better care by integrating the pearls of this text into our practices.

Michael J. Huckabee, PhD, MPAS, PA-C
Director, Physician Assistant Program, Associate Professor, Senior Associate Consultant-II,
Mayo Clinic, Rochester, Minnesota

PREFACE

Introduction

Primary care medicine is the largest medical specialty in the United States. While physician assistants, nurse practitioners, and physicians branch into specialties, a majority practices in primary care. When practicing primary care medicine, clinical skills and soft, or bedside manner, skills are important. Although there are many clinical medicine textbooks for students to learn all the important data about the hundreds of conditions a primary care provider will treat, there are few that use case studies as a primary means to help students work through a real patient scenario to strengthen clinical skills, let alone soft skills, which are often overlooked in a packed clinical curriculum. Current case study products typically focus solely on diagnostic skill. None focus on the combination of both clinical and bedside skills.

This book is intended to bridge the gap between the objective clinical content presented in the didactic phase of a PA, NP, or medical curriculum and the clinical application/rotation phase. It can be used during both phases of a program. Students will use book knowledge to work through a real-life chief complaint presented by a patient, and through a series of questions determine the appropriate focused exam, workup, diagnosis, and treatment for the patient.

Real-life medicine is not organized by organ system or diagnosis. Most often, patients will present with vague descriptions of symptoms, and a PCP will have to surmise the best approach to the problem. For example, a patient who presents with chest pain may have a diagnosis related to the heart, but the problem could also be related to anxiety or reflux.

The Origin of This Book

When I was a PA student, I enjoyed learning from clinicians who shared patient cases. I knew I would see similar cases when I started practice. When I began teaching at the University of California Davis PA/NP program, I taught students based on real cases. I recognized immediately that students are keen to learn from real cases. My experience first as a PA student and then as a medical educator led me to propose a book based on real cases. My initial idea was to write a book to help PA, NP, and medical students acquire competent skills.

Meeting Alex Moir

In August 2010, I started practicing primary care medicine in Sanger, a small town in California. I practiced medicine with Dr. Alex Moir, my collaborative physician. During my first week, Dr. Moir invited me to have lunch with him so we could get to know each other. I was looking forward to our lunch and was nervous at the same time. During our lunch, I said, "Dr. Moir, I am happy to work for you." He immediately corrected me, "Please don't think you work for me. I want you to know that you work *with* me. We are one team." On that day, I realized I had the opportunity to work with a great human being. Dr. Moir was my mentor, who practiced competent and compassionate care. I wanted to practice medicine like Dr. Moir practiced medicine. I always thought I was pretty compassionate, but, as I worked with Dr. Moir, I realized my compassionate care skills were developing even more. Dr. Moir was teaching me to deliver compassionate care. I was committed to sharing this powerful message with other clinicians, particularly with future clinicians, by keeping compassionate care central to the book's focus. So, I compiled this book based on real patient cases. I wanted Dr. Alex Moir to coauthor this book, but he died in a tragic accident. My grief put the book on hold for a time.

When I began to think about the book again, I decided I would dedicate it to Dr. Moir, whose mentorship influenced my life as a husband, father, and clinician. With that in mind, I reached out to some PCPs who provide competent and compassionate care to contribute cases. Some have taught me during my didactic training in PA school, some have trained me during my clinical clerkships, some are friends and colleagues, and some are students I had trained. I intentionally included a wide range of experience in this book, from very experienced clinicians to a few new clinicians. I wanted to present a variety of cases from clinicians with short-term and long-term experience. I hope these patient cases help future and practicing clinicians to learn and provide the best care to their patients. This book was a collaborative effort of many people with a common goal: taking care of patients and doing something meaningful for medical education.

The goal of this book is to improve competent skills and bedside skills. There is no disagreement that we can teach competence skills to the next generation and improve clinical skills. However, there is disagreement on whether compassion can be learned. I believe it can be, and there is evidence in support of my belief.

Are Bedside Skills and Compassion Necessary?

Compassion is fundamental to the delivery of healthcare,[1] something that patients, families, clinicians, and policy makers all agree.[2] The first principle of the American Medical Education cites compassion as being necessary in the delivery of care.[2] According to the Code of Ethics, "A physician shall be dedicated to providing competent medical care, with compassion and respect for human dignity and rights."[2] PAs and NPs are expected to practice the same. Consequently, compassion is required of all clinicians.

Are Bedside Skills and Compassion Practical to Teach?

There has been a long-term debate whether compassion can be taught. Some argue that compassion is an innate quality of character.[2] Current evidence suggests that compassion can be developed and sustained over time.[2] At the beginning of training, students demonstrate different levels of inherent compassion. Subsequently, capacity varies from student to student depending on their character at the baseline.[2] Recently, a randomized controlled trial on empathy training suggested that inherent qualities can be developed and sustained.[3]

Eight observational studies focused on educational interventions aimed at improving compassionate care provided by clinicians and students in a clinical setting.[4–12] The researchers used a variety methods (journals, simulations, reflection, etc.) and found that students demonstrate improved self-awareness, clinical communication skills, job satisfaction, caregiving competence, satisfaction with provision, and caregiver and workplace wellness.[4–12] Considering these results, it is safe to suggest that compassion is teachable.

Another group of authors found that common exemplary characteristics can improve humanistic behavior. Some of these were nonverbal communication, overt demonstrations of respect, building a personal connection, and eliciting and addressing patients' affective response to illness.[13] The authors concluded that there are many ways clinical teachers demonstrate humanistic behavior at the bedside.[13] Collectively, these findings suggest that as medical educators we have a role to play in teaching by example: Our humanistic behavior will build the same in students.[14] I am optimistic that the Insight from the PCP section of this book will reveal the art of medicine and be a valuable resource to promote a love of humanity.

Conclusion

Humanism and competent care are the primary focus of this book. If you are a PA, NP, or medical student, this will be a helpful and practical workbook during your education. These are real cases, so you know exactly what took place and how the cases were managed. To protect patients' privacy, names and other identifying information have been omitted, and some details about the cases were changed. Additionally, the authors who treated these patients do not have a byline on the case to further protect patient privacy. My goal is to share the practical aspect from each case and provide you an excellent learning opportunity while protecting every patient's privacy. Working through this book prior to clinical clerkships will provide a good foundation. Also, for practicing PCPs or clinicians about to enter practice, this book will be a helpful and practical resource.

When treating a patient, a PCP has an opportunity to provide comprehensive care that is both evidenced based and compassionate. All of us practicing clinicians and/or medical educators and future clinicians should be deliberate in our efforts to provide comprehensive care. It is my sincere hope that *101 Primary Care Case Studies* will contribute to your ability to be a compassionate and competent PCP. Be well.

Sampath ("Sam") Wijesinghe

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HOW TO USE THIS BOOK

- Cases are organized randomly in the table of contents by a patient's chief complaint, which is how a patient realistically presents in clinic.
- You will work through real-life patient cases* and answer a series of questions to determine the workup, diagnosis, and treatment for a patient. Except for question 6, the questions in each case are the same, to help guide you on how to methodically work through a patient's complaint. The questions are as follows:

1. **What is the differential diagnosis?** Pay careful attention to the history of present illness, review of systems, relevant history, and physical exam to determine a list of differential diagnoses. Provide a rationale for each diagnosis on your list. Briefly explain why or why not it is the most likely diagnosis.
2. **What is the most likely diagnosis? Why?** Based on the information available, determine the most likely diagnosis. Some cases are straightforward; others are not. That is the reality in primary care. Keep in mind you are making a most likely diagnosis, not a definitive diagnosis.
3. **Demonstrate your understanding about the pathophysiology in regard to the most likely diagnosis.** While this is not a focus of the book, it is practical to have a basic understanding of a disease.
4. **Should tests/imaging studies be ordered? Which ones? Why? Think about tests/imaging beyond the primary care setting as well.** Determine what diagnostic testing and/or imaging is needed to evaluate the patient. What tests will be performed in the clinic? What tests or images might you want to order but are not typically available in a primary care setting? The online supplement provides details about the tests/imaging ordered by the primary care provider (PCP) and other specialists involved in the case and also provides the results.
5. **What are the next appropriate steps in management?** Think about what your next steps would be for this patient. Are you going to treat and manage the patient? Would you transfer the patient to the ED? Would you refer to a specialist? If you are unclear how to move forward, check the online supplement to determine your progress and then move forward as appropriate.
6. **Review research on the diagnosis. Provide reference(s).** This question will vary from case to case, asking about risk factors, diagnostic criteria, prevalence, treatment options, and other information about the diagnosis under consideration. The use of evidence-based medicine is essential to stay abreast of recent developments, and no one has a greater need for an incredibly broad and deep knowledge base than a PCP. Read and rely on the best available research and refer to evidence whenever it is available. This, coupled with growing clinical expertise, is essential for practicing medicine. We are all lifelong learners.
7. **What are the pertinent ICD-10 and CPT (E/M) codes for this visit? Provide a short rationale.** ICD-10 has approximately 68,000 codes. Medical practitioners are expected to

be specific when choosing these codes. This is an opportunity for future clinicians to learn how to do this. In addition, CPT (E/M) coding can be challenging for new clinicians. If there is an established patient with a medical diagnosis, clinicians may find it challenging to determine whether the visit is coded as level 3 or level 4. This exercise builds this skill. Remember to use the diagnostic codes for the initial visit.

8. **What is the appropriate patient education for this case?** PCPs have a responsibility to educate patients on disease, diagnosis, treatment, and good health habits. This is mandatory and part of every patient visit.
9. **If not managed appropriately, what is/are the medical/legal concern(s) that may arise?** Despite training and experience, there are rare occasions when a negative patient outcome or experience leads to legal action or medical consequence. It is important that young clinicians identify areas of legal exposure and the consequences of incorrect diagnoses and negligence.
10. **Think about interprofessional collaboration for this case. Provide a list of specialties or other disciplines and indicate what contribution these professionals might make to managing the patient.** Medicine is a team sport. PCPs cannot do their jobs alone. It is essential that clinicians value each team member and recognize their contributions. This question will help you become aware of how many individuals actually contribute to a patient's care.

- The cases conclude with a few questions (11–13, but not all three are always included) about your personal bedside manner approach, including communication, handling a distressed patient or parent, and dealing with negative outcomes. These are subjective questions for which answers are not directly provided, but are intended to be thought-provoking and to encourage discussion.
- Pay careful attention to the history of present illness, review of systems, relevant history, and physical exam to determine the best answers to these questions.
- Answers to all the questions are available on Springer Publishing Connect. Instructions for how to access Connect appears on the Connect access card that accompanies this book. Try to answer the questions yourself before reviewing the answers and outcomes online.
- Note that the answers for the bedside manner questions are somewhat subjective. The Outcome and Insight from the PCP sections in the online supplement demonstrate the author's bedside manner and compassion and how the case developed and concluded. The insights from the PCPs provide valuable information about effective communication skills and ways to build trust and underscore the importance of a PCP–patient relationship.
- Keep in mind that medicine is subjective, and clinicians have different approaches to managing patients. They may come up with the same diagnosis at the end; however, their approaches will likely differ.
- For instructors who are using this workbook in a classroom environment, a filterable table of contents is available to you to sort through cases by diagnosis, patient population, gender, and organ system to aid in assignments. Contact your Springer Publishing sales representative for access at springerpub.com/instructors.
- A breakdown of the number of cases by systems appears below:

❍ Behavioral Medicine	5	❍ Infectious Disease/ Reproductive System	4
❍ Cardiovascular System	5	❍ Infectious Disease	10
❍ Dermatologic System	5	❍ Musculoskeletal System	12
❍ Endocrine System	7	❍ Neurologic System	7
❍ Eyes, Ears, Nose, and Throat	8	❍ Pulmonary System	8
❍ Gastrointestinal System	11	❍ Renal System	5
❍ Genitourinary System	4	❍ Reproductive System	5
❍ Hematology/Oncology	5		

*Demographics and patient data have been altered to protect privacy.

FEVER AND BACK PAIN, GERIATRIC FEMALE

CASE 37

Chief Complaint

"Fever and back pain."

History of Present Illness

A 78-year-old woman presents to her regular PCP with a 2-day history of fatigue, malaise, and fever. She awoke this morning with a dull ache in her right mid-back and some nausea. She came to the office because she is concerned about the pain and her worsening symptoms. She has been resting and taking acetaminophen (650 mg every 4 to 6 hours), which has helped with the fever and aches, but her symptoms return as the drug wears off. She is unsure of how high her fever has gotten. She states the pain is a 3 or 4 out of 10, but the fatigue, malaise, and nausea have kept her from her daily activities and caused her to stay in bed most of yesterday and today. She believes she might have "the flu" though she received the vaccine 3 weeks ago. She is most concerned because she lives alone and is afraid of becoming seriously ill and having no way to call for help. She denies ever smoking and drinks a glass of wine only once or twice a month. Her husband of many years died 8 years ago of prostate cancer, and she lives independently in an apartment. One of her three children lives a few miles away and visits frequently. She is not currently sexually active.

She denies chills, night sweats, rhinorrhea, cough, SOB, dyspnea, chest pains, palpitations, vomiting, diarrhea, or constipation. She admits to increased urinary frequency and urgency but denies pain with urination. She denies sick contacts or changes to her dietary routine.

Review of Systems

The patient's ROS is positive for occasional knee pain. Her ROS is negative for weakness, weight loss, focal pain except in the right flank, difficulty with memory or concentration, recent illness, or injury.

Relevant History

The patient's history is significant for hypertension and osteoporosis. She has a family history of CAD. Her daughter lives nearby and is available to stay with her if needed.

Allergies

No medication, environmental, or food allergies.

Medications

- Lisinopril/hydrochlorothiazide 10/12.5 mg daily.
- Alendronate 70 mg weekly.
- OTC 1,000 mg calcium citrate with 600 IU vitamin D3 daily.

Physical Examination

Vitals: T 38.8°C (101.8°F), P 96, R 14, BP 106/68, WT 56.7 kg (125 lbs), HT 172.72 cm (68 in.), BMI 20.2.

General: Ill and uncomfortable appearing, but non-toxic and without acute distress.

Psychiatric: Alert and oriented to person, place, and time; coherent conversation.

Skin, Hair, and Nails: Skin pale and slightly flushed, no rash or lesion. Nails are smooth without hemorrhage.

Eye: Eyes without retinal lesions.

ENT/Mouth: Oral mucosa moist without lesions.

Chest: Symmetric excursion with no accessory muscle use.

Breasts: No mass or lesion bilaterally.

Lungs: Resonant with vesicular breath sounds all fields; no wheezes, rales, or rhonchi.

Heart: Quiet precordium; RSR; no murmur, rub, or gallop.

Abdomen: Flat, normoactive bowel sounds all quadrants, no mass. There is mild right costovertebral angle tenderness and mild suprapubic discomfort but no tenderness.

Genital/Rectal: Vaginal and introital mucosa show atrophy. The uterus is small and smooth. No mass or lesion detected in the adnexa or cul-de-sac.

Musculoskeletal: No point tenderness detected on the vertebral processes.

Clinical Discussion Questions

1. What is the differential diagnosis?

2. What is the most likely diagnosis? Why?

3. Demonstrate your understanding about the pathophysiology in regard to the most likely diagnosis.

4. Should tests/imaging studies be ordered? Which ones? Why? Think about tests/imaging beyond the primary care setting as well.

5. What are the next appropriate steps in management?

6. Review a recent and credible research article about the key factors (causes, risks, diagnostic testing, and treatment selection) of this diagnosis. Provide references for your response.

7. What are the pertinent ICD-10 and CPT (E/M) codes for this visit? Provide a short rationale.

8. What is the appropriate patient education for this case?

9. If not managed appropriately, what is/are the medical/legal concern(s) that may arise?

10. Think about interprofessional collaboration for this case. Provide a list of specialties or other disciplines and indicate what contribution these professionals might make to managing the patient.

BEDSIDE MANNER QUESTION

11. What would your communication style/approach be with this patient?

ANSWER KEY: FEVER AND BACK PAIN, GERIATRIC FEMALE

CASE 37

1. Differential Diagnosis

- **Influenza** is certainly a consideration in a patient with fever and myalgia. The patient notes influenza vaccination 3 weeks ago, which is normally sufficient time to mount a response but the immunogenicity of vaccines is reduced with age, and it is possible that the vaccine does not fully cover the strain that a patient encounters.
- **Pyelonephritis** is high on the differential list for this patient. She admits to some urinary frequency and urgency, and although she is not complaining of dysuria there is some discomfort over the bladder as well as right CVA tenderness.
- **Osteomyelitis** generally presents with back pain and fever but the patient displays no tenderness of her spine, making this diagnosis unlikely.
- **Metastatic cancer** is a possible etiology in an older patient. Breast, renal, and lung cancers are all common cancers that might metastasize to the spine as well as cause fever and malaise. Her stable weight makes this diagnosis less likely but does not take the possibility off our list.
- **Endocarditis** may present without specific symptoms or signs beyond fever and fatigue. Septic emboli may lodge in various organs, including the bones. The lack of a heart murmur makes this a far less likely possibility.

2. Most Likely Diagnosis

Pyelonephritis is the most likely cause of the patient's symptoms and is consistent with her symptoms and presentation. Older patients may not have symptoms of cystitis. Vaginal and introital atrophy can lead to changes in the microbiome, which might lead to increased susceptibility to urinary infections. With pyelonephritis, one should be very alert to the possibility of sepsis, particularly in the older patient.

3. Pathophysiology

Pathogens from the GI tract, generally gram-negative rods such as *Escherichia coli*, ascend through the bladder to one or both kidneys. Either gram-positive or -negative bacteria may go on to cause bacteremia and potentially lead to sepsis through direct effect or through toxin production. Any obstruction, such as a kidney stone or, in males, an enlarged prostate may predispose a patient to infection.[1]

4. Diagnostic Tests/Images

- Urine dipstick showed leukocytes, trace blood, and positive nitrate.
- Urine sent for culture and sensitivity.

5. Next Steps

- Start empiric antimicrobial therapy with a fluoroquinolone (ciprofloxacin 500 mg BID for 7 days) and monitor the patient closely over the next day or two.
- Call the patient next day to assess how she is doing. Patient stated it is getting worse, including fever and nausea.
- Because the patient lived alone and was showing worsening symptoms suggestive of impending sepsis (nausea), she was hospitalized.

6. Causes, Risks, Diagnostic Testing, and Treatment Selection

- *E. coli* causes most cases of pyelonephritis. While the preferred treatment of lower UTIs is nitrofurantoin because it collects in the urinary system, it does not sufficiently penetrate the tissues and is not an appropriate treatment for pyelonephritis.[2]
- Vaginal atrophy may play a role in susceptibility to UTI as well as cause irritation during sexual activity. Local vaginal estrogen therapy may be used in patients at low risk for breast cancer.[3]
- Every patient with suspected pyelonephritis should have a urine culture and sensitivity test done. This will allow selection of the best antimicrobial based on response of the specific causative pathogen. Results will take 2 to 3 days, at which time, assuming a patient is stable, treatment can continue with the least toxic and most effective regimen. Duration of treatment varies with the agent.[2]
- Resistance to trimethoprim-sulfamethoxazole, the second-line treatment for lower UTI, is sufficiently common, so a patient should start on a fluoroquinolone, usually ciprofloxacin. Fluoroquinolone resistance is also becoming increasingly problematic. In areas where it is prevalent among uropathogens, a patient should be started on parenteral antimicrobials such as ceftriaxone. This may be stepped down once specific microbial results are available.[2]

7. ICD-10 and CPT (E/M) Codes

ICD-10 Code: N10
Acute pyelonephritis. This can be diagnosed based on clinical presentation and urinalysis results. If the cause of her symptoms was less clear, one might code her diagnosis as fever, R50.9, and flank pain, R10.9 (unspecified abdominal pain). A modifier might be added if there is a known precipitating illness or unusual pathogen.

CPT (E/M) Code: Level 4—99214 (Established Patient)
This is a primary care visit for an established patient. Her differential is relatively complex. Her symptoms put infection immediately at the top of the differential, but the wide variety of potential causes requires that we do a detailed history and exam. In addition, impending urosepsis, a potentially deadly complication of pyelonephritis, particularly in an older patient, must be ruled out.

8. Patient Education Topics

- Pyelonephritis
- Cystitis
- Sepsis
- Atrophy of introital mucosa

9. Medical or Legal Concerns

It is critical to evaluate this patient for potential sepsis, a potentially lethal complication. Missing this possibility could lead to serious illness and death. Such consequences could lead to litigation. In addition, it is important to remember the risk of tendon rupture associated with fluoroquinolone therapy in older patients. Therefore, addressing the black box warning and assessing the risk–benefit ratio while obtaining consent from the patient prior to prescribing fluoroquinolone is recommended.

10. Interprofessional Collaboration

- Receptionist registers the patient.
- MA takes brief history and vital signs and notifies clinician if patient is in distress.
- PCP diagnoses pyelonephritis and instigates arrangements for hospitalization and calls ED and informs the clinician there of the patient's case.
- MA arranges for transportation of the patient along with the record of the visit and labs.

- ED clinician evaluates the patient and begins empiric therapy.
- Hospitalist manages the patient during admission. In cases of sepsis, an ICU clinician will also become involved, and if there is significant antimicrobial resistance the infectious disease specialist will also be involved.
- PCP monitors patient's progress and resumes her care on discharge.

Outcome

The patient was admitted to the hospital and started on IV ciprofloxacin. Her fever increased and her blood pressure dropped, indicating potential onset of sepsis. Fortunately, her symptoms began to resolve within 24 hours. Urine culture and sensitivity showed *E. coli* susceptible to trimethoprim-sulfamethoxazole, which was continued for a week after discharge.

Insight from the PCP

The patient recovered from pyelonephritis without complication. She became nervous about the possibility of having pyelonephritis again and frequently came to the office with symptoms of dysuria. On some occasions, bacteriuria with or without leukocytosis was found, and she was treated twice in the ensuing year for cystitis. After the second episode, a gynecologic exam was done, revealing atrophy of the introitus and vaginal tissue. She was started on vaginal estrogen tablets as her breast cancer risk was low. Symptoms resolved and there were no further episodes of UTI.

It is critical to acknowledge both the patient's immediate concern (UTI and potential pyelonephritis) and the underlying concern that relates to the availability of help in case of illness and injury without losing her independence. A local senior services agency was able to assist her and her daughter to set up a regular monitoring system. In addition, she became more involved in volunteer activities with her church, giving her another point of contact and helped allay her concerns.

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PAINLESS ANAL BUMPS, ADULT TRANSGENDER MALE

CASE 52

Chief Complaint

"Painless anal bumps."

History of Present Illness

A 23-year-old transgender man presents to a new PCP with a several-month history of painless lesions around his anal area. He first noticed them while showering; they felt like little skin tags and were painless. Early on, he could only feel two or three. He states those are larger now, and more have emerged around the anus. He states they sometimes bleed after a bowel movement. He is sexually active with a self-identified gender non-conforming partner with male genitalia, and they engage in both vaginal and anal sex where the patient is the receptive partner. He denies any other history of STIs and gets regular HIV testing, and the last routine screens for HIV and STI testing at the local health department were negative.

The patient did see a local urgent care provider last week about his complaints. The clinician told him that they looked like skin tags, but might be warts, and if he waited, they should go away on their own. They have not, and this is why he has come to today's appointment.

Review of Systems

The patient's ROS is negative for any similar skin rashes on other areas of the body. He denies any vaginal or anal discharge or bleeding. He also denies any symptoms of fever, chills, changes in bowel habits, chest pain, abdominal pain, SOB, or any constitutional symptoms.

Relevant History

The patient's medical history is significant for elevated BP as told to him by a previous PCP, but he has never been diagnosed with hypertension and he takes no medications for this. His surgical history is significant for a tonsillectomy at age 18. He lives with his partner; they have been together for 2 years, and he denies other sexual partners. He states he has all his required vaccinations but does not remember if he had the HPV vaccine. He was asked to leave his parents' house at 19 when he embraced his gender identity and has not spoken with them since; they have all his childhood medical and vaccination records. His mental health is good, he sees a therapist regularly and has never been diagnosed with any formal psychological diagnoses.

We discussed his gender confirmation, a process he has embraced since he was a young teenager, but only began taking hormones 3 years ago when he became comfortable mentioning it to his medical provider. He reports no interest in a mastectomy as part of his confirmation at this point. He prefers to "go with the hormones" first before pursuing surgical interventions as well. In spite of the regular follow up, he states he has not had a full pelvic exam in years since his gender confirmation. Because none of his previous providers suggested he have one, he thought it was fine to just skip it.

He only takes injectable testosterone at this time, which he administers himself or sometimes his partner administers for him. His testosterone levels have ranged in the mid-400s, which he is happy with, and he has been pleased with facial hair growth, a deeper voice, and a notable increase in muscle mass. He has stopped having periods 2 years ago.

Medical Allergies

No known drug allergies; no known food allergies.

Medications

Testosterone 200 mg IM every 2 weeks (he administers himself).

Physical Examination

Vitals: T 37.1°C (98.8°F), P 77, R 16, BP 128/84, WT 85.3 kg (188 lbs), HT 177.8 cm (70 in.), BMI 27.

General: Thin male in no apparent distress.

Genital/Rectal: Pelvic exam reveals unremarkable vaginal anatomy, no lesions or rashes noted, no cervical lesions or discharge noted. Rectal exam reveals multiple (>5) verruca-appearing lesions varying from 1 to 3 cm. No tenderness to palpation noted; no evidence of external bleeding. All lesions are immediately at the anal verge or immediately surrounding it, without evidence of outlet obstruction.

Clinical Discussion Questions

1. What is the differential diagnosis?

2. What is the most likely diagnosis? Why?

3. Demonstrate your understanding about the pathophysiology in regard to the most likely diagnosis.

4. Should tests/imaging studies be ordered? Which ones? Why? Think about tests/imaging beyond the primary care setting as well.

5. What are the next appropriate steps in management?

6. Review a reliable, recent source and demonstrate an understanding of the prevalence, prevention, and treatments. Provide references for your responses.

7. What are the pertinent ICD-10 and CPT (E/M) codes for this visit? Provide a short rationale.

8. What is the appropriate patient education for this case?

9. If not managed appropriately, what is/are the medical/legal concern(s) that may arise?

10. Think about interprofessional collaboration for this case. Provide a list of specialties or other disciplines and indicate what contribution these professionals might make to managing the patient.

BEDSIDE MANNER QUESTIONS

11. What would your communication style/approach be with this patient?

12. If a patient is distressed by the diagnosis, what might offer support?

ANSWER KEY: PAINLESS ANAL BUMPS, ADULT TRANSGENDER MALE

CASE 52

1. Differential Diagnosis

- **Herpes simplex infection** is a consideration here, but the absence of pain in relation to the rash no blistering argues against this. Herpes often presents as grouped vesicles or ulcers on an erythematous base, and clinically the rash described does not fit this picture.
- **HPV or genital warts** are the most likely diagnosis for this patient based on his presentation and history. The painless nature of this rash and the vegetative quality and appearance of outgrowths of skin all are suggestive of HPV infection.
- **Molluscum contagiosum** is a good consideration for the differential. Molluscum infections occur in a younger population, can be transmitted even when using condoms, and are painless. The appearance, however, is more consistent with erythematous papules with umbilicated centers, which is inconsistent with this patient's presentation.
- **Folliculitis** often presents in the anogenital area and may be more present in areas where patients shave. The lesions here will be more pustular, erythematous, and likely pruritic and/or painful. This patient is on testosterone, which could influence an increased production of sebum in hair follicles and precipitate a follicular infection, though this does not appear to the case here.
- **Syphilis** is known as "the great masquerader." All clinicians should include syphilis in a differential with an unknown rash, particularly in the groin area. Typically, primary syphilis will present as a solitary painless chancre, and secondary syphilis can present as condyloma lata, flat painless lesions, as opposed to lesions with a vegetative appearance, as in HPV.

2. Most Likely Diagnosis

- **HPV or genital warts.** The painless nature of this rash, the vegetative quality, and appearance of outgrowths of skin all are suggestive of HPV infection. Moreover, the history of anal sex may increase general risk for HPV in the anal area manifesting as genital warts. There is no specific blood test for HPV, so clinical suspicion and identification are key to a diagnosis.

3. Pathophysiology

HPV infection occurs at the basal cell layer of stratified squamous epithelial cells.
Infection stimulates cellular proliferation in the epithelium and infected cells display a broad spectrum of changes, ranging from benign hyperplasia to dysplasia to invasive carcinoma. To effectively replicate, HPV must use the host cellular machinery.[1]

There are estimated to be around 150 different strains of HPV, with low risk strains HPV 6 and 11 causing about 90% of genital warts cases. HPV Types 16 and 18 cause about 70% of cervical cancers.[1]

4. Diagnostic Tests/Images

This is a clinical diagnosis. Therefore, no test/imaging was ordered. However, during pelvic exams, cervical testing for HPV DNA can be done as well as cytology during Papanicolaou testing to assess for any cellular dysplastic changes. Similarly, anal HPV testing and cytology can be done to identify strains and potential cellular dysplasia.

5. Next Steps

Because of the location and the number of lesions, the patient was referred to a colorectal surgical center in the clinic for further evaluation and treatment.

6. Prevalence, Prevention, and Treatments

- HPV Types 6 and 11 cause approximately 90% of all cases of genital warts.[1]
- HPV Types 16 and 18 cause an estimated 70% of cervical cancer and 90% of anal cancer cases, respectively.[1]
- The HPV vaccine is a highly effective prevention approach to HPV, particularly given skin to skin transmission even when using condoms.[2]
- Treatment for HPV varies by location, number of lesions, and the skill of the provider. Most simple cases can be easily treated with cryotherapy or topical treatments. While there is no cure, active lesions can be eradicated, and new ones can be quickly identified and treated by ensuring frequent follow-up and patient education.[3]
- It appears that HPV is responsible/and or linked with more than 90% of anal and cervical cancers, approximately 70% of vaginal and vulvar cancers, 60% of penile cancers, and 60% to 70% of oropharyngeal cancer.[4]

7. ICD-10 and CPT (E/M) Codes

ICD-10 Code: A63.0
Anogenital warts. This is the initial diagnosis for the primary care visit where the PCP identifies genital warts. Another appropriate ICD-10 code would be B97.7 for human papillomavirus.

CPT (E/M) Code: Level 3—99203 (New Patient)
This is an evaluation of a new patient with a new complaint with the potential for major health complications (cancer) if untreated or misdiagnosed. Level 3 was used for this case as the physical exam was limited to the patient's chief complaint, and not a full initial new patient visit. In that case, more of a physical exam would have been performed that would make the visit Level 4 or 99204, or possibly Level 5 or 99205 if blood pressure management and other health care maintenance were included.

8. Patient Education Topics

- Genital warts
- HPV vaccine
- STI screening
- Counseled on sexual health, pleasure, and safety/STI prevention

9. Medical or Legal Concerns

As with many communicable or contagious STIs, state laws differ regarding disclosure. While HPV is the most common STI worldwide due to its ability to be transmitted skin to skin and even when condoms are used, there is the potential for litigation if patients do not disclose their infection to sexual partners. Know your state laws and as a provider and counsel your patients about considering discussing HPV infection with sexual partners if they are comfortable, even if fully treated with no resulting lesions. Most providers do not discuss this with patients, but during identification and treatment, it will surely be on our patients' minds, and educating them on the state laws and complicated nature of disclosure is advisable. Work with the patient to decide how best to move forward.

10. Interprofessional Collaboration

- Receptionist registers the patient.
- MA takes history and vitals.
- PCP formulates most likely diagnosis.
- Referral clerk arranges referral of patient to colorectal surgery.
- Colorectal surgeon performs surgery.

Outcome

Because of the location of the lesions at the anal verge and high likelihood of lesions in the rectal vault, the patient was referred to a local colorectal surgical practice. He was seen 2 days after the initial visit, and a decision was made to wait on topical treatment until a full evaluation was performed. A HRA identified several other verrucae inside the patient's rectum in addition to those identified in the anal verge. Surgery removed the internal warts in the rectum and employed topical treatment (imiquimod cream) to treat the outer anal verge lesions.

Insight from the PCP

I was aggressive about making sure this patient got quickly into see a specialist and receive treatment. For many transgender patients, some clinicians avoid pelvic and genital/anal exams because of their personal discomfort and bias. This results in treatable conditions such as genital warts often going months to years undiagnosed. Also, many transgender patients fear stigmatization by medical staff. Considering HPV and its potential relation to atypical cytology and ultimately, cancer, this is a recipe for disaster if a thorough physical examination is not done at the outset. This patient had a good outcome, as the external wart lesions resolved easily with topical imiquimod treatment, and the surgery, while uncomfortable for a few days, was able to rid him of the internal lesions as his immune system was allowed to take over. Additionally, he was given the HPV vaccine series, as there is evidence that in spite of previous HPV skin lesions, vaccination can confer protection against other strains of the virus. This patient came back to clinic and continued his regular STI testing routine and continued to get regular anal and cervical pap smears to follow-up.

HPV can be a challenging STI to discuss in a clinical setting, as patients can present afraid and feeling tainted by the diagnosis. Answering questions and providing reassurance goes a long way. HPV can be transmitted even when a person uses condoms because it is a skin-to-skin transmission (similar to HSV and syphilis), so care must be taken to not shame a patient for not using condoms or suggest HPV could have been prevented simply by proper condom use. Condoms do not offer full protection from HPV; hence why discussions of being checked when noticing new rashes/lesions and the importance of the HPV vaccine are crucial. Additionally, a PCP should be careful not to offer certainty after treatment such as "they won't come back" or "treatment is curative" regarding verruca lesions—the course of the disease is unpredictable and varies in patients, so counseling on proper follow-up is vital. Educating patients on the immune system and how important it is in controlling HPV and preventing new breakouts is helpful as well. Simple things like getting enough sleep, exercise, drinking enough water, proper diet, and taking care of mental health will go a long way to ensure the immune system is healthy enough to ward off HPV and its associated lesions.

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COUGHING AND GAGGING, PEDIATRIC MALE

CASE 81

Chief Complaint

"Coughing and gagging."

History of Present Illness

A mother brings her 3-month-old previously healthy infant to his PCP for evaluation of an apparent apnea episode that occurred that morning. He had developed a cough and nasal congestion about 5 days prior to this visit, and on the morning of the visit had a prolonged coughing spell followed by a gagging episode. His mother heard the cough and gagging over the baby monitor and when the gagging began, she ran to his room to check on him. By the time she picked him up from his crib, he did not seem to be breathing and his face and lips were blue. She immediately brought the baby to her husband, by which time the child had begun to breathe, and his color quickly returned to normal.

The episodes of cough have become more frequent and prolonged since the onset of the illness, but he has not had a fever. His mother reported she had been fighting off a "nagging cough" for about 3 weeks. The infant's 2-year-old sister and 4-year-old brother had no respiratory symptoms. None of the children attended day care.

Review of Systems

The infant's ROS is positive for decreased feeding and a few episodes of vomiting following coughing spells. The ROS is negative for fever, conjunctivitis, diarrhea, rash, or seizures.

Relevant History

The infant was born by vaginal delivery at 39 weeks' gestation following an uncomplicated pregnancy. His mother received regular prenatal care and had no history of untreated cervical infection. His birth weight was 6 lbs 14 oz, and he was discharged home at 48 hours of age after an uneventful stay in the newborn nursery. He had an appropriate weight gain and normal development and physical examination at his 2-week, 1-month, and 2-month well baby visits, and his routine newborn screening was normal. He had received all recommended immunizations, including those routinely administered at 2 months.

Allergies

No known drug allergies; no known food allergies.

Medications

None.

Physical Examination

Vitals: T 37.1°C (98.8°F); P 140; R 40; BP 80/40; SpO_2 96%; HT 61 cm (24 in.), 43rd percentile; WT 5.5 kg (12 lbs), 10th percentile; BMI 14.6.

General: Alert and active, in no distress.

Skin, Hair, and Nails: Acyanotic, no rash or lesions. No abnormal findings with hair or nails.

Head: Anterior fontanelle soft and flat.

Eyes: No discharge or conjunctival injection.

ENT/Mouth: Nares congested, tympanic membranes clear, oral mucosa moist and without lesions.

Lungs: Clear to auscultation bilaterally, breath sounds equal bilaterally; no grunting, retractions, or nasal flaring.

Heart: RRR, S1 and S2 normal intensity, no murmur, pulses 2+ in all extremities.

Abdomen: Soft, no masses or hepatosplenomegaly.

Neurologic: Alert, moving all extremities equally, normal muscle bulk and tone.

CLINICAL DISCUSSION QUESTIONS

1. What is the differential diagnosis?

2. What is the most likely diagnosis? Why?

3. Demonstrate your understanding about the pathophysiology in regard to the most likely diagnosis.

4. Should tests/imaging studies be ordered? Which ones? Why? Think about tests/imaging beyond the primary care setting as well.

5. What are the next appropriate steps in management?

6. What are the preventive plans and treatment approaches for the diagnosis? Provide references for your response.

7. What are the pertinent ICD-10 and CPT (E/M) codes for this visit? Provide a short rationale.

8. What are appropriate parent education topics for this case?

9. If not managed appropriately, what is/are the medical/legal concern(s) that may arise?

10. Think about interprofessional collaboration for this case. Provide a list of specialties or other disciplines and indicate what contribution these professionals might make to managing the patient.

BEDSIDE MANNER QUESTIONS

11. What would your communication style/approach be with this patient's mother?

12. If the patient's mother is distressed by the diagnosis, what might offer support?

ANSWER KEY: COUGHING AND GAGGING, PEDIATRIC MALE

CASE 81

1. Differential Diagnosis

- **Viral upper respiratory illness** is possible. The infant had an episode of apnea with cyanosis and is afebrile. An infant with a viral upper respiratory infection is not likely to experience a BRUE such as apnea and is more likely to have a fever.
- **Sepsis** cannot be ruled out without appropriate cultures. Infants with sepsis are likely to appear ill on physical examination and often have a history of fever. Bacterial sepsis may cause symptoms such as apnea and cyanosis. When sepsis is suspected, appropriate broad-spectrum intravenous antibiotics must be started after obtaining cultures.
- **Bacterial pneumonia** is a less likely diagnosis. An infant with pneumonia is likely to have a history of fever and physical examination findings consistent with pneumonia (focal decreased breath sounds, crackles, tachypnea). Symptoms of pneumonia due to *Chlamydia trachomatis* are similar to those of the most likely diagnosis (listed next), but the absence of untreated cervical infection in his mother and the fact that she had regular prenatal care make this diagnosis less likely.[1]
- **Pertussis** is a likely diagnosis. The infant has no abnormal lung findings. His cough, nasal congestion, apnea, and immunization history (up to date but had only 2 months' immunization) raise suspicion for pertussis. In addition, the mother's nagging cough for about 3 weeks increases further suspicion. Performing a CBC will be helpful to further assess the diagnosis.
- **Bronchiolitis (respiratory syncytial virus)** may cause apnea, and infants with bronchiolitis are likely to have findings on lung exam such as diffuse crackles, wheezing, tachypnea, and retractions and are also likely to have a fever. Infants with bronchiolitis often have a history of contact with a young child with bronchiolitis or an upper respiratory tract infection.

2. Most Likely Diagnosis

Pertussis is the most likely diagnosis, although this cannot be confirmed without appropriate diagnostic studies. The infant has cough, nasal congestions, and apnea. His mother has been coughing about 3 weeks; thus, it is possible she passed pertussis to the infant. Even though he is up to date with immunizations, he is not completely protected from pertussis until the series is complete. (DTaP vaccine is administered at the ages of 2 months, 4 months, and 6 months, and then a booster around 15 months, and at the age of 4.) The differential diagnosis for an infant with an episode of apnea and cyanosis (a BRUE) is extensive and should include seizures and metabolic disorders. The rapid resolution of this patient's apnea and its association with an episode of coughing and gagging led to a focus on respiratory infection as the cause. Therefore, seizures and metabolic disorders were excluded on the differential.

3. Pathophysiology

Pertussis (also known as whooping cough) is a respiratory infection caused by the bacterium *Bordetella pertussis*. It is a highly contagious illness, with the potential for significant morbidity and mortality in infants and young children. Infection is spread by respiratory droplets, and the incubation period is usually between 1 week and 3 weeks. After the bacterium is inhaled, it adheres to ciliated respiratory epithelial cells. Following adherence, local tissue damage is brought about by the production of biologically active substances and virulence factors, leading to cough and systemic manifestations (lymphocytosis).[2]

4. Diagnostic Tests/Images

Primary Care Setting
A CBC was done as a stat order in the primary care office.

Results
Total white blood cell count of 21,000/mm^3 with 72% lymphocytes.

Hospital Setting
- CBC to provide insight regarding the presence and type of infection
- Chemistry profile to evaluate for dehydration or an electrolyte abnormality, which might have contributed to the patient's clinical presentation
- Urinalysis to provide additional information regarding hydration status (specific gravity) and the presence of indicators of infection (white blood cells, nitrite, leukocyte esterase)
- Chest radiography to evaluate for signs of lung or heart disease, given the presence of respiratory symptoms and history of cyanosis and apnea
- Nasopharyngeal aspirate for PCR for pertussis and pertussis culture to confirm the suspected diagnosis of pertussis
- Nasopharyngeal swab for influenza A and B to rule out influenza infection
- Nasopharyngeal aspirate to rule out respiratory syncytial virus infection
- Blood and urine cultures to rule out bacterial infection, given the infant's high white blood cell count and history of apnea and cyanosis

Results
- CBC results from the hospital were consistent with the CBC results from the primary care clinic (a high percentage of lymphocytes along with a high overall number of white blood cells).
- PCR for pertussis and pertussis culture were both positive.
- Other results were unremarkable.

5. Next Steps

The urgency of the likely diagnosis was explained to the patient's mother and an immediate referral to a hospital made. The family agreed with admission to the local hospital, given that it has a pediatric ICU, it is close by, and a transfer could be arranged expeditiously.

6. Preventive Plans and Treatment Approach

- Postexposure prophylaxis is recommended for all household contacts of the patient regardless of immunization status. This patient's mother, father, sister, and brother were all candidates for postexposure antibiotic prophylaxis. This patient's mother had a prolonged cough and was likely the source of infection. Prophylaxis is also recommended for other close contacts: persons with close face-to-face exposure to a patient (within 3 feet); persons with direct contact with a patient's respiratory, oral, or nasal secretions; or persons who were in a confined space with a patient for an hour or more.[3, 4]
- Antibiotic prophylaxis for household and other close contacts of a patient with pertussis should be initiated within 21 days of onset of cough in the index patient.[3, 4] Recommendations for antibiotic agent and dosing regimen for prophylaxis are the same as those for treatment of pertussis. At the time of presentation, this patient had been ill for only 5 days, and antibiotic prophylaxis of contacts was therefore indicated to control the spread of infection.
- Macrolide antibiotics are the preferred treatment for pertussis. The specific recommended macrolide antibiotic varies by patient age. Clarithromycin is not recommended in infants younger than 1 month, and azithromycin is preferred over erythromycin in this age group. Both azithromycin and erythromycin are associated with an increased risk of pyloric stenosis (especially in infants younger than 2 weeks) while the risk with clarithromycin is not known. Any of the macrolide antibiotics may be used in infants older than 1 month.3

- The PCP has a critical role to prevent the spread of pertussis infection by ensuring that patients of all ages receive the pertussis vaccine at the recommended intervals and through the identification of individuals who are candidates for postexposure prophylaxis. Additionally, PCPs can prevent the spread of pertussis to young infants by ensuring that pregnant women are immunized against pertussis with the Tdap vaccine during each pregnancy and by recommending and supporting breastfeeding.[5] It is also important that other household contacts be protected by keeping up with pertussis vaccine as recommended by age.

7. ICD-10 and CPT (E/M) Codes

ICD-10 Code: R68.13
Apparent life-threatening event in infant is the most appropriate ICD-10 code for the office visit as it applies to patients ages 0 through 17 years with a life-threatening BRUE (manifested as apnea and cyanosis in this patient). Although the diagnosis of pertussis was suspected, this could not be confirmed at the office visit, and therefore the code for pertussis should not be used for the visit.

CPT (E/M) Code: Level 5—99215 (Established Patient)
This is an established patient with a high complexity of medical decision-making (a new problem with additional workup planned and an illness with a threat to life). Documentation in support of this CPT code should include a comprehensive history and/or physical examination, both of which are critical in a case such as this.

8. Patient Education Topics

- Importance of immunizations for the patient and family members (including parents)
- Basic facts about pertussis
- Identification of close contacts who would benefit from postexposure prophylaxis
- Expected duration of cough

9. Medical or Legal Concerns

Even with appropriate management in a hospital, pertussis infection in young infants (even those who are otherwise healthy) is associated with significant morbidity and mortality. Complications include cyanosis, apnea, and seizures. It is the standard of care to hospitalize young infants with pertussis for close monitoring, specific treatment, and supportive care. Failure to admit such patients may lead to increased morbidity and mortality and significant anxiety for the family in the event that a complication or deterioration in condition is experienced at home.

Given the potential for rapid deterioration, consideration should be given to transferring young infants with pertussis to a hospital with a pediatric ICU. The need for transfer should take into consideration the preferences of the family, distance to a tertiary care facility, and comfort level of a PCP.

10. Interprofessional Collaboration

- Receptionist triages call from parent and identifies need for urgent appointment.
- MA gathers vital signs, height, and weight; obtains brief history; communicates concerns to the PCP; and calls for admission.
- PCP takes focused history, performs physical examination, develops differential diagnosis and plan of care, coordinates hospital admission, provides admitting nurse with admission orders, and coordinates care during hospitalization.
- Hospital nurse institutes appropriate infection control precautions; monitors patient's respiratory, nutrition, and hydration status; and assesses the ability of caretakers to provide care following discharge.
- Respiratory therapist provides supplemental oxygen, assists in cardiorespiratory monitoring, and looks for signs of deteriorating respiratory status.

- Pre-hospital care providers (paramedic/EMT) may be needed to transfer the patient with caregiver to a higher level of care.
- Public health department tracks contacts of confirmed pertussis cases.

Outcome

The infant was admitted to the pediatrics unit of a local hospital with a suspected diagnosis of pertussis. Extensive testing confirmed the suspected diagnosis and ruled out alternative diagnoses. Specific treatment for pertussis, including continuous cardiorespiratory monitoring, was initiated as soon as pertussis was suspected.

After initial diagnostic testing, the patient was started on a broad-spectrum intravenous antibiotic (ceftriaxone) pending results of blood and urine cultures as well as oral erythromycin for the suspected diagnosis of pertussis. A chest radiography showed a normal cardiac silhouette and no evidence of pulmonary disease. Testing for respiratory syncytial virus and influenza was negative.

PCR for pertussis and pertussis culture were both positive, and the case was reported to the local health department. Ceftriaxone was discontinued 72 hours after admission, at which time blood and urine cultures showed no growth. The infant remained hospitalized for 4 days, and oral erythromycin was continued for 14 days. He had no further episodes of apnea, bradycardia, or cyanosis during the hospitalization and was discharged home when the severity of the coughing episodes decreased and his oral intake returned to normal.

Insight from the PCP

Symptoms of pertussis in young infants overlap those of other respiratory infections, and the PCP must have a high index of suspicion to make the diagnosis and provide appropriate treatment. Young infants with pertussis should be admitted to the hospital even if well appearing.[6] A PCP should not delay treatment for pertussis while awaiting results of confirmatory testing. This is especially important for younger infants, who are at greater risk for complications.

Close follow-up of patients after discharge is important, and a PCP has a significant responsibility to ensure that a child's caretakers are competent to provide care and have the necessary resources to seek further medical care if needed.

Given that this infant most likely acquired the infection from his mother, whose persistent cough was a symptom of pertussis infection acquired as a result of a natural decline in immunity years after vaccination, it was important to approach the discussion of pertussis prevention and transmission in a sensitive manner. The mother expressed guilt that she was the likely source of his infection. As the PCP who had a long-standing relationship with the family, I was able to reassure her that the phenomenon of declining pertussis immunity is only now being appreciated and that no one in the medical community would consider her to be at fault. Following this reassurance, she was receptive to the recommendation that she receive a booster dose of Tdap.

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