Obstetric Care
To those physicians who have taken stands against medical corruption; may you look in your mirrors with pride.
## Contents

*List of Contributors*  page ix  
*Preface*  xiii  

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Labor</td>
<td>1</td>
</tr>
<tr>
<td>Abnormal Labor</td>
<td>13</td>
</tr>
<tr>
<td>Induction and Augmentation of Labor</td>
<td>23</td>
</tr>
<tr>
<td>Placental Abnormalities</td>
<td>32</td>
</tr>
<tr>
<td>Management of Obstetric Umbilical Cord Complications</td>
<td>42</td>
</tr>
<tr>
<td>Operative Vaginal Delivery</td>
<td>50</td>
</tr>
<tr>
<td>Cesarean Section</td>
<td>64</td>
</tr>
<tr>
<td>Cesarean Delivery Complications and Cesarean Hysterectomy</td>
<td>72</td>
</tr>
<tr>
<td>Vaginal Birth after Cesarean</td>
<td>80</td>
</tr>
<tr>
<td>Shoulder Dystocia</td>
<td>86</td>
</tr>
<tr>
<td>Perineal Trauma after Vaginal Delivery: Third and Fourth Degree Lacerations and Hematomas</td>
<td>99</td>
</tr>
<tr>
<td>Obstetric Anesthesia</td>
<td>105</td>
</tr>
<tr>
<td>Intrapartum Fetal Monitoring</td>
<td>116</td>
</tr>
<tr>
<td>Obstetric Ultrasound for the Generalist Obstetricist</td>
<td>126</td>
</tr>
<tr>
<td>Prenatal Diagnosis</td>
<td>143</td>
</tr>
<tr>
<td>Genetics</td>
<td>150</td>
</tr>
<tr>
<td>Abnormal Fetal Growth</td>
<td>161</td>
</tr>
<tr>
<td>Alloimmunization and Non-immune Hydrops Fetalis</td>
<td>169</td>
</tr>
<tr>
<td>Fetal Anomalies</td>
<td>179</td>
</tr>
<tr>
<td>Malpresentation</td>
<td>188</td>
</tr>
<tr>
<td>Intraamniotic Infection</td>
<td>197</td>
</tr>
<tr>
<td>Multifetal Pregnancy</td>
<td>204</td>
</tr>
<tr>
<td>Premature Rupture of Fetal Membranes Preterm and at Term</td>
<td>213</td>
</tr>
<tr>
<td>Preterm Delivery</td>
<td>220</td>
</tr>
<tr>
<td>Second Trimester Pregnancy Loss</td>
<td>229</td>
</tr>
<tr>
<td>Third Trimester Fetal Loss</td>
<td>236</td>
</tr>
<tr>
<td>Antepartum Hemorrhage</td>
<td>245</td>
</tr>
<tr>
<td>Postpartum Hemorrhage</td>
<td>252</td>
</tr>
<tr>
<td>Postpartum Infection</td>
<td>262</td>
</tr>
</tbody>
</table>

© in this web service Cambridge University Press  
www.cambridge.org
## Contents

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>The Obstetric Patient with Trauma</td>
<td>Felicity Plaat and Charles Cox</td>
</tr>
<tr>
<td>31</td>
<td>Post-term Pregnancy</td>
<td>Olukayode Akinlaja and William Gist</td>
</tr>
<tr>
<td>32</td>
<td>Musculoskeletal Disorders</td>
<td>Sarah Shaffer and Colleen K. Stockdale</td>
</tr>
<tr>
<td>33</td>
<td>Obesity in Pregnancy</td>
<td>Jasjit K. Beausang and Shontreal M. Cooper</td>
</tr>
<tr>
<td>34</td>
<td>Nausea and Vomiting of Pregnancy and Hyperemesis Gravidarum</td>
<td>Olukayode Akinlaja and William Gist</td>
</tr>
<tr>
<td>35</td>
<td>Hypertension in Pregnancy</td>
<td>Lauren Coyne and Colleen K. Stockdale</td>
</tr>
<tr>
<td>36</td>
<td>Cardiovascular Disease in Pregnancy</td>
<td>Cornelia R. Graves</td>
</tr>
<tr>
<td>37</td>
<td>Pulmonary Disease in Pregnancy</td>
<td>Joseph Shumway and Isaac Babarinsa</td>
</tr>
<tr>
<td>38</td>
<td>Neurological Disease Complicating Pregnancy</td>
<td>Leah W. Antoniewicz and Karen M. Schneider</td>
</tr>
<tr>
<td>39</td>
<td>Renal Diseases in Pregnancy</td>
<td>Moune Jabre Raughley and Gene La Monica</td>
</tr>
<tr>
<td>40</td>
<td>Hematologic Diseases Complicating Pregnancy</td>
<td>Natalie Bowersox</td>
</tr>
<tr>
<td>41</td>
<td>Gastrointestinal Disorders in Pregnancy</td>
<td>Stephen K. Patrick and Karen M. Schneider</td>
</tr>
<tr>
<td>42</td>
<td>Selected Endocrine Disorders in Pregnancy</td>
<td>Kenneth K. Chen</td>
</tr>
<tr>
<td>43</td>
<td>Diabetes Mellitus in Pregnancy</td>
<td>Mohamad Hamdi</td>
</tr>
<tr>
<td>44</td>
<td>Connective Tissue Disorders and Pregnancy</td>
<td>Joseph E. Peterson</td>
</tr>
<tr>
<td>45</td>
<td>Dermatologic Disorders and Pregnancy</td>
<td>Colleen K. Stockdale and Sarina Martini</td>
</tr>
<tr>
<td>46</td>
<td>Selected Infectious Diseases</td>
<td>Marygrace Elson</td>
</tr>
<tr>
<td>47</td>
<td>Human Immunodeficiency Virus Infection and Pregnancy</td>
<td>Denise Willers</td>
</tr>
<tr>
<td>48</td>
<td>Psychiatric Diseases in Pregnancy and the Postpartum Period</td>
<td>M. Camille Hoffman and Gareen Hamalian</td>
</tr>
<tr>
<td>49</td>
<td>Substance Use in Women and Pregnancy</td>
<td>Natalie E. Roche and Damali Campbell Oparaji</td>
</tr>
<tr>
<td>50</td>
<td>Cancer in Pregnancy</td>
<td>Scott D. Richard and Clinton A. Veselis</td>
</tr>
<tr>
<td>51</td>
<td>Thromboembolic Complications of Pregnancy</td>
<td>Zachary C. Kuhlmann</td>
</tr>
<tr>
<td>52</td>
<td>Disability in Pregnancy</td>
<td>Gwinnett M. Ladson, Kimberly R. Looney, and Sonia Jackson</td>
</tr>
<tr>
<td>53</td>
<td>The History of Obstetrics</td>
<td>George H. Davis</td>
</tr>
</tbody>
</table>

### Index

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>511</td>
</tr>
</tbody>
</table>
Contributors

Olukayode Akinlaja, MD, MBA
Assistant Professor
Department of Obstetrics and Gynecology
University of Tennessee College of Medicine
Chattanooga, TN

Melanie D. Altizer, MD
Assistant Professor
Department of OB/GYN
Virginia Tech-Carilion School of Medicine

Heather Anaya, DO
Clinical Assistant Professor
Division of Maternal-Fetal Medicine
Department of Obstetrics and Gynecology
University of Iowa Carver College of Medicine

Leah W. Antoniewicz, MD
Assistant Professor
Department of OB/GYN
Baylor College of Medicine

Isaac Babarinsa, MBBS, MSc, MRCOG, FWACS
Senior Attending Physician
Department of Obstetrics and Gynecology
Sidra Medical and Research Center, Doha, Qatar

Anitra Beasley, MD, MPH
Assistant Professor
Department of Obstetrics & Gynecology
Baylor College of Medicine
Houston, TX

Jasjit K. Beausang, MD
Assistant Professor
Department of Obstetrics and Gynecology
Drexel University College of Medicine

Alexandria Betz, DO
Maternal Fetal Medicine Fellow Associate
Division of Maternal-Fetal Medicine
Department of Obstetrics and Gynecology
University of Iowa Carver College of Medicine

Natalie Bowersox, MD, FACOG
Clinical Assistant Professor of Surgery
Cleveland Clinic Foundation

Phillip L. Bressman, MD
Affiliated Assistant Professor
University of Tennessee College of Medicine
Nashville, TN

Jeremy P. Campbell, MB ChB (Hons.), MRCSEd, FRCA
Consultant Anaesthetist
Queen Charlotte's and Chelsea Hospital
Imperial College Healthcare NHS Trust
London, UK

Christinne Canela, MD, FACOG
Attending Physician
Department of Obstetrics and Gynecology
Carilion Clinic

Frances Casey, MD, MPH
Assistant Professor
VCU Medical Center

Kenneth K. Chen, MD
Assistant Professor of Medicine & Assistant Professor of ObGyn
Alpert Medical School of Brown University

David Churchill, MD, FRCOG
Consultant Obstetrician
The Royal Wolverhampton NHS Trust,
New Cross Hospital Wolverhampton, UK

Shontreal M. Cooper, MD
Resident Physician
Department of Obstetrics and Gynecology
Hahnemann University Hospital
Contributors

Lauren Coyne, MD
Clinical Assistant Professor
University of Iowa Hospitals and Clinics
Department of Obstetrics and Gynecology

Charles Cox
The Royal Wolverhampton NHS Trust, New Cross Hospital Wolverhampton, UK

George H. Davis, DO, FACOOG
Professor of Obstetrics and Gynecology
Division of Maternal-Fetal Medicine
Quillen College of Medicine
East Tennessee State University

Julie DeCesare, MD, FACOG
Associate Professor
Department of Obstetrics and Gynecology
University of Florida College of Medicine
Pensacola

Marygrace Elson, MD, MME
Clinical Professor Obstetrics and Gynecology
University of Iowa Carver College of Medicine
Iowa City, IA

Georgia Ferrell, MD
Instructor
University of Tennessee, Nashville

Heather Frey, MD
Assistant Professor, Clinical
Department of Maternal Fetal Medicine
Ohio State University Wexner Medical Center

Etoi A. Garrison, MD, PhD
Associate Professor
Division of Maternal Fetal Medicine
Department of Obstetrics and Gynecology
Vanderbilt University

William Gist, MD
Assistant Professor and Program Director
Department of Obstetrics and Gynecology
University of Tennessee College of Medicine
Chattanooga, TN

Aaron Goldberg, MD
Assistant Professor
Department Obstetrics and Gynecology
Medical College of Virginia

William Goodnight, MD
Associate Professor
University North Carolina Dept. Ob/Gyn

Cornelia R. Graves, MD
Medical Director, Tennessee Maternal Fetal Medicine
Medical Director, Perinatal Services,
St. Thomas Health Systems
Professor, University of Tennessee
Clinical Professor, Vanderbilt University
Adjunct Professor, Meharry Medical College

Gareen Hamalian, MD, MPH
Department of Psychiatry
University of Colorado School of Medicine

Mohamad Hamdi, MD
Assistant Professor of Obstetrics and Gynecology (Clinical)
The Alpert Medical School of Brown University
Providence, RI

M. Camille Hoffman, MD, MSCS
Department of Obstetrics & Gynecology
Division of Maternal Fetal Medicine and Department of Psychiatry
University of Colorado School of Medicine

Jessica R. Jackson, MD, MSBS
University of Florida
Gainesville, FL

Sonia Jackson, MD
Resident
Department of Obstetrics and Gynecology
Meharry Medical College
Nashville, TN

Zachary C. Kuhlmann, DO
Clinical Associate Professor
Program Director
Department of Obstetrics and Gynecology
University of Kansas School of Medicine — Wichita

Gwinnett M. Ladson, MD
Professor
Department of Obstetrics and Gynecology
Meharry Medical College
Nashville, TN

Julia Lagow, DO, FACOG
University of Florida, Department of OB/GYN
Obstetrics and Gynecology Residency Program
Sacred Heart Health System

Heidi Leftwich, DO
Assistant Professor of Obstetrics and Gynecology
Division of Maternal-Fetal Medicine
<table>
<thead>
<tr>
<th>Contributors</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Massachusetts Medical School/UMASS Memorial Medical Center Worcester, MA Kimberly R. Looney, MD Assistant Professor Department of Obstetrics and Gynecology, Meharry Medical College Nashville, TN Anjali Martinez, MD Obstetrics and Gynecology The George Washington University Washington DC Sarina Martini, MD Clinical Assistant Professor University of Iowa Hospitals and Clinics Department of Obstetrics and Gynecology Iowa City, IA Gene La Monica, MD, FACOG Adjunct Assistant Professor and Attending in Maternal-Fetal Medicine Department of Obstetrics and Gynecology Weill-Cornell Medicine — Qatar, Sidra Medical and Research Center, Doha, Qatar Mahmoud Moussa, MD, MRCOG Clinical Fellow The Royal Wolverhampton NHS Trust, New Cross Hospital Wolverhampton, UK Loriana Newman, MD Assistant Professor Clinical Dept. of Obstetrics and Gynecology Ohio State University Wexner Medical Center Martin Olsen, MD Professor East Tennessee State University Department of Ob/Gyn Damali Campbell Oparaji, MD Assistant Professor Department of Obstetrics, Gynecology and Women's Health Rutgers, the State University of New Jersey Rutgers New Jersey Medical School Newark, NJ Stephen K. Patrick, MD Associate Professor Department of Obstetrics and Gynecology Baylor College of Medicine Houston, TX Joseph E. Peterson, MD Clinical Associate Professor Department of Health Sciences University of Florida Sara Petruska, MD Associate Professor University of Louisville Felicity Plaat, BA, MBBS, FRCA Consultant Anaesthetist Queen Charlotte's and Chelsea Hospital Imperial College Healthcare NHS Trust London, UK Moune Jabre Raughley, MD, FACOG Assistant Professor and Attending in Obstetrics and Gynecology Department of Obstetrics and Gynecology Weill-Cornell Medicine — Qatar, Sidra Medical and Research Center, Doha, Qatar Erin C. Rebele, MD Assistant Professor of Obstetrics and Gynecology Vanderbilt University Vanderbilt University School of Medicine Nashville, TN Scott D. Richard, MD Associate Professor Drexel University College of Medicine Department of Obstetrics and Gynecology Division of Gynecologic Oncology Philadelphia, PA Fidelma B. Rigby, MD Associate Professor Maternal Fetal Medicine Department OB/GYN VCUHS Richmond, VA Natalie E. Roche, MD Assistant Professor Department of Obstetrics, Gynecology and Women's Health Rutgers, the State University of New Jersey Rutgers New Jersey Medical School Newark, NJ Stephen Rotholz, MD Assistant Professor Department of Obstetrics and Gynecology</td>
</tr>
<tr>
<td>Contributors</td>
</tr>
</tbody>
</table>

University of Colorado School of Medicine  
Colorado Institute for Maternal & Fetal Health

**Karen M. Schneider, MD**  
Associate Professor  
Department of Obstetrics and Gynecology  
Baylor College of Medicine  
Houston, TX

**Sarah Shaffer, DO**  
Clinical Assistant Professor  
Department of Obstetrics & Gynecology  
University of Iowa

**Joseph Shumway, MD, MPH, FACOG**  
Senior Consulting Physician  
Director of Education  
Department of Obstetrics and Gynecology  
Sidra Medical and Research Center  
Doha, Qatar  
Weill Cornell School of Medicine, Qatar

**Rolanda Standifer, MD**  
Assistant Professor  
Division of Maternal Fetal Medicine  
Department Obstetrics and Gynecology  
Vanderbilt University

**Colleen K. Stockdale, MD, MS**  
Clinical Associate Professor  
Department of Obstetrics & Gynecology  
University of Iowa  
Iowa City, IA

**Theodore Tsaltas, MD**  
Assistant Professor  
Department Ob/Gyn  
University of Tennessee College of Medicine at Chattanooga

**Clinton A. Veselis, MD**  
Instructor  
Drexel University College of Medicine  
Department of Obstetrics and Gynecology  
Division of Gynecologic Oncology  
Philadelphia, PA

**Roxanne A. Vrees, MD**  
Assistant Professor of Obstetrics and Gynecology  
Warren Alpert Medical School of Brown University  
Women & Infants Hospital  
Providence, RI

**Selman I. Welt, MD, RDMS**  
Professor  
East Tennessee University  
Department of OB/GYN

**Denise Willers, MD**  
Associate Professor  
Dept. Obstetrics and Gynecology  
Washington University School of Medicine  
in St. Louis

**Ann E. Williford, MD**  
Instructor- Department of Clinical Medical Education  
University of Tennessee Health Science Center  
Nashville, TN
Preface

Practitioners of obstetrics and gynecology must have a thorough understanding of the breadth of the subject matter while also accepting the challenge of comprehending the depth of information required to give outstanding patient care to women. Obstetric Care is the second book in a series of three texts that cover the breadth of the Ob/Gyn specialty. Modern Ob/Gyn leaders divide our specialty into three divisions: office practice, obstetrics, and gynecology. Office Care of Women was the first book in this series and Gynecologic Care rounds out the subject matter. After a thorough understanding of the specialty, readers can then move on to literature review or subspecialty texts to further their knowledge on the depth of obstetrics and gynecology.

The care of pregnant patients is uniquely satisfying. The practice of obstetrics combines the need for outstanding technical skills with the intellectual challenges of medical management for both maternal and fetal conditions. Outstanding psychosocial skills combined with crisis management abilities are also essential. The volume of material covering these and other topics within the discipline of obstetrics is vast. This book is tightly written and is designed to be read in its entirety. The basic information provided here can be used as a review or as a springboard to a more knowledgeable review of the literature in depth.

Advances in the care of obstetric patients and their fetuses have created dramatic improvements in maternal and newborn health in most, but not all, areas of the world. Obstetric care is critically important to the families that are served by each maternal care provider since the loss of a mother has a devastating impact on each member of that family. Entire societies benefit when maternal and child healthcare improvements occur. I hope this book inspires excellence in the practice of obstetrics.