REICHMAN'S

EMERGENCY

MEDICINE PROCEDURES





Reichman's Emergency Medicine Procedures





NOTICE

Medicine is an ever-changing science. As new research and clinical experience broaden our knowledge, changes in treatment and drug therapy are required. The authors and the publisher of this work have checked with sources believed to be reliable in their efforts to provide information that is complete and generally in accord with the standards accepted at the time of publication. However, in view of the possibility of human error or changes in medical sciences, neither the editors nor the publisher nor any other party who has been involved in the preparation or publication of this work warrants that the information contained herein is in every respect accurate or complete, and they disclaim all responsibility for any errors or omissions or for the results obtained from use of the information contained in this work. Readers are encouraged to confirm the information contained herein with other sources. For example and in particular, readers are advised to check the product information sheet included in the package of each drug they plan to administer to be certain that the information contained in this work is accurate and that changes have not been made in the recommended dose or in the contraindications for administration. This recommendation is of particular importance in connection with new or infrequently used drugs.



Reichman's Emergency Medicine Procedures

Third Edition

Eric F. Reichman, PhD, MD, FAAEM, FACEP, NBPAS

Clinical Associate Professor of Emergency Medicine
Attending Physician, Department of Emergency Medicine
UT-Health
McGovern Medical School
University of Texas Health Science Center at Houston-Medical School
Voluntary Attending Physician, Emergency Department
Memorial Hermann Hospital-Texas Medical Center
Houston, Texas



New York Chicago San Francisco Athens London Madrid Mexico City Milan New Delhi Singapore Sydney Toronto



Reichman's Emergency Medicine Procedures, Third Edition

Copyright © 2019 by Eric F. Reichman, PhD, MD. All rights reserved. Printed in China. Except as permitted under the United States Copyright Act of 1976, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a data base or retrieval system, without the prior written permission of the editor.

1 2 3 4 5 6 7 8 9 DSS 23 22 21 20 19 18

ISBN 978-1-259-86192-5 MHID 1-259-86192-9

This book was set in Minion Pro by Cenveo® Publisher Services.

The editors were Amanda Fielding and Kim J. Davis.

The production supervisor was Catherine Saggese.

Project management was provided by Shivani Salhotra and Neha Bhargava, Cenveo Publisher Services.

The illustrations were done by Susan Gilbert, CMI.

This book is printed on acid-free paper.

Library of Congress Cataloging-in-Publication Data

Names: Reichman, Eric F., editor.

Title: Reichman's emergency medicine procedures / [edited by] Eric F. Reichman.

Other titles: Emergency medicine procedures.

Description: Third edition. | New York : McGraw-Hill Education, [2019] |

Preceded by Emergency medicine procedures / [edited by] Eric F. Reichman.

2nd. ed. c2013. | Includes bibliographical references and index.

Identifiers: LCCN 2018024915 (print) | LCCN 2018025655 (ebook) | ISBN

9781259861932 (ebook) | ISBN 1259861937 (ebook) | ISBN 9781259861925

(hardback: alk. paper) | ISBN 1259861929 (hardback: alk. paper)

Subjects: | MESH: Emergency Medicine—methods

Classification: LCC RC86.7 (ebook) | LCC RC86.7 (print) | NLM WB 105 | DDC

616.02/5—dc23

LC record available at https://lccn.loc.gov/2018024915

McGraw-Hill Education Professional books are available at special quantity discounts to use as premiums and sales promotions, or for use in corporate training programs. To contact a representative, please visit the Contact Us pages at www.mhprofessional.com.



To my wife, Kristi. Thanks for your patience and help.
I appreciate your tolerance with the mess from all the papers and files and your trips for printer paper. Thanks for your support and understanding.
Thanks to Phoebe, Joey, Ken, Russ, Rick, Kobi, and Freya for the help and entertaining me each day.







Contents

	ibutors		19	Confirmation of Endotracheal Intubation	139
	pwledgments		20	Video Assisted Orotracheal Intubation Devices	147
SEC	TION 1 Introductory Chapters		21	Fiberoptic-Assisted Endotracheal Intubation Devices	163
1	Informed Consent	. 1	22	Endotracheal Tube Intubating Introducers and Bougies	170
2	Against Medical Advice	. 8	23	Marco Mikhael, Gennadiy G. Voronov, and Ned F. Nasr Digital (Tactile) Orotracheal Intubation	178
3	Family Presence	15	24	James A. Heilman, Beech S. Burns, and O. John Ma Lighted Stylet Intubation	181
4	Procedures on Recently Deceased	18		Jaroslav Tymouch, Gennadiy G. Voronov, and Ned F. Nasr	
5	Bryan Darger and Eric Isaacs Aseptic Technique	20	25	Supraglottic Airway Devices	187
6	John S. Rose Basic Principles of Ultrasonography		26	Laryngeal Mask Airways	193
U	Basem F. Khishfe		27	Double Lumen Airway Tube Intubation	211
7	Ultrasound Assisted Procedures	41	28	Fiberoptic Endoscopic Intubation	217
8	Trauma Ultrasound: The FAST and EFAST Scans	45	29	Ruth E. Moncayo, Alia Safi, and Ned F. Nasr Nasotracheal Intubation	228
SEC	TION 2 Respiratory Procedures	55	30	Ned F. Nasr, Abed Rahman, and Isam F. Nasr Retrograde Guidewire Intubation	236
9	Essential Anatomy of the Airway	55		Ned F. Nasr, Anna Tzonkov, and Gennadiy G. Voronov	
10	Divya Karjala Chakkaravarthy, Serge G. Tyler, and Isam F. Nasr Basic Airway Management	61	31	Percutaneous Transtracheal Jet Ventilation	240
11	Christopher J. Russo		32	Cricothyroidotomy	247
11	Noninvasive Airway Management		33	Tracheostomy	264
12	Pharmacologic Adjuncts to Intubation	79	34	Eric S. Levy and Christopher J. Haines Tracheostomy Care	275
13	Endotracheal Medication Administration	92		H. Gene Hern Jr and Julie K. Oliva	
14	Megan Johnson and Shoma Desai Management of the Difficult Airway	98	35	Transtracheal Aspiration	284
	Konstantin Inozemtsev, Gennadiy G. Voronov, and Ned F. Nasr		36	Ventilator Management	288
15	Obese Airway	105		Ahmad M. Abou Leila, Abayomi E. Akintorin, and Ned F. Nasr	
16	Rapid Sequence Intubation	111	SEC 37	TION 3 Cardiothoracic Procedures	301 301
17		118	38	Basem F. Khishfe Chemical Cardioversion	313
18	·	121	50	Paul Casey and Thomas Alcorn	515



viii Contents

39	Automated External Defibrillation	319	63	Central Venous Access	516
40	Cardioversion and Defibrillation	324	64	Ultrasound-Guided Vascular Access	541
41	Transcutaneous Cardiac Pacing	330	65	Troubleshooting Indwelling Central Venous Lines James J. McCarthy	559
42	Transthoracic Cardiac Pacing	336	66	Accessing Indwelling Central Venous Lines	563
43	Transvenous Cardiac Pacing	339	67	Pulmonary Artery (Swan-Ganz) Catheterization J. Elizabeth Neuman and Jessica Mann	570
44	Transesophageal Cardiac Pacing	348	68	Noninvasive and Minimally Invasive Cardiac Output Monitoring	577
45	Pacemaker Assessment	353	69	Caleb P. Canders, Daniel W. Weingrow, and Alan T. Chiem Peripheral Venous Cutdown	586
46	Automatic Implantable Cardioverter-Defibrillator Assessment	373	70	Jason M. Rotoli and Flavia Nobay Intraosseous Infusion	599
47	Left Ventricular Assist Device (LVAD) Assessment Paulino A. Alvarez, Myles C. McClelland, and Ashrith Guha	384	71	Umbilical Vessel Catheterization	615
48	Pericardiocentesis	394	72	Arterial Puncture and Cannulation	623
49	Intracardiac Injection	408	73	Extracorporeal Membrane Oxygenation	635
50	Needle Thoracostomy	410	74	Catheter-Based Hemorrhage Control	646
51	Tube Thoracostomy	417	SEC	TION 5 Gastrointestinal Procedures	657
52	Thoracentesis	429	75	Nasogastric Intubation	657
53	Open Chest Wound Management	447	76	Activated Charcoal Administration	665
54	Emergency Department Thoracotomy	452	77	Gastric Lavage	669
55	Open Cardiac Massage	458	78	Whole Bowel Irrigation	673
56	Cardiac Wound Repair	461	79	Video Capsule Endoscopy for Gastrointestinal Bleeding Eric S. Levy, Christopher J. Haines, and Grant Wei	
57	Hilum and Great Vessel Wound Management	468	80	Esophageal Foreign Body Removal	684
58	Thoracic Aortic Occlusion	471	81	Balloon Tamponade of Gastrointestinal Bleeding Bashar M. Attar	
SEC	TION 4 Vascular Procedures	475	82	Gastrostomy Tube Complications and Replacement Erika Flores Uribe and Erick A. Eiting	706
59	General Principles of Intravenous Access	475	83	Paracentesis	717
60	Heel Stick Blood Sampling	492	84	Diagnostic Peritoneal Lavage	729
61	Venipuncture and Peripheral Intravenous Access	495	85	Anal Fissure Management	738
62	Peripheral Inserted Central Catheter (PICC) Lines.	508	86	External Hemorrhoid Management	744



				Contents	ix
87	Prolapsed Rectum Reduction	748	110	Knee Joint Dislocation Reduction	928
88	Anoscopy	752	111	Ankle Joint Dislocation Reduction	933
89	Rigid Rectosigmoidoscopy	757	112	Common Fracture Reduction	938
90	Rectal Foreign Body Extraction	762	113	Casts and Splints	951
91	Proctoclysis	769	SEC	TION 7 Skin and Soft Tissue Procedures	971
SEC	FION 6 Orthopedic and Musculoskeletal		114	General Principles of Wound Management	971
		775 775	115	Burn Wound Management	988
93	Dedra R. Tolson, Brandon M. Fetterolf, and Elaine H. Situ-LaCasse Compartment Pressure Measurement	788	116	Basic Wound Closure Techniques	994
94	Danielle D. Campagne and Scott T. Owens Fasciotomy	797	117	Tissue Adhesives for Wound Repair	1018
	Andrew Rotando and Justin Mazzillo		118	Advanced Wound Closure Techniques	1025
95	Field Amputation of the Extremity	808	119	Management of Specific Soft Tissue Injuries	1034
96	Extensor Tendon Repair	813	120	Thomas M. Kennedy and Christopher J. Russo Subcutaneous Foreign Body Identification	1040
97	Arthrocentesis	819		and Removal	1049
98	Methylene Blue Joint Injection	842	121	Ultrasound-Guided Foreign Body Identification and Removal	1060
99	Basic Principles of Fracture and Joint Reductions Scott C. Sherman and John Robert Hardwick	848	122	Daniel S. Morrison and Chirag N. Shah Hair Tourniquet Management	1066
100	Ultrasound for Fracture and Dislocation Identification and Management	852	123	Asim A. Abbasi Tick Removal	1069
101	Sternoclavicular Joint Dislocation Reduction	864	124	Fishhook Removal	1073
102	Shoulder Joint Dislocation Reduction	871	125	TASER Probe Removal	1076
103	Elbow Joint Dislocation Reduction	895	126	Ring Removal	1080
104	Radial Head Subluxation (Nursemaid's Elbow) Reduction	900	127	Subungual Hematoma Evacuation	1088
105	Carpometacarpal Dislocation Reduction	904	128	Subungual Foreign Body Removal	1094
106	Metacarpophalangeal Joint Dislocation Reduction Michael Gottlieb	908	129	Nail Bed Repair	1097
107	Interphalangeal Joint Dislocation Reduction	914	130	Ganglion Cyst Aspiration and Injection	1105
108	Hip Joint Dislocation Reduction	919	131	Subcutaneous Abscess Incision and Drainage Priya D. Perumalsamy	1108
109	Patellar Dislocation Reduction	925	132	Paronychia or Eponychia Incision and Drainage Lisa Palivos and Tim Richardson	1119



x Contents

133	Felon Incision and Drainage	1123	154	Topical and Noninvasive Anesthesia	1257
134	Pilonidal Abscess or Cyst Incision and Drainage Carolyn Chooljian	1126	155	Hematoma Blocks	1267
135	Perianal Abscess Incision and Drainage	1130	156	Regional Nerve Blocks (Regional Anesthesia) Eric F. Reichman and Jehangir Meer	1271
136	Sebaceous Cyst Incision and Drainage	1137	157	Intravenous Regional Anesthesia	1312
137	Hemorrhage Control	1141	158	Nitrous Oxide Analgesia	1320
138	Trigger Point Injections	1154	159	Procedural Sedation and Analgesia (Conscious Sedation)	1328
139	Escharotomy	1159		Hagop M. Afarian	
140	Subcutaneous Hydration (Hypodermoclysis)	1163	SEC	TION 10 Obstetrical and Gynecologic Procedures	
141	Mary J. O Subcutaneous Extravasation and Infiltration		160	Ultrasound in Early Pregnancy	1347
141	Management	1168	161	Uterine Bleeding	1363
SEC	TION 8 Neurologic and Neurosurgical Procedures	1175	162	Normal Spontaneous Vaginal Delivery	1371
142	Lumbar Puncture		163	Episiotomy	1384
143	Blood Patching for Postdural Puncture (Lumbar Puncture) Headache	1195	164	Shoulder Dystocia Management	1393
144	Gunnar Subieta-Benito, Maria L. Torres, and Ned F. Nasr Burr Holes	1200	165	Breech Delivery	1401
177	Caleb P. Canders, Noah T. Sugerman, and Amir A. Rouhani	1200	166	Postpartum Hemorrhage Management	1409
145	Lateral Cervical Puncture	1207	167	Leah W. Antoniewicz Perimortem Cesarean Section	
146	Intracranial Pressure Monitoring	1210	107	(Perimortem Cesarean Delivery)	1418
147	Ventriculostomy John Burke, Shahed Toossi, and Debbie Yi Madhok	1217	168	Symphysiotomy	1424
148	Ventricular Shunt Evaluation and Aspiration	1223	169	Bartholin Gland Abscess or Cyst Incision and Drainage Alison Uyemura and Charlie C. Kilpatrick	1427
149	Subdural Hematoma Aspiration in the Infant Sarah J. Christian-Kopp	1231	170	Sexual Assault Examination	1433
150	Skeletal Traction (Gardner-Wells Tongs) for Cervical Spine Dislocations and Fractures	1236	171	Culdocentesis	1445
151	Thomas W. Engel and Rebecca R. Roberts Reflex Eye Movements		172	Prolapsed Uterus Reduction	1449
151	(Caloric Testing and Doll's Eyes)	1241	SEC	TION 11 Genitourinary Procedures	1455
152	Myasthenia Gravis Testing	1245	173	Urethral Catheterization	1455
SEC	TION 9 Anesthesia and Analgesia	1249	174	Suprapubic Bladder Aspiration	1466
153	Local Anesthesia		175	Suprapubic Bladder Catheterization (Percutaneous Cystotomy)	1473

				Contents	хi
176	Retrograde Urethrography and Cystography	1481	199	Tympanocentesis	1622
177	Anesthesia of the Penis, Testicle, and Epididymis Eric F. Reichman	1487	200	Auricular Hematoma Evacuation	1625
178	Priapism Management	1493	201	Nasal Medication Administration	1633
179	Paraphimosis Reduction	1500	202	Nasal Foreign Body Removal	1637
180	Phimosis Reduction	1506	203	Nasal Fracture Reduction	1646
181	Dorsal Slit of the Foreskin	1510	204	Nasal Septal Hematoma Evacuation	1655
182	Manual Testicular Detorsion	1514	205	Epistaxis Management	1660
183	Zipper Injury Management	1519	206	Laryngoscopy	1676
184	Genitourinary Foreign Body Removal	1523	207	Airway Foreign Body Removal	1683
SEC	TION 12 Ophthalmologic Procedures	1535	208	Peritonsillar Abscess Incision and Drainage	1690
185	Eye Examination	1535		Daniel S. Morrison and Chirag N. Shah	
186	Contact Lens Removal	1556	SEC	TION 14 Dental Procedures	1699
	Scott A. Heinrich and Dino P. Rumoro		209	Dental Anesthesia and Analgesia	1699
187	Ocular Burn Management and Eye Irrigation	1560	210	Dental Abscess Incision and Drainage	1711
188	Intraocular Pressure Measurement (Tonometry)	1567	210	Richard Dean Robinson and Peter S. Kim	17 11
	Rosalia Njeri Mbugua and Adam Jennings		211	Post-Extraction Pain and Dry Socket (Alveolar Osteitis)	
189	Digital Globe Massage	1576		Management	1718
190	Anterior Chamber Paracentesis	1579	212	Post-Extraction Bleeding Management Eric F. Reichman	1720
191	Corneal Foreign Body Removal	1582	213	Defective Dental Restoration Management	1724
192	Corneal Rust Ring Removal	1588	214	Subluxed and Avulsed Tooth Management	1728
193	Eye Patching and Eye Shields	1591	215	Fractured Tooth Management	1736
194	Acute Orbital Compartment Syndrome		216	Temporomandibular Joint Dislocation Reduction Marilyn M. Hallock	1740
	(Retrobulbar Hemorrhage) Management	1595	217	Arch Bar Separation	1747
195	Globe Luxation Reduction	1600	217	Richard Dean Robinson, Amanda Pientka, and Phuc Ba Duong	1747
196	Hordeolum (Stye) Incision and Drainage	1603	CEC	TION 15 Podiatric Procedures	1751
	Sami H. Uwaydat, Andrew F. Perin, and Jamil D. Bayram		218	Ingrown Toenail Management	
SEC	TION 13 Otolaryngologic Procedures	1607	210	Sean Dyer and Jeffrey Schaider	1/31
197		1607	219	Plantar Puncture Wound Management	1755
198	Cerumen Impaction Removal	1616	220	Toe Fracture Management	1760





(ii	Contents				
221	Plantar Wart Management	1764	227	Hyperthermic Patient Management Jessica Mann and J. Elizabeth Neuman	1821
222	Neuroma Management	1769	228	Autotransfusion	1828
223	Management of Select Podiatric Conditions JoAnna Leuck, Jacob Hurst, and Anant Patel	1775	229	Helmet Removal	1833
SEC	TION 16 Miscellaneous Procedures	1789	230	Pneumatic Antishock Garment (MAST Trousers) Evan J. Weiner	1841
224	Relief of Choking and Acute Upper Airway Foreign Body Removal	1789	231	Hazmat Patient Management	1845
225	Guy Shochat and Jacqueline Nemer Induction of Therapeutic Hypothermia		232	Physical Restraints	1859
	(Targeted Temperature Management)	1797	233	Chemical Restraint	1867
226	Hypothermic Patient Management	1806		Index	. 1879



Contributors

Asim A. Abbasi, MD, MPH [122]

Assistant Professor Department of Pediatric Emergency Medicine University of Rochester Rochester, New York

Adi Abramovici, MD [164]

Maternal-Fetal Medicine Sinai Perinatal, LLC Plantation, Florida

Tiffany Abramson, MD [49]

Resident Physician Department of Emergency Medicine LAC+USC Medical Center Keck School of Medicine of USC Los Angeles, California

Srikar Adhikari, MD, MS [64, 160]

Chief, Section of Emergency Ultrasound Associate Professor Department of Emergency Medicine University of Arizona Tucson, Arizona

Hagop M. Afarian, MD, MS, FACEP [117, 159]

Associate Clinical Professor of Emergency Medicine UCSF School of Medicine Attending Physician, Department of Emergency Medicine UCSF Fresno Associate Chief Medical Informatics Officer Community Medical Centers Fresno, California

Ikem Ajaelo, MD [168]

Independent Attending Physician John Muir Urgent Care John Muir Medical Group Walnut Creek, California

Abayomi E. Akintorin, MD [36]

Chairman
Division of Pediatric Anesthesia
Division of Critical Care
Attending Physician
Department of Anesthesiology
John H. Stroger, Jr. Hospital
Cook County Health and Hospitals System
Clinical Assistant Professor
University of Illinois at Chicago
Chicago, Illinois

Steven E. Aks, DO, FACMT, FACEP [78]

Director, the Toxikon Consortium Division of Toxicology, Department of Emergency Medicine Cook County Health and Hospitals System Professor of Emergency Medicine Rush Medical College Chicago, Illinois

Carmen Alcalá, MD [185]

Resident Physician Department of Emergency Medicine Cook County Health and Hospital Systems Chicago, Illinois

Thomas Alcorn, MD [38]

Assistant Professor Rush University Medical Center Department of Emergency Medicine Chicago, Illinois

Piotr C. Al-Jindi, MD [15, 16]

Associate Program Director Attending Physician Department of Anesthesiology John H. Stroger, Jr. Hospital Cook County Health and Hospitals System Chicago, Illinois

Paulino A. Alvarez, MD [47]

Cardiology Fellow Houston Methodist Hospital Houston, Texas

Ricky N. Amii, MD [183]

Assistant Clinical Professor Department of Emergency Medicine David Geffen School of Medicine at UCLA Los Angeles, California

Dhara Patel Amin, MD [120, 123, 219]

Assistant Program Director of Cook County Emergency Medicine Department of Emergency Medicine John H. Stroger, Jr. Hospital Cook County Health and Hospital Systems Assistant Professor of Emergency Medicine Rush University Medical College Chicago, Illinois

Martin E. Anderson, Jr., MD, FACS [207]

Division of Pediatric Otolaryngology Advocate Children's Hospital Park Ridge, Illinois

Reichman_FM_pi-xxx.indd 13 (5:28 PM

Leah W. Antoniewicz, MD [161, 166]

Assistant Professor Department of Obstetrics and Gynecology Baylor College of Medicine Houston, Texas

Simeon W. Ashworth, DO [162]

Clerkship Director
Department of Emergency Medicine
Madigan Army Medical Center
Tacoma, Washington
Clinical Instructor of Emergency Medicine
University of Washington School of Medicine
Seattle, Washington

Bashar M. Attar, MD, PhD, MPH (Epid), MBA, FACP, FACG, AGAF, FASGE, AGSF, FAASLD [80, 81]

Systemwide Chair for Gastroenterology and Hepatology Cook County Health and Hospitals System Director, GI Fellowship Program John H. Stroger, Jr. Hospital of Cook County Professor of Medicine and Surgery Rush University Medical Center Chicago, Illinois

Michael Balkin, MD [86]

Chief Resident Department of Emergency Medicine John Peter Smith Hospital Fort Worth, Texas

Kenny Banh, MD [54]

Associate Professor of Clinical Emergency Medicine Assistant Dean of Undergraduate Medical Education University of California San Francisco Fresno Fresno, California

John Bass, MD [44]

Resident Physician Madigan Army Medical Center Tacoma, Washington

Jamil D. Bayram, MD, MPH, EMDM, MEd, PhDc [87, 194, 196]

Associate Professor
Department of Emergency Medicine
Johns Hopkins University School of Medicine
Department of International Medicine
Bloomberg School of Public Health
Medical Director, National Capital Region
Johns Hopkins Medicine International
Baltimore, Maryland

Daniel Belmont, MD [59, 61]

Attending Physician Department of Emergency Medicine Elmhurst Hospital Elmhurst, Illinois

Deena Ibrahim Bengiamin, MD, RDMS [135]

Clinical Assistant Professor Department of Emergency Medicine Loma Linda University Medical Center Loma Linda, California

Abraham Berhane, MD [126]

Department of Emergency Medicine Cook County Health and Hospitals System Chicago, Illinois

Vishal Bhuva, MD [219]

Resident Physician Department of Emergency Medicine Cook County Hospital Chicago, Illinois

Charles Boland, MD [15, 32]

Former Chief Resident Cook County Hospital Chicago, Illinois Cardiothoracic Fellow Virginia Commonwealth University Richmond, Virginia

David W. Boldt, MD [12]

Associate Clinical Professor Department of Anesthesiology Division of Critical Care Medicine University of California Los Angeles School of Medicine Los Angeles, California

Justin C. Bosley, MD, CAQSM [222]

Emergency Medicine Physician Sports Medicine Physician The Permanente Medical Group Oakland, California

Steven H. Bowman, MD, FACEP [126-128]

Program Director
Department of Emergency Medicine
Cook County Health and Hospitals System
Associate Professor of Emergency Medicine
Department of Emergency Medicine
Rush Medical College
Chicago, Illinois

Keegan Bradley, MD [96]

Resident Physician Department of Emergency Medicine John Peter Smith Hospital Fort Worth, Texas

Carlos E. Brown, Jr., MD [139]

Resident Physician Department of Emergency Medicine Cook County Health and Hospital System Chicago, Illinois

Curtis Blake Buchanan, MD [20]

Attending Physician US Acute Care Solutions Department of Emergency Medicine Florida Hospital Tampa Temple, Florida





Joshua T. Bucher, MD, FAAEM [95]

Assistant Professor EMS Medical Director, RWJ-MHS Department of Emergency Medicine Rutgers–Robert Wood Johnson Medical School New Brunswick, New Jersey

Aaron W. Bull, MD [175]

Department of Emergency Medicine John Peter Smith Health Network Fort Worth, Texas

Michael D. Burg, MD [101]

Associate Clinical Professor of Emergency Medicine Department of Emergency Medicine UCSF/Fresno Medical Education Program Fresno, California

John Burke, MD, PhD [147]

Resident Physician Department of Neurological Surgery University of California at San Francisco San Francisco, California

Beech S. Burns, MD, MCR [23, 70]

Assistant Professor Departments of Emergency Medicine and Pediatrics Division of Emergency Medicine Oregon Health & Science University Portland, Oregon

Danielle D. Campagne, MD, FACEP [93, 138]

Associate Professor of Clinical Emergency Medicine Department of Emergency Medicine UCSF School of Medicine Fresno, California

Angelique Campen, MD, FACEP [103]

Emergency Department
Providence Saint Joseph Medical Center
Clinical Instructor of Emergency Medicine
Ronald Reagan UCLA Medical Center
Emergency Department
Providence Saint Joseph Medical Center
Assistant Adjunct Professor of Medicine
UCLA Emergency Department
Los Angeles, California

Caleb P. Canders, MD [68, 144]

Clinical Associate Professor Department of Emergency Medicine David Geffen School of Medicine at UCLA Los Angeles, California

Rene Carizey, DO [105, 190]

Associate Professor Department of Emergency Medicine Rush University Chicago, Illinois

Paul Casey, MD, FACEP [38]

Associate Professor Vice Chairman, Operations Associate Chief Medical Informatics Officer Department of Emergency Medicine Rush University Medical Center Chicago, Illinois

Anthony W. Catalano, MD [183]

Emergency Medicine Physician Cottage Hospital Santa Barbara, California

Divya Karjala Chakkaravarthy, MD [9]

Anesthesiologist and Fellowship in Pain Management Department of Anesthesiology and Pain Management John H. Stroger, Jr. Hospital, Cook County Chicago, Illinois

Steven J. Charous, MD, FACS [206]

Clinical Professor Director, Voice and Swallow Center Department of Otolaryngology–Head and Neck Surgery Loyola University Medical Center Maywood, Illinois

Bharti R. Chaudhari, DO [215]

Attending Physician Department of Emergency Medicine John Peter Smith Health Network Fort Worth, Texas

Alan T. Chiem, MD, MPH [68]

Assistant Clinical Professor Department of Emergency Medicine Olive View–UCLA Medical Center David Geffen School of Medicine Los Angeles, California

Padraic Chisholm, MD [163]

Former Resident
Department of Obstetrics and Gynecology
Baylor College of Medicine
Houston, Texas
Obstetrician Gynecologist
Women's Clinic of South Texas
Edinburg, Texas

Carolyn Chooljian, MD [134]

Clinical Professor, Emergency Medicine Department of Emergency Medicine UCSF Fresno Emergency Medicine Residency Program University of California, San Francisco Fresno, California



Sarah J. Christian-Kopp, MD, FAAP [149, 161, 165]

Clinical Assistant Professor of Pediatric Emergency Medicine & Emergency Medicine

Loma Linda University Medical Center and Children's Hospital Clinical Assistant Professor of Emergency Medicine

UCLA/Olive View Medical Center

Attending Physician

Department of Emergency Medicine

Providence Tarzana Medical Center

Attending Physician

Department of Emergency Medicine

Kaiser Permanente Hospitals

Fontana and Ontario, California

Laura Chun, MD [120]

Resident Physician Department of Emergency Medicine John H. Stroger, Jr. Hospital Cook County Health and Hospital Systems Chicago, Illinois

Jennalee Cizenski, MD [171]

Resident, Emergency Medicine John Peter Smith Hospital Fort Worth, Texas

G. Carolyn Clayton, MD [197, 202]

Clinical Assistant Professor Department of Emergency Medicine Rush Medical College Rush University Medical Center Chicago, Illinois

Ginger Clinton, MD [128]

Emergency Medicine Cook County Health and Hospital Systems Chicago, Illinois

Alfred Coats, III, FNP-C [43, 125]

Nurse Practitioner Department of Emergency Medicine San Jacinto Methodist Hospital University of Texas Health Science Center at Houston Houston, Texas

Emily Cooper, MD [157]

Chief Resident Department of Emergency Medicine Jackson Memorial Hospital Miami, Florida

John Cruz, DO [66]

Resident Physician Department of Emergency Medicine Madigan Army Medical Center Tacoma, Washington

Bryan Darger, MD [4]

Department of Emergency Medicine University of San Francisco School of Medicine San Francisco, California

Dayle Davenport, MD [129, 198]

Assistant Professor Department of Emergency Medicine Rush University Medical Center Chicago, Illinois

Beth R. Davis, MD [161]

Assistant Professor Baylor College of Medicine Houston, Texas

Shoma Desai, MD [13, 49]

Clinical Associate Professor of Emergency Medicine Department of Emergency Medicine Keck School of Medicine University of Southern California Los Angeles, California

Sasha Michael Dib, MD [176]

Emergency Medicine Resident John Peter Smith Hospital Fort Worth, Texas

Kevin J. Donnelly, MD [17]

Resident Physician Department of Anesthesiology and Pain Management John H. Stroger, Jr. Hospital of Cook County Chicago, Illinois

Andrea Dreyfuss, MD, MPH [172]

Ultrasound Fellow Department of Emergency Medicine Highland Hospital–Alameda Health System Oakland, California

Stephen N. Dunay, MD, MHS [162]

Resident Physician Department of Emergency Medicine Madigan Army Medical Center Tacoma, Washington

Eleanor Dunham, MD [225]

Assistant Professor Department of Emergency Medicine Penn State Health Milton S. Hershey Medical Center Penn State University College of Medicine Hershey, Pennsylvania

David K. Duong, MD, MS, FACEP [233]

Alameda Health System, Highland Hospital Department of Emergency Medicine Associate Professor University of California, San Francisco School of Medicine Oakland, California

Phuc Ba Duong, DO [217]

Resident Physician Department of Emergency Medicine John Peter Smith Health Network Fort Worth, Texas







Department of Emergency Medicine Cook County Health and Hospital System Instructor, Department of Emergency Medicine Rush Medical College Chicago, Illinois

Erick A. Eiting, MD, MPH, MMM, FACEP [82]

Vice Chair of Operations Mount Sinai Downtown Assistant Professor of Emergency Medicine Icahn School of Medicine at Mount Sinai New York, New York

Tamer Elattary, MB, ChB [11, 31]

Anesthesia Resident Department of Anesthesiology and Pain Management Cook County Health and Hospitals System Chicago, Illinois

Thomas W. Engel, II, MD [150]

Resident Department of Emergency Medicine Cook County Hospital Chicago, Illinois

Brian Euerle, MD [7, 97]

Associate Professor Department of Emergency Medicine University of Maryland School of Medicine Baltimore, Maryland

Mahmuda Farha, DO [215]

Emergency Medicine Resident Department of Emergency Medicine John Peter Smith Hospital Fort Worth, Texas

Rosaura Fernandez, MD [77]

Assistant Program Director of Cook County Emergency Medicine Department of Emergency Medicine Cook County Health and Hospital Systems Assistant Professor of Emergency Medicine Rush Medical College Chicago, Illinois

Brandon M. Fetterolf, DO [92]

Special Operations Resuscitation Team "A" Medical Director 528th Sustainment Brigade (SO)(A) 1st Special Forces Command Fort Bragg
Fort Bragg, North Carolina

Adam Flink, MD [214]

Department of Emergency Medicine John Peter Smith Hospital Fort Worth, Texas

Adrian H. Flores, MD, MPH [100]

Assistant Clinical Professor Department of Emergency Medicine UCSF School of Medicine San Francisco, California

Christopher Freeman, MD [137, 157, 164]

Program Director Emergency Medicine Jackson Memorial Hospital Affiliated Assistant Professor Department of Surgery University of Miami Miller School of Medicine Miami, Florida

Michael Friedman, MD [204]

Professor and Chairman Section of Otolaryngology Advocate Illinois Masonic Medical Center Medical Director ChicagoENT Chicago, Illinois

Kimberly Lynn Fugok, DO [60]

Emergency and Hospital Medicine Pediatric Emergency Medicine Nemours/Alfred I. duPont Hospital for Children Wilmington, Delaware

Sonali Gandhi, MD [133, 154]

Resident Physician Department of Emergency Medicine Cook County Health and Hospitals System Chicago, Illinois

Molly Garcia [39]

Emergency Medical Technician Sacramento, California

Christopher A. Gee, MD, MPH [112]

Clinical Associate Professor Department of Orthopaedics University of Utah School of Medicine Salt Lake City, Utah

Steven Go, MD, FACEP [178, 182]

Professor of Emergency Medicine Department of Emergency Medicine Truman Medical Center, Hospital Hill University of Missouri—Kansas City School of Medicine Kansas City, Missouri

Chad Gorbatkin, MD [44, 66]

Assistant Professor Department of Military and Emergency Medicine Uniformed Services University of the Health Sciences Staff Physician, Madigan Army Medical Center Tacoma, Washington

Katarzyna M. Gore, MD [197, 202]

Clinical Assistant Professor Department of Emergency Medicine Rush University Medical Center Chicago, Illinois





•

Michael Gottlieb, MD, RDMS [50, 102, 106, 107, 108, 110, 142]

Director of Emergency Ultrasound Assistant Professor Department of Emergency Medicine Rush University Medical Center Chicago, Illinois

Thomas P. Graham, MD [130, 155]

Professor of Emergency Medicine Department of Emergency Medicine UCLA School of Medicine Los Angeles, California

Justin Grisham, DO [72]

Resident Department of Emergency Medicine Madigan Army Medical Center Tacoma, Washington

Andrew Grock, MD [74]

Faculty Physician
Division of Emergency Medicine
Greater Los Angeles VA Healthcare System
Assistant Clinical Professor of Emergency Medicine
David Geffen School of Medicine
University of California Los Angeles
Los Angeles, California

Lindsay K. Grubish, DO [161]

Staff Physician Madigan Army Medical Center Tacoma, Washington

Ashrith Guha, MD, MPH, FACC [47]

Assistant Professor Department of Cardiology Methodist DeBakey Heart and Vascular Center JC Walter Transplant Canter Houston Methodist Hospital Houston, Texas

Ameera Haamid, MD [128]

Resident Physician Department of Emergency Medicine John H. Stroger, Jr. Hospital of Cook County Chicago, Illinois

Christopher J. Haines, DO [33, 79]

Clinical Associate Professor Department of Pediatrics Division of Pediatric Emergency Medicine Rutgers Robert Wood Johnson Medical School New Brunswick, New Jersey

Marilyn M. Hallock, MD, MS, FACEP [216]

Clinical Assistant Professor Department of Emergency Medicine Rush University Medical College Chicago, Illinois

John Robert Hardwick, MD [99]

Associate Emergency Physician Northern Nevada Emergency Physicians Reno, Nevada

Tarlan Hedayati, MD, FACEP [19]

Assistant Professor Associate Program Director Department of Emergency Medicine Cook County Health and Hospitals System Chicago, Illinois

Tyler Hedman, MD [220]

Emergency Medicine Resident Department of Emergency Medicine John Peter Smith Hospital Fort Worth, Texas

James A. Heilman, MD, MBA [23, 70]

Assistant Professor Department of Emergency Medicine Oregon Health and Science University Portland, Oregon

Scott A. Heinrich, MD [186, 191]

Assistant Professor Department of Emergency Medicine Rush Medical College Chicago, Illinois

H. Gene Hern, Jr., MD [34]

Associate Clinical Professor University of California, San Francisco Vice Chair of Education, Emergency Medicine Alameda Health System–Highland General Hospital Oakland, California

Tyson Jay Higgins, MD [91]

Resident Physician Department of Emergency Medicine John Peter Smith Health Network Fort Worth, Texas

Jean W. Hoffman, MD [73]

Assistant Professor Departments of Emergency Medicine and Anesthesia University of Colorado School of Medicine Aurora, Colorado

Jordan R. H. Hoffman, MPH, MD [73]

Fellow, Cardiothoracic Surgery Department of Surgery Division of Thoracic Surgery University of Colorado School of Medicine Aurora, Colorado

Chad Holmes, DO [90]

Associate Ultrasound Director Department of Emergency Medicine JPS Health Network Fort Worth, Texas





Katherine Holmes, DO [86]

Medical Student Clerkship Director JPS EM Director of New Media Department of Emergency Medicine John Peter Smith Hospital Fort Worth, Texas

Marcus Holmes, DO [192]

Chief Resident Department of Emergency Medicine John Peter Smith Health Network Fort Worth, Texas

Louis G. Hondros, DO, FACEP [3]

Director
Emergency Medical Systems
Assistant Professor
Department of Emergency Medicine
Assistant Professor
Department of Anatomy and Cell Biology
Rush University Medical Center
Chicago, Illinois

Dennis Hsieh, MD, JD [184]

Assistant Professor Department of Emergency Medicine Harbor-UCLA Medical Center University of California, Los Angeles Torrance, California

Charles Huggins, MD, FACEP [88]

Core Faculty Emergency Medicine Residency Program Department of Emergency Medicine John Peter Smith Hospital Fort Worth, Texas

Jacob Hurst, MD [223]

Resident Physician Department of Emergency Medicine John Peter Smith Health Network Fort Worth, Texas

Pholaphat Charles Inboriboon, MD, MPH, FACEP [20, 98]

Clinical Associate Professor Department of Emergency Medicine University of Missouri Kansas City School of Medicine Kansas City, Missouri

Konstantin Inozemtsev, MD [14]

Resident Physician Department of Anesthesiology and Pain Management John H. Stroger, Jr. Hospital of Cook County Chicago, Illinois

Eric Isaacs, MD [1, 4]

Clinical Professor Department of Emergency Medicine University of California, San Francisco San Francisco, California

Adam Jennings, DO, FACEP [188, 192, 193, 195]

Assistant Professor Department of Emergency Medicine TCU & UNTHSC School of Medicine Fort Worth, Texas

Megan Johnson, MD [13]

Department of Emergency Medicine LAC+USC Medical Center Keck School of Medicine of USC Los Angeles, California

Paul J. Jones, MD, FACS [199]

Associate Professor Pediatric/General Otolaryngology Department of Otolaryngology—Head and Neck Surgery Loyola University Medical Center Maywood, Illinois

Kimberly T. Joseph, MD, FACS, FCCM [51]

ATLS Subcommittee Chair
Committee on Trauma of the American College of Surgeons
Assistant Professor
Department of General Surgery
Rush University Medical College
Voluntary Attending Surgeon
Department of Trauma & Burns
John H. Stroger, Jr. Hospital
Cook County Health and Hospitals System
Chicago, Illinois

Marianne Juarez, MD [48, 52]

Assistant Clinical Professor Department of Emergency Medicine University of California San Francisco San Francisco, California

Thomas M. Kennedy, MD [119]

Fellow, Pediatric Emergency Medicine Sidney Kimmel Medical College at Thomas Jefferson University Nemours/Alfred I. duPont Hospital for Children Division of Pediatric Emergency Medicine Wilmington, Delaware

Neera Khattar, MD [127]

Resident Physician John H. Stroger, Jr. Hospital of Cook County Chicago, Illinois

Basem F. Khishfe, MD [6, 37]

Emergency Ultrasound Director Mercy Hospital and Medical Center Assistant Professor of Emergency Medicine Chicago Medical School Chicago, Illinois

Charlie C. Kilpatrick, MD, MEd [169]

Residency Program Director, Vice Chair of Education Associate Professor | Female Pelvic Medicine, Reconstructive Surgery Department of Obstetrics and Gynecology Baylor College of Medicine Houston, Texas





Resident Physician Department of Emergency Medicine John Peter Smith Health Network Fort Worth, Texas

Peter S. Kim, MD [210]

Emergency Medicine Resident John Peter Smith Hospital Fort Worth, Texas

Jessica J. Kirby, DO, FACEP [2]

Associate Medical Director Department of Emergency Medicine John Peter Smith Health Network Fort Worth, Texas

Ryan P. Kirby, MD, FACEP [2]

Program Director Department of Emergency Medicine John Peter Smith Healthcare Network Fort Worth, Texas

Hannah Kirsch, MD [146]

Resident in Neurology Department of Neurology University of California, San Francisco School of Medicine San Francisco, California

Mark P. Kling, MD, FAAEM, CSCS [104, 109]

Former Assistant Clinical Professor Cook County (Stroger) Emergency Medicine Residency Former Private Practice Emergency Healthcare Physicians and IEMS of Illinois Senior Attending Physician TeamHealth NW–Franciscan Affiliates Gig Harbor, Washington

Heidi Knowles, MD, FACEP [195]

Core Faculty
Department of Emergency Medicine
John Peter Smith Health Network
Fort Worth, Texas

Igor V. Kolesnikov, MD, PharmD [21]

Senior Attending Physician
Chief of Head and Neck Anesthesia Section
Assistant Professor of Anesthesiology
Rush University Medical Center
Attending Physician
Department of Anesthesiology and Pain Management
John H. Stroger, Jr. Hospital
Chicago, Illinois

Alex Koo, MD [75, 83]

Department of Emergency Medicine Madigan Army Medical Center Joint Base Lewis McChord, Washington

Laurie Krass, MD [123]

Department of Emergency Medicine John H. Stroger, Jr. Hospital of Cook County Chicago, Illinois

Ryan Nathaniel Krech, MD, JD, FACEP [214]

Medical Director Department of Emergency Medicine John Peter Smith Health Network Fort Worth, Texas

John C. Kubasiak, MD [51]

Assistant Instructor of Surgery Department of Surgery Division of General and Acute Care Surgery UT Southwestern School of Medicine Dallas, Texas

Elizabeth Kwan, MS, MD [45]

Assistant Professor Department of Emergency Medicine University of California San Francisco San Francisco, California

Steven Lai, MD [205]

Assistant Residency Program Director
UCLA Emergency Medicine Residency
Olive View-UCLA Medical Center | Ronald Reagan-UCLA
Medical Center
Assistant Clinical Professor
Department of Emergency Medicine
David Geffen School of Medicine at UCLA
Los Angeles, California

John Larkin, MD [97]

Assistant Medical Director Attending Physician Emergency Department CHI Baylor–St. Luke's Medical Center Houston, Texas

Teresa D. Le, MD [193]

Resident Physician Department of Emergency Medicine John Peter Smith Hospital Fort Worth, Texas

Ahmad M. Abou Leila, MD [36]

Assistant Professor of Anesthesiology Cleveland Clinic Anesthesiology Attending Department of Anesthesiology Hillcrest Hospital Mayfield Heights, Ohio

Jacob Lentz, MD [148]

Resident Department of Emergency Medicine University of California at Los Angeles Los Angeles, California

JoAnna Leuck, MD, FACEP [96, 171, 220, 223]

Assistant Professor Academic Vice Chair Program Director Department of Emergency Medicine John Peter Smith Health Network Fort Worth, Texas



13/08/18 6:28 PM



Eric S. Levy, DO [33, 79]

Department of Emergency Medicine Rutgers Robert Wood Johnson Medical School New Brunswick, New Jersey

Karen Lind, MD, MACM, FACEP [184]

Faculty Physician
Department of Emergency Medicine
Alameda Health System/Highland Campus
Oakland, California

Jenny J. Lu, MD, MS [76, 77]

Assistant Professor Rush University Medical College Cook County Health and Hospitals System Department of Emergency Medicine Division of Medical Toxicology Chicago, Illinois

Claire H. Lyons, MS, MD [184]

Resident Physician Department of Emergency Medicine Highland Hospital–Alameda Health System University of California at San Francisco–Medical School San Francisco, California

O. John Ma, MD [23, 70]

Professor and Chair Department of Emergency Medicine Oregon Health & Science University Portland, Oregon

Debbie Yi Madhok, MD [146, 147]

Assistant Clinical Professor Zuckerberg San Francisco General Hospital Department of Emergency Medicine University of California San Francisco San Francisco, California

Leann Mainis, MD [84, 158]

Chief Resident Department of Emergency Medicine UCSF Fresno Fresno, California

Jessica Mann, MD, MS [67, 227]

Assistant Professor of Emergency Medicine
Life Lion EMS Medical Director–Berks County and Community
Paramedicine
EMS Fellowship Core Faculty
Department of Emergency Medicine
Penn State Health Milton S. Hershey Medical Center
Hershey, Pennsylvania

Monique A. Mayo, MD [170]

Attending Physician
Department of Emergency Medicine
Division of Pediatrics
Nemours/Alfred I. duPont Hospital for Children
Sidney Kimmel Medical College at Thomas Jefferson University
Wilmington, Delaware

Briana D. Mazur, DO [195]

Department of Emergency Medicine John Peter Smith Health Network Fort Worth, Texas

Justin Mazzillo, MD [94]

Assistant Professor Assistant Medical Director Department of Emergency Medicine University of Rochester Medical Center Rochester, New York

Rosalia Njeri Mbugua, MD [188]

Staff Physician Department of Emergency Medicine Medical City Healthcare, Alliance Fort Worth, Texas

James J. McCarthy, MD, FACEP, FAEMS [65]

Professor
Department of Emergency Medicine
McGovern Medical School, Part of UTHealth
The University of Texas Health Science Center at Houston
Houston, Texas

Myles C. McClelland, MD, MPH, CMQ [43, 47, 125]

Medical Director Department of Emergency Medicine Willowbrook Methodist Hospital Houston, Texas

Daisha McLarty, MD [213]

Emergency Medicine Resident John Peter Smith Hospital Fort Worth, Texas

Jehangir Meer, MD [7, 156]

Seattle Emergency Physicians Department of Emergency Medicine First Hill & Cherry Hill Campuses Swedish Medical Center Seattle, Washington

Amit Mehta, MD, CMQ [228]

Assistant Professor Department of Emergency Medicine Director of Medical Informatics McGovern Medical School at UTHealth Houston, Texas

Dara Mendelsohn, MD [233]

Resident Department of Emergency Medicine Highland Hospital Oakland, California

Marco Mikhael, MD [22]

Senior Pediatric Anesthesiologist Cook County Health and Hospitals System Pediatric Anesthesia Attending St. Alexius Medical Center AMITA Heath-Hoffman Estates Chicago, Illinois



•

Ruth E. Moncayo, MD [28]

Senior Faculty Attending Physician Department of Anesthesiology and Pain Management Cook County Health and Hospital Systems Chicago, Illinois

James Montoya, MD, FAAEM, FACEP [39]

CEP Physician, Partner
Vice-Chief, Department of Emergency Medicine
Sutter Medical Center-Sacramento
Sacramento, California
Clinical Associate Professor
Department of Emergency Medicine
California Northstate University College of Medicine
Elk Grove, California

Daniel S. Morrison, MD, FACEP [40, 41, 42, 121, 208]

Associate Professor Department of Emergency Medicine Rutgers Robert Wood Johnson Medical School New Brunswick, New Jersey

Ivette Motola, MD, MPH [114]

Assistant Director, Gordon Center for Research in Medical Education

Director, Division of Prehospital & Emergency Healthcare Associate Professor of Emergency Medicine University of Miami Miller School of Medicine Miami, Florida

David Murray, MD [120]

Department of Emergency Medicine John H. Stroger, Jr. Hospital of Cook County Chicago, Illinois

Arun Nagdev, MD [63]

Director, Emergency Ultrasound Alameda Health System Highland General Hospital Associate Clinical Professor UCSF School of Medicine San Francisco, California

Damali N. Nakitende, MD, RDMS [102, 142]

Ultrasound Faculty at Advocate Christ Medical Center Department of Emergency Medicine Chicago, Illinois

Isam F. Nasr, MD [9, 12, 16, 29]

Clinical Assistant Professor Department of Emergency Medicine Rush Medical College Chicago, Illinois

Ned F. Nasr, MD [11, 12, 14-18, 21, 22, 24, 26, 28-32, 36, 143]

Vice Chairman for Academic Affairs and Program Director Chairman, Division of Neuroanesthesiology Department of Anesthesiology and Pain Management Cook County Health and Hospitals System Chicago, Illinois

Robert Needleman, MD [126]

Resident Physician Department of Emergency Medicine John H. Stronger, Jr. Hospital Cook County Health and Hospital Systems Chicago, Illinois

Jacqueline Nemer, MD, FACEP [48, 52, 207, 224]

Professor of Emergency Medicine Director of Advanced Clinical Skills Department of Emergency Medicine University of California San Francisco School of Medicine San Francisco, California

J. Elizabeth Neuman, DO, FACEP [67, 227]

Assistant Professor of Emergency Medicine Department of Emergency Medicine Penn State Hershey Medical Center Hershey, Pennsylvania

Ann P. Nguyen, MD [179]

Attending Physician Emergency Trauma Center Hackensack University Medical Center Hackensack, New Jersey

Thuy Tran T. Nguyen, FNP-C [43, 125]

Nurse Practitioner Department of Emergency Medicine Methodist Hospital University of Texas Medical Branch Galveston, Texas

Abdoulie Nije, MD [126]

Department of Emergency Medicine Cook County Hospital Chicago, Illinois

Flavia Nobay, MD [69]

Associate Professor of Emergency Medicine Department of Emergency Medicine Associate Dean for Admissions University of Rochester School of Medicine and Dentistry University of Rochester Rochester, New York

Jeanne A. Noble, MD, MA [71, 167]

Assistant Professor of Emergency Medicine UCSF-SFGH Emergency Medicine Residency Simulation Director Department of Emergency Medicine University of California, San Francisco San Francisco, California

Mary J. O, MD, FACEP [140]

Assistant Professor of Emergency Medicine Frank H. Netter MD School of Medicine Quinnipiac University St. Vincent's Medical Center Bridgeport, Connecticut



Julie Kautz Oliva, MD [34]

Resident Physician Department of Emergency Medicine Highland Hospital Oakland, California

Francisco Orejuela, MD [163]

Associate Professor Department of Obstetrics and Gynecology Division of Female Pelvic Medicine and Reconstructive Surgery Baylor College of Medicine Houston, Texas

Kevin O'Rourke, MD [180, 221]

Assistant Professor Department of Emergency Medicine Truman Medical Center University of Missouri at Kansas City School of Medicine Kansas City, Missouri

Guillermo Ortega, MD [42]

Emergency Medicine Resident Rutgers–Robert Wood Johnson Medical School New Brunswick, New Jersey

Scott T. Owens, MD, MPH [93]

Acting Instructor, Senior Fellow Department of Emergency Medicine University of Washington Seattle, Washington

Hyang won Paek, MD, MBA [18]

Pediatric Anesthesiologist Department of Anesthesiology and Pain Management John H. Stroger, Jr. Hospital of Cook County Assistant Professor of Anesthesiology Rush Medical College Chicago, Illinois

Lisa Palivos, MD, FACEP [132, 133]

Assistant Professor Rush Medical College Attending Physician Department of Emergency Medicine Cook County Health and Hospital Systems Chicago, Illinois

Anant Patel, DO [223]

Assistant Medical Director Core Faculty Department of Emergency Medicine: John Peter Smith Health Network Integrative Emergency Services Fort Worth, Texas

Andrew F. Perin, MD [194, 196]

Little Rock Eye Clinic Little Rock, Arkansas

Priya D. Perumalsamy, MD [105, 131]

Associate Professor Department of Emergency Medicine Rush University Medical Center Chicago, Illinois

Amanda Pientka, MD [217]

Chief Resident Department of Emergency Medicine John Peter Smith Health Network Fort Worth, Texas

Teresa Proietti, DO [174]

Resident Department of Emergency Medicine John Peter Smith Hospital Fort Worth, Texas

Kara N. Purdy, MD, MS [161]

Doctor, Department of Emergency Medicine Madigan Army Medical Center Tacoma, Washington

Yanina Purim-Shem-Tov, MD, MS, FACEP [3]

Associate Professor Vice Chairperson Faculty Development and Research Department of Emergency Medicine Medical Director of Chest Pain Center Rush University Medical Center Chicago, Illinois

Abed Rahman, MD, MS [29]

Interventional Pain Service Oak Forest Health Center Anesthesiology and Pain Management John H. Stroger, Jr. Hospital Chicago, Illinois

René Ramirez, MD, FACEP [84, 158]

Scribe Director Assistant Clinical Professor Department of Emergency Medicine Community Regional Medical Center University of California San Francisco-Fresno Fresno, California

John Ramos, MMS, PA-C [135]

Assistant Professor Dominican University of California Department of Emergency Medicine Marin General Hospital San Rafael, California

Caleb Andrew Rees, MD [173]

Resident Physician Department of Emergency Medicine John Peter Smith Health Network Fort Worth, Texas



•

Eric F. Reichman, PhD, MD, FAAEM, FACEP, NBPAS [53, 55-58,

85, 87, 97, 113, 116, 118, 124, 145, 152, 156, 177, 189, 200, 203, 209, 211, 212]

Clinical Associate Professor of Emergency Medicine Attending Physician, Department of Emergency Medicine UT-Health

McGovern Medical School

University of Texas Health Science Center at Houston-Medical School

Voluntary Attending Physician, Emergency Department Memorial Hermann Hospital-Texas Medical Center Houston, Texas

Nicole Remish, DO [89]

Department of Emergency Medicine John Peter Smith Hospital Fort Worth, Texas

Melissa M. Rice, MD [197, 202]

Assistant Professor Department of Emergency Medicine Rush University Medical College Chicago, Illinois

Tim Richardson, MD [132]

Department of Emergency Medicine John H. Stroger, Jr. Cook County Hospital Chicago, Illinois

Rebecca R. Roberts, MD [150]

Attending Physician
Research Director
Department of Emergency Medicine
John H. Stroger, Jr. Hospital
Assistant Professor of Emergency Medicine
Rush University Medical College
Chicago, Illinois

Richard Dean Robinson, MD [2, 91, 173-176, 210,

213-215, 217]

Houston, Texas

Vice Chairman
Department of Emergency Medicine
John Peter Smith Health Network
Associate Professor
Department of Emergency Medicine
University of North Texas Health Science Center
Fort Worth, Texas

Patrick J. Rogers, DO [40, 41]

Department of Emergency Medicine Jersey Shore University Medical Center Neptune, New Jersey

Carlos J. Roldan, MD, FACEP, FAAEM [46, 136, 181, 189, 228]

Associate Professor of Emergency Medicine
The University of Texas, Health Science Center at Houston Medical School
Assistant Professor of Pain Medicine
The University of Texas MD Anderson Cancer Center

John S. Rose, MD, FACEP [5]

Professor

Department of Emergency Medicine University of California, Davis Health System Sacramento, California

Matthew Rosen, MD [74]

Resident

Department of Emergency Medicine UCLA Emergency Medicine Residency Program Ronald Reagan UCLA Medical Center Olive View-UCLA Medical Center Los Angeles, California

Andrew Rotando, DO [94]

Attending Physician Department of Emergency Medicine Rochester Regional Health Rochester, New York

Jason M. Rotoli, MD [69]

Assistant Professor
Department of Emergency Medicine
University of Rochester
Assistant Residency Director
Department of Emergency Medicine
Deaf Health Pathways, Director
University of Rochester Medical Center
Rochester, New York

Amir A. Rouhani, MD [144]

Assistant Clinical Professor Director of Simulation Education Olive View-UCLA Medical Center Department of Emergency Medicine David Geffen School of Medicine at UCLA Los Angeles, California

Dino P. Rumoro, DO, MPH [186, 191]

Associate Professor Department of Emergency Medicine Rush Medical College Chicago, Illinois

Christopher J. Russo, MD [10, 60, 115, 119, 170]

Clinical Assistant Professor of Pediatrics Sidney Kimmel Medical College of Thomas Jefferson University Philadelphia, Pennsylvania Attending Physician Division of Emergency Medicine Nemours/Alfred I. duPont Hospital for Children Wilmington, Delaware

Alia Safi, MD [28]

Former Anesthesiology Resident Department of Anesthesiology John H. Stroger, Jr. Hospital Cook County Health and Hospitals System Chicago, Illinois





Dean Sagun, MD [232]

Attending Physician Department of Emergency Medicine TeamHealth Memorial Hermann Hospital Northeast Humble, Texas

Joseph A. Salomone, III, MD [35]

St. Croix, United States Virgin Islands

Stephen Sandelich, MD [115]

Emergency Medicine Physician Division of Emergency Medicine Summerville Medical Center Trident Health System Charleston, South Carolina

Devin Sandlin, MD [192]

Clinical Faculty Department of Emergency Medicine John Peter Smith Hospital Fort Worth, Texas

Ashley N. Sanello, MD [229]

Emergency Medicine Physician Torrance Memorial Medical Center Medical Director, City of Compton Fire Department Torrance, California

Shari Schabowski, MD [185]

Assistant Professor Rush Medical College Attending Physician Department of Emergency Medicine Cook County Health and Hospital Systems Chicago, Illinois

Jeffrey Schaider, MD [218]

Chairman, Department of Emergency Medicine Cook County Health and Hospital System Professor, Department of Emergency Medicine Rush Medical College Chicago, Illinois

Jessen D. Schiebout, MD [226]

Associate Professor Department of Emergency Medicine Rush University Medical Center Chicago, Illinois

Michael A. Schindlbeck, MD, FACEP [139, 154]

Associate Program Director Cook County Emergency Medicine Training Program Assistant Professor of Emergency Medicine Rush Medical College Chicago, Illinois

Matthew D. Schwartz, DO [179]

Attending Emergency Physician Department of Emergency Medicine Southside Hospital Bay Shore, New York

Luis Sequera-Ramos, MD [26]

Anesthesia Resident Department of Anesthesiology and Pain Management Cook County Health System Chicago, Illinois

Fred A. Severyn, MD [25]

Associate Professor of Emergency Medicine University of Colorado School of Medicine Aurora, Colorado

Chirag N. Shah, MD, FACEP [40-42, 121, 208]

Associate Professor Department of Emergency Medicine Rutgers-Robert Wood Johnson Medical School New Brunswick, New Jersey

Andrew Shedd, MD, FACEP [174, 175]

Associate Residency Director Ultrasound Director Department of Emergency Medicine John Peter Smith Health Network Fort Worth, Texas

Scott C. Sherman, MD [99]

Associate Residency Director Cook County Emergency Medicine Residency Associate Professor of Emergency Medicine Rush Medical College Chicago, Illinois

Guy Shochat, MD [207, 224]

Clinical Associate Professor Department of Emergency Medicine University of California, San Francisco School of Medicine San Francisco, California

Craig Sisson, MD, RDMS, FACEP [63]

Clinical Associate Professor
Director, Division of Ultrasound
Director, Emergency Ultrasound Fellowship
Co-Director, Combined Ultrasound and Global Health Fellowship
Co-Director, Longitudinal Medical Student Ultrasound
Curriculum

Adjunct Associate Professor, Department Cell Systems and Anatomy

UTHSCSA Department of Emergency Medicine Joe R. and Teresa Lozano Long School of Medicine San Antonio, Texas

Elaine H. Situ-LaCasse, MD [92]

Clinical Assistant Professor Department of Emergency Medicine University of Arizona College of Medicine Banner University Medical Center Tucson, Arizona

Eric R. Snoey, MD [172, 222]

Clinical Professor of Emergency Medicine UCSF School of Medicine Designated Institutional Official and Vice Chair Department of Emergency Medicine Alameda Health System–Highland Hospital Oakland, California



•

Steven J. Socransky, MD, FRCPC [187]

Associate Professor Northern Ontario School of Medicine Sudbury, Ontario, Canada

Jennifer L'Hommedieu Stankus, MD, JD, FACEP [72]

Contract Emergency Physician Department of Emergency Medicine Madigan Army Medical Center Tacoma, Washington

Lori Stolz, MD, RDMS [64, 160]

Assistant Professor Banner University Medical Center Tucson, Arizona

Gunnar Subieta-Benito, MD [143]

Attending Physician
Department of Anesthesiology
John H. Stroger, Jr. Hospital
Cook County Health and Hospitals System
Assistant Professor
Rush Medical College
Chicago, Illinois

Noah T. Sugerman, MD [144]

Health Sciences Assistant Clinical Professor Department of Emergency Medicine Olive View-UCLA Medical Center Los Angeles, California Staff Physician Department of Emergency Medicine Los Robles Hospital and Medical Center Thousand Oaks, California

John E. Sullivan, MD [114]

Attending Physician, Emergency Medicine Boca Raton Regional Hospital Voluntary Clinical Assistant Professor Florida Atlantic University School of Medicine Boca Raton, Florida

Tina Sundaram, MD, MS [102, 142]

Clinical Instructor Department of Emergency Medicine Rush University Medical School Chicago, Illinois

Mark Supino, MD, FACEP [153]

Associate Program Director Department of Emergency Medicine Jackson Memorial Hospital Miami, Florida

Henry D. Swoboda, MD [78, 141]

Departments of Emergency Medicine and Psychiatry Rush University Medical Center Assistant Professor Rush Medical College Chicago, Illinois

Crystal Ives Tallman, MD [111, 201]

Assistant Clinical Professor of Emergency Medicine Department of Emergency Medicine UCSF Fresno Fresno, California

Joel Tallman, PharmD [201]

Clinical Pharmacist Department of Pharmacy Community Regional Medical Center Fresno, California

Jessica Tang, MD [204]

Fellow in Otolaryngologic Research Chicago ENT Advanced Center for Specialty Care Advocate Illinois Masonic Medical Center Chicago, Illinois

Katie Tataris, MD, MPH, FAEMS, FACEP [27]

Assistant Professor of Medicine Section of Emergency Medicine EMS Medical Director, Chicago South EMS System–Region XI The University of Chicago Medicine and Biological Sciences Chicago, Illinois

Alexis R. Taylor, MD, MSc [161]

Emergency Medicine Resident Madigan Army Medical Center Tacoma, Washington

Benjamin Thomas, MD [63]

Senior Resident Department of Emergency Medicine Highland Hospital Oakland, California

Natasha Thomas, MD [127]

Resident Physician Department of Emergency Medicine John H. Stroger, Jr. Hospital Cook County Health and Hospital Systems Chicago, Illinois

Dedra R. Tolson, MD [92]

Staff Physician Department of Emergency Medicine Madigan Army Medical Center Tacoma, Washington

Shahed Toossi, MD [146, 147]

Neurocritical Care Attending Departments of Neurology and Neurosurgery Cedars-Sinai Medical Center Los Angeles, California

Maria L. Torres, MD [143]

Director Pain Management Center Department of Anesthesiology and Pain Management Cook County Health and Hospital System Chicago, Illinois





Serge G. Tyler, MD [9]

Chairman, Adult Anesthesia Senior Attending, Section of Airway Anesthesia Anesthesiology OR Manager, Department of Anesthesiology and Pain Management Cook County Health and Hospitals System Chicago, Illinois

Jaroslav Tymouch, MD [24]

Department of Anesthesiology Division of Cardio-Thoracic Anesthesia John H. Stroger, Jr. Hospital of Cook County Clinical Associate Professor Anesthesiology Department Rush University Chicago, Illinois

Anna Tzonkov, MD [30]

Clinical Associate Professor Department of Anesthesiology and Pain Management Cook County Hospital and Health Systems Chicago, Illinois

Atilla Üner, MD, MPH [151, 220, 231]

Health Science Clinical Professor of Emergency Medicine and Nursing David Geffen School of Medicine at UCLA Los Angeles, California

Erika Flores Uribe, MD, MPH [82]

Assistant Professor of Clinical Emergency Medicine Department of Emergency Medicine LAC + USC Medical Center Keck School of Medicine Los Angeles, California

Sami H. Uwaydat, MD [194, 196]

Associate Professor Director, Vitreoretinal Service Jones Eye Institute University of Arkansas for Medical Sciences Little Rock, Arkansas

Alison Uyemura, MD [169]

Obstetrics and Gynecology Baylor College of Medicine Houston, Texas

Gennadiy G. Voronov, MD [11, 14, 17, 18, 21, 22, 24, 26, 30-32]

Assistant Professor of Anesthesiology Rush University Medical Center Chairman Department of Anesthesiology and Pain Management Cook County Health & Hospitals System Chicago, Illinois

David L. Walner, MD [207]

Pediatric Otolaryngology Advocate Children's Hospital Park Ridge, Illinois Clinical Professor Departments of Surgery and Pediatrics Rosalind Franklin University of Medicine and Science North Chicago, Illinois

Ryan Walsh, MD [75, 83]

Assistant Professor Department of Emergency Medicine Vanderbilt University Medical Center Nashville, Tennessee

Hao Wang, MD, PhD [86, 88-91]

Director of Research Department of Emergency Medicine Integrative Emergency Services John Peter Smith Health Network Fort Worth, Texas

Matthew Waxman, MD, DTM&H [205]

Associate Clinical Professor of Emergency Medicine and Internal Medicine Department of Emergency Medicine Olive View-UCLA Medical Center David Geffen School of Medicine at UCLA Los Angeles, California

Ariana Wilkinson Weber, MD [137]

Emergency Medicine Resident Jackson Memorial Hospital Miami, Florida

Joseph M. Weber, MD [27]

Associate Professor of Emergency Medicine Rush Medical College Department of Emergency Medicine Cook County Hospital Chicago, Illinois

Grant Wei, MD [79]

Associate Professor Department of Emergency Medicine Rutgers Robert Wood Johnson Medical School New Brunswick, New Jersey

Evan J. Weiner, MD, FAAP, FACEP, FAAEM [230]

Program Director, Pediatric Emergency Medicine Fellowship St. Christopher's Hospital for Children Assistant Professor of Pediatrics Drexel University College of Medicine Philadelphia, Pennsylvania

Daniel W. Weingrow, DO [68, 148]

Clinical Assistant Professor Department of Emergency Medicine Ronald Reagan UCLA Medical Center David Geffen School of Medicine at UCLA Los Angeles, California





xxviii Contributors

Elizabeth Barrall Werley, MD [62]

Assistant Professor Department of Emergency Medicine Penn State Health Milton S. Hershey Medical Center Penn State University College of Medicine Hershey, Pennsylvania

Michael S. Westrol, MD [95]

Assistant EMS Medical Director Department of Emergency Medicine AtlantiCare Regional Medical Center Atlantic City, New Jersey

Katherine Gloor Willet, MD [98]

Attending Physician Department of Emergency Medicine Hickson-Lied Medical Center Omaha, Nebraska

Jon Wolfshohl, MD [90]

Chief Resident Department of Emergency Medicine John Peter Smith Hospital Fort Worth, Texas

Peter C. Wroe, MD [63]

Resident Physician Department of Emergency Medicine Highland Hospital–Alameda Health System Oakland, California

Daniel Yousef, PharmD [153]

Clinical Pharmacy Specialist Department of Pharmacy Jackson Memorial Hospital Miami, Florida

Wesley Zeger, DO, FACEP [8, 160]

Director of Clinical Operations Department of Emergency Medicine University of Nebraska Medical Center Omaha, Nebraska

Nestor Zenarosa, MD, FACEP [89]

Attending Physician Department of Emergency Medicine John Peter Smith Health Network Fort Worth, Texas



Preface

Emergency Medicine is extremely broad and the advances have been amazing in recent years. The field covers the neonate through the geriatric, surgical and medical, and encompasses all organ systems. Emergency Medicine is rapidly evolving. Procedural skills must supplement our cognitive skills. Achieving proficiency in procedural skills is essential for the daily practice of Emergency Medicine. We have produced a clear, complete, and easy to understand textbook of Emergency Medicine procedures. This new edition addresses the diverse topic of Emergency Medicine. This text will provide medical students, residents, advanced practice practitioners, and the seasoned Emergentologist with a single procedural reference on which to base clinical practices and technical skills.

The primary purpose of this text is to provide a detailed and step-by-step approach to procedures performed in the Emergency Department. It is expressly about procedures. It is not meant to be a comprehensive reference but an easy to use and clinically useful procedure book that should be in every Emergency Department. The contents and information are complete. It is organized and written for ease of access and usability. The detail is sufficient to allow the reader to gain a thorough understanding of each procedure. When available, alternative techniques or hints are presented. Each chapter provides the reader with clear and specific guidelines for performing the procedure. Although some may use this text as a library reference, its real place is in the Emergency Department where the procedures are performed. Despite its size, I hope that this book will find its way to the bedside to be used by medical students, residents, advanced practice providers, and practicing clinicians.

This book will satisfy the needs of a variety of backgrounds and training. While this text is primarily written for Emergentologists, many other practitioners will find this a valuable reference. This book is written for those who care for people with acute illness or injury. Medical students and residents will find this an authoritative work on procedural skills. Medical students, residents, nurse practitioners, physician's assistants, and practitioners with limited experiences will find all the information in each chapter to learn the complete procedure. Family Physicians, Internists, and Pediatricians will find this text useful to review procedures infrequently performed in the clinic, office, or urgent care center. Intensivists and Surgeons involved in the care of acutely ill patients will also find this book a wonderful resource. The experienced clinician can get a quick refresher on the procedure while enhancing their knowledge and skills. Physicians actively involved in education will find this text an easy to understand and well-illustrated source of didactic material.

The book is organized into sections with each representing an organ system, an area of the body, or a surgical specialty. Each chapter, with a few exceptions, is devoted to a procedure. This should allow quick access to complete information. The chapters have a similar format to allow information to be retrieved as quickly and as efficiently as possible. There are often several acceptable methods

to perform a procedure. While alternative techniques are described in many chapters, we have not exhaustively included all alternative techniques. Key information, cautions, and important facts are highlighted throughout the text in bold type.

Each chapter, with a few exceptions, has a standard format. The relevant anatomy and pathophysiology is discussed followed by the indications and contraindications for the procedure. A list is provided of the necessary equipment. The patient preparation including consent, anesthesia, and analgesia is addressed. The procedure is then described in a step-by-step format. Cautions are placed where problems commonly occur. Alternative techniques and helpful hints for each procedure are presented. The aftercare and follow-up are discussed. Any potential complications are described including the methods to reduce and care for the complications. Finally, a summary contains a review of any critical or important information.

This book covers a wide variety of procedures that may be performed in a rural or urban Emergency Department. This includes procedures performed routinely or rarely; procedures that are often performed in the acute care, clinic, and office settings; procedures that are performed frequently in the daily practice of Emergency Medicine; and procedures that are seldom to rarely performed but critical to the practice of Emergency Medicine. Some procedures are uncommon, may not be known to the reader, and provide an opportunity to acquire new information that may be converted with proper practice and training into a useful skill. A few of the procedures are performed only by Surgeons and are included to promote understanding when the patient presents to the Emergency Department with a complication. This new edition has added chapters, algorithms, clinical pictures, cutting-edge technological advancements, radiographs, and tables based upon readers' comments, input, and suggestions.

We have drawn on a wide variety of authors. The majority of authors are residency-trained, board-certified, and practicing Emergentologists. We have the honor of having some contributors from outside the field of Emergency Medicine and who are experts in their own specialty. All authors do have biases because of differences in education, experience, and training. We have tried to base all recommendations on sound clinical and scientific data. However, we have not excluded personal experience or preferences when appropriate. In these cases, the authors also present alternative techniques.

This book has grown and changed with this third edition. I am happy and privileged to edit this third edition of the text. Continued input and suggestions from you, the reader, would be most appreciated. Let me know what additional procedures should be included or excluded in the future. Any errors, in the end, are mine. Please let me know of any mistakes or omissions, big or small, at eric.f.reichman@gmail.com.

Eric F. Reichman, PhD, MD