# **DISCLOSURE OF POTENTIAL CONFLICTS OF INTEREST**

Consultancies: Nicholas Schwier: Consultancies (Biomedical Insights, Inc.)

Stock Ownership: Brittany Florczykowski (Pfizer)

**Royalties:** 

Grants:

Honoraria: Douglas Jennings: Honoraria (Novartis Pharmaceuticals)

## Other:

Nothing to disclose: Nicole M. Acquisto; Ayesha Ather; Reem A. Bahmaid: Jessica Casey; Alana M. Ciolek; Jennifer L. Cole; Megan Corrigan; Ilya Danelich; Brianne Dunn; Katherine M. Greenlee; Brian Kersten; Michelle J. Lew; Sharon K. Milfred-LaForest; Amy Lehnert; Matthew Lillyblad; Rhynn J. Malloy; Mary Mekheil; Asmaa Kamal Mohammed; Megan Musselman; Mikayla A. Muzzey; Jared W. Netley; Libby Herman Orzel; Phillip Owen; Komal A. Pandya; Lisa M. Peters; Kerry Pickworth; Christina Ruggia-Check; Rachel Schult; Harleen Singh; Kevin Sowinski; Dustin D. Spencer; Alan Tan; Rebecca JC Tran; Kyle Weant; Kacy Whyte; Barbara S. Wiggins; Lianjie Xiong; Kimberly Zammit

**ROLE OF BPS:** The Board of Pharmacy Specialties (BPS) is an autonomous division of the American Pharmacists Association (APhA). To maintain its strict, independent standards for certification, BPS does NOT endorse or provide review information, preparatory courses, or study guides for Board Certification Examinations. The Board, through its specialty councils, is responsible for specialty examination content, administration, scoring, and all other aspects of its certification programs. BPS is totally separate and distinct from ACCP. CardSAP has been approved by BPS for use in BCCP recertification. Information about the BPS recertification process is available <u>online</u>.

Questions regarding BCCP recertification should be directed to:

Board of Pharmacy Specialties 2215 Constitution Avenue NW Washington, DC 20037 (202) 429-7591

# **Critical Care Cardiology I Panel**

## Series Editors:

## Cynthia A. Jackevicius, Pharm.D., M.Sc., FCCP, FCSHP, FAHA, FCCS, FACC, BCPS-AQ Cardiology, BCCP

Professor, Pharmacy Practice College of Pharmacy Western University of Health Sciences *Clinical Pharmacy Specialist, Cardiology* VA Greater Los Angeles Healthcare System Los Angeles, California

## J. Herbert Patterson, Pharm.D., FCCP, FHFSA

Professor of Pharmacy Research Professor of Medicine Executive Vice Chair, Division of Pharmacotherapy and Experimental Therapeutics UNC Eshelman School of Pharmacy University of North Carolina at Chapel Hill Chapel Hill, North Carolina

## **Faculty Panel Chair:**

## Judy Cheng, Pharm.D., MPH, FCCP, BCPS-AQ Cardiology

Professor and Chair of Pharmacy Practice Department of Pharmacy Practice MCPHS University *Clinical Pharmacy Specialist* Department of Pharmacy Brigham and Women's Hospital Boston, Massachusetts

# Perioperative Coronary Artery Bypass Grafting

## Author

## Matthew P. Lillyblad, Pharm.D., BCPS-AQ Cardiology, BCCCP

Clinical Pharmacy Coordinator – Cardiology and Critical Care Department of Pharmacy Abbott Northwestern Hospital, part of Allina Health

Minneapolis, Minnesota

## Reviewers

## Phillip Owen, Pharm.D., BCPS

Cardiothoracic Unit Clinical Pharmacy Specialist Department of Pharmacy University of North Carolina Medical Center Chapel Hill, North Carolina

## Brittany Florczykowski, Pharm.D., BCPS-AQ Cardiology

Clinical Pharmacist Specialist – Cardiology Department of Pharmacy UPMC Pinnacle Harrisburg, Pennsylvania

## Reem A. Bahmaid, M.Sc., BCPS-AQ Cardiology, Cardiovascular Pharmacotherapy Specialist

Consultant Clinical Pharmacist, Adult Cardiology Pharmacy Services Administration King Fahad Medical City Riyadh, Saudi Arabia

# **Perioperative Valvular Surgery**

## Authors

## Ayesha Ather, Pharm.D., BCPS, BCCP

Clinical Pharmacist – Cardiothoracic Surgery Program Director, PGY2 Cardiology Residency Acute Care Pharmacy Services University of Kentucky Assistant Adjunct Professor Department of Pharmacy Practice and Science University of Kentucky College of Pharmacy Lexington, Kentucky

## Komal A. Pandya, Pharm.D., BCCCP

Critical Care Pharmacist – Cardiothoracic Surgery Program Director, PGY2 Critical Care Residency Acute Care Pharmacy Services University of Kentucky Assistant Adjunct Professor Department of Pharmacy Practice and Science University of Kentucky College of Pharmacy Lexington, Kentucky

## Reviewers

## Rhynn Malloy, Pharm.D., BCPS, BCCP

Clinical Pharmacy Specialist Departments of Pharmacy, Cardiac Surgery, and Cardiology Brigham and Women's Hospital Boston, Massachusetts

## Alan Tan, Pharm.D., BCPS

Clinical Pharmacist – General Medicine and Anticoagulation Health Sciences Assistant Clinical Professor of Pharmacy Department of Clinical Pharmacy University of California San Francisco Medical Center San Francisco, California

## Mikayla Muzzey, Pharm.D., MBA, BCPS

Clinical Pharmacist Pharmacy Department North Kansas City Hospital North Kansas City, Missouri The American College of Clinical Pharmacy and the authors thank the following individuals for their careful review of the Critical Care Cardiology I chapters:

## Lynn Kassel, Pharm.D., BCPS

Associate Professor of Clinical Sciences Department of Clinical Sciences Drake University College of Pharmacy & Health Sciences Des Moines, Iowa Acute Care Pharmacist MercyOne West Des Moines Hospital West Des Moines, Iowa

## Eric W. Mueller, Pharm.D., FCCM, FCCP

Assistant Director, Clinical Services and Research Clinical Pharmacy Specialist, Critical Care UC Health-University of Cincinnati Medical Center Adjunct Associate Professor of Pharmacy Practice and Administrative Sciences James L. Winkle College of Pharmacy University of Cincinnati Cincinnati, Ohio

# **Critical Care Cardiology II Panel**

## Series Editors:

## Cynthia A. Jackevicius, Pharm.D., M.Sc., FCCP, FCSHP, FAHA, FCCS, FACC, BCPS-AQ Cardiology, BCCP

Professor, Pharmacy Practice College of Pharmacy Western University of Health Sciences *Clinical Pharmacy Specialist, Cardiology* VA Greater Los Angeles Healthcare System Los Angeles, California

## J. Herbert Patterson, Pharm.D., FCCP, FHFSA

Professor of Pharmacy Research Professor of Medicine Executive Vice Chair, Division of Pharmacotherapy and Experimental Therapeutics UNC Eshelman School of Pharmacy University of North Carolina at Chapel Hill Chapel Hill, North Carolina

## Faculty Panel Chair:

## Judy Cheng, Pharm.D., MPH, FCCP, BCPS-AQ Cardiology

Professor and Chair of Pharmacy Practice Department of Pharmacy Practice MCPHS University *Clinical Pharmacy Specialist* Department of Pharmacy Brigham and Women's Hospital Boston, Massachusetts

# **Toxicology of Cardiovascular Drugs**

## Authors

## Rachel F. Schult, Pharm.D., DABAT

Toxicology Clinical Pharmacy Specialist Department of Pharmacy Assistant Professor Department of Emergency Medicine University of Rochester Medical Center Rochester, New York

## Nicole M. Acquisto, Pharm.D., FCCP, FASHP, BCCCP

*Emergency Medicine Clinical Pharmacy Specialist* Department of Pharmacy *Associate Professor* Department of Emergency Medicine University of Rochester Medical Center Rochester, New York

#### Reviewers

## Kyle A. Weant, Pharm.D., FCCP, BCPS, BCCCP

Emergency Medicine Clinical Pharmacy Specialist Residency Program Director,PGY2 Emergency Medicine Department of Pharmacy Services Affiliate Assistant Professor College of Pharmacy Medical University of South Carolina Charleston, South Carolina

## Lianjie Xiong, Pharm.D., BCPS, BCCP

*Emergency Medicine Clinical Pharmacist* Department of Pharmacy Sutter Health memorial Medical Center Modesto, California

## Kacy Whyte, Pharm.D., BCPS, BCCP

Clinical/Staff Pharmacist IV Department of Pharmacy Vidant Medical Center Greenville, North Carolina Assistant Professor of Clinical Education Eshelman School of Pharmacy University of North Carolina Chapel Hill, North Carolina

## **Drug-induced Cardiovascular Disease**

## Authors

## Barbara S. Wiggins, Pharm.D., MBA, BCPS, BCCP, BCCCP

Pharmacy Clinical Specialist – Cardiology Department of Pharmacy Medical University of South Carolina Charleston, South Carolina

## Amy L. Lehnert, Pharm.D., BCPS, BCCP

Cardiology Clinical Pharmacy Specialist Department of Pharmacy Roper St. Francis Healthcare Charleston, South Carolina

## Reviewers

## Kevin M. Sowinski, Pharm.D., FCCP

Professor of Pharmacy Practice Department of Pharmacy Practice Purdue University College of Pharmacy West Lafayette and Indianapolis, Indiana Adjunct Professor of Medicine Division of Clinical Pharmacology Department of Medicine Indiana University School of Medicine Indianapolis, Indiana

## Rebecca JC Tran, Pharm.D., BCPS, BCACP, BCCP, CLS

Associate Professor KGI School of Pharmacy and Health Sciences Claremont, California

## Harleen Singh, Pharm.D., BCPS-AQ Cardiology, BCACP

Clinical Associate Professor Department of Pharmacy Practice Oregon State University Portland, Oregon

The American College of Clinical Pharmacy and the authors thank the following individuals for their careful review of the Critical Care Cardiology II chapters:

## Anne L. Hume, Pharm.D., FCCP, BCPS

Professor of Pharmacy Department of Pharmacy Practice University of Rhode Island Kingston, Rhode Island Adjunct Professor of Family Medicine Alpert School of Medicine at Brown University Providence, Rhode Island

## Emilie L. Karpiuk, Pharm.D., BCPS

Oncology Pharmacist Department of Pharmacy Froedtert Hospital Milwaukee, Wisconsin

# **Critical Care Cardiology III Panel**

## Series Editors:

## Cynthia A. Jackevicius, Pharm.D., M.Sc., FCCP, FCSHP, FAHA, FCCS, FACC, BCPS-AQ Cardiology, BCCP

Professor, Pharmacy Practice College of Pharmacy Western University of Health Sciences Clinical Pharmacy Specialist, Cardiology VA Greater Los Angeles Healthcare System Los Angeles, California

## J. Herbert Patterson, Pharm.D., FCCP, FHFSA

Professor of Pharmacy Research Professor of Medicine Executive Vice Chair, Division of Pharmacotherapy and Experimental Therapeutics UNC Eshelman School of Pharmacy University of North Carolina at Chapel Hill Chapel Hill, North Carolina

## **Faculty Panel Chair:**

## Judy Cheng, Pharm.D., MPH, FCCP, BCPS-AQ Cardiology

Professor and Chair of Pharmacy Practice Department of Pharmacy Practice MCPHS University *Clinical Pharmacy Specialist* Department of Pharmacy Brigham and Women's Hospital Boston, Massachusetts

# **Cardiogenic Shock**

## Authors

## Kerry K. Pickworth, Pharm.D., FCCP, BCPS-AQ Cardiology

Specialty Practice Pharmacist – Cardiology Department of Pharmacy The Ohio State University Wexner Medical Center Columbus, Ohio

## Libby Orzel, Pharm.D., BCPS

Specialty Practice Pharmacist Department of Pharmacy The Ohio State University Wexner Medical Center Columbus, Ohio

## Reviewers

## Brianne Dunn, Pharm.D.

Associate Dean, Outcomes Assessment and Accreditation Associate Professor Clinical Pharmacy and Outcomes Sciences University of South Carolina College of Pharmacy Columbia, South Carolina

## Michelle Lew, Pharm.D., BCPS, BCCP

Clinical Pharmacist Department of Pharmacy Scripps Memorial Hospital – La Jolla La Jolla, California

## Asmaa Kamal Mohammed, M.Sc., BCPS

Clinical Pharmacist Department of Pharmacy Royal Commission Medical Center Yanbu al Synaia City, Saudi Arabia, Clinical Pharmacist Department of Pharmacy National Liver Institute Menoufia, Egypt

# **Heart Transplantation**

## Authors

## Alana M. Ciolek, Pharm.D., BCPS

Clinical Pharmacy Manager, Cardiothoracic Intensive Care Department of Pharmacy New York-Presbyterian/Columbia University Irving Medical Center New York, New York

## Douglas Jennings, Pharm.D., FACC,

## FAHA, FCCP, FHFSA, BCPS

Associate Professor of Pharmacy Clinical Pharmacist, Heart Transplant and LVAD Team New York-Presbyterian/Columbia University Irving Medical Center New York, New York

## Reviewers

## Sharon K. Milfred-LaForest, Pharm.D., FCCP, BCPS

Clinical Pharmacy Specialist, Cardiology and Organ Transplantation Pharmacy Department VA Northeast Ohio Health System Cleveland, Ohio

## Christina Ruggia-Check, Pharm.D., BCPS, BCCP, AACC

Clinical Pharmacy Specialist – Cardiovascular Surgery/Heart Transplant Department of Pharmacy Temple University Hospital Philadelphia, Pennsylvania

## Lisa Peters, Pharm.D., BCPS

Clinical Specialist Pharmacist, Advanced Heart Failure and Heart Transplant Department of Pharmacy MedStar Washington Hospital Center Washington, D.C.

The American College of Clinical Pharmacy and the authors thank the following individuals for their careful review of the Critical Care Cardiology III chapters:

## Judy Cheng, Pharm.D., MPH, FCCP, BCPS-AQ Cardiology

Professor and Chair of Pharmacy Practice Department of Pharmacy Practice MCPHS University *Clinical Pharmacy Specialist* Department of Pharmacy Brigham and Women's Hospital Boston, Massachusetts

## Lisa C. Hutchison, Pharm.D., MPH, FCCP, BCPS, BCGP

Professor Pharmacy Practice University of Arkansas for Medical Sciences Little Rock, Arkansas

# **Critical Care Cardiology IV Panel**

## Series Editors:

## Cynthia A. Jackevicius, Pharm.D., M.Sc., FCCP, FCSHP, FAHA, FCCS, FACC, BCPS-AQ Cardiology, BCCP

Professor, Pharmacy Practice College of Pharmacy Western University of Health Sciences *Clinical Pharmacy Specialist, Cardiology* VA Greater Los Angeles Healthcare System Los Angeles, California

## J. Herbert Patterson, Pharm.D., FCCP, FHFSA

Professor of Pharmacy Research Professor of Medicine Executive Vice Chair, Division of Pharmacotherapy and Experimental Therapeutics UNC Eshelman School of Pharmacy University of North Carolina at Chapel Hill Chapel Hill, North Carolina

## **Faculty Panel Chair:**

## Judy Cheng, Pharm.D., MPH, FCCP, BCPS-AQ Cardiology

Professor and Chair of Pharmacy Practice Department of Pharmacy Practice MCPHS University *Clinical Pharmacy Specialist* Department of Pharmacy Brigham and Women's Hospital Boston, Massachusetts

## Interactive Case: Pharmacist Participation in Advanced Cardiac Life Support

## Authors

## Kimberly Zammit, Pharm.D., BCPS, BCCCP

*Clinical Pharmacy Coordinator* Department of Pharmacy Kaleida Health Buffalo, New York

## Brian P. Kersten, Pharm.D., BCPS, BCCCP

*Clinical Pharmacy Coordinator* Department of Pharmacy Buffalo General Medical Center Buffalo, New York

## Reviewers

## Katie M. Greenlee, Pharm.D., BCPS-AQ Cardiology, BCCP

Cardiology Clinical Coordinator Cardiology Clinical Specialist PGY-2 Cardiology Residency Program Director Department of Pharmacy Cleveland Clinic Cleveland, Ohio

## Dustin Spencer, Pharm.D., MBA, BCPS, BCCP

*Clinical Director, Cardiopulmonary and Critical Care* Cardinal Health Martinsville, Indiana

# Recorded Webcast: Endocarditis/ Pericarditis/Myocarditis

## Author

## Nicholas C. Schwier, Pharm.D., BCPS-AQ Cardiology

Assistant Professor Department of Pharmacy: Clinical and Administrative Science University of Oklahoma College of Pharmacy Oklahoma City, Oklahoma

## Reviewers

## Ilya M. Danelich, Pharm.D., BCPS, BCCP

Clinical Coordinator Cardiology Clinical Pharmacy Specialist Department of Pharmacy Thomas Jefferson University Hospital Philadelphia, Pennsylvania

## Jennifer L. Cole, Pharm.D., FCCP, BCPS, BCCCP

*Clinical Pharmacy Specialist* Department of Pharmacy Veterans Healthcare System of the Ozarks Fayetteville, Arkansas

# Recorded Webcast: Alternative Routes of Drug Administration in Critical Care Patients

## Authors

## Megan E. Musselman, Pharm.D., MS, BCPS, BCCCP

Clinical Pharmacy Specialist, Emergency Medicine/ Neurotrauma Critical Care PGY1 Residency Coordinator Department of Pharmacy North Kansas City Hospital North Kansas City, Missouri

## Jessica M. Casey, Pharm.D., BCPS, BCCP

Clinical Pharmacy Specialist, Cardiac/ Cardiothoracic Surgery Intensive Care Department of Pharmacy North Kansas City Hospital North Kansas City, Missouri

## Reviewers

## Megan A. Corrigan, Pharm.D., MPH, BCPS

Director of Pharmacy Services Department of Pharmacy Advocate Good Samaritan Hospital Downers Grove, Illinois

## Mary Mekheil, Pharm.D., BCPS

Clinical Pharmacist Break Through Care Center DuPage Medical Group Wheaton, Illinois

## Jared W. Netley, Pharm.D., MPA, BCPS, BCCCP

Clinical Pharmacist Acute Care – Department of Pharmaceutical Care University of Iowa Healthcare Iowa City, Iowa The American College of Clinical Pharmacy and the authors thank the following individuals for their careful review of the Critical Care Cardiology IV features:

## Joseph S. Bubalo, Pharm.D., BCPS, BCOP

Oncology Clinical Pharmacy Specialist Assistant Professor of Medicine Oregon Health and Science University Hospital and Clinics Portland, Oregon

## Judy Cheng, Pharm.D., MPH, FCCP, BCPS-AQ Cardiology

Professor and Chair of Pharmacy Practice Department of Pharmacy Practice MCPHS University *Clinical Pharmacy Specialist* Department of Pharmacy Brigham and Women's Hospital Boston, Massachusetts

## Jeffrey T. Sherer, Pharm.D., MPH, BCPS, BCGP

Clinical Professor Department of Pharmacy Practice and Translational Research University of Houston College of Pharmacy Houston, Texas