

Sean M. Berenholtz, M.D., M.H.S.  
Curriculum Vitae

## **CURRICULUM VITAE**

**Sean M. Berenholtz, M.D., M.H.S.**

### **DEMOGRAPHIC INFORMATION**

#### **Current Appointments:**

Assistant Professor  
Departments of Anesthesiology / Critical Care Medicine and Surgery  
The Johns Hopkins University School of Medicine  
Director, Performance Improvement  
Adult Surgical Critical Care, The Johns Hopkins Hospital  
Baltimore, Maryland

#### **Personal**

Address: The Johns Hopkins University School of Medicine  
Office: Department of Anesthesiology/Critical Care Medicine  
600 N. Wolfe Street/ Halsted 842  
Baltimore, Maryland 21287-5842  
Phone: (410) 614-9919 Fax: (410) 614-1776

#### **Education**

1985-1989 B.S., Business (finance minor)  
Towson State University  
Baltimore, Maryland

1989-1990 Pre-medicine  
University of Maryland  
Baltimore, Maryland

1990-1995 M.D., Medical College of Virginia / Virginia Commonwealth University  
Richmond, Virginia

1995-1996 Internship, Transitional  
LDS Hospital  
Salt Lake City, Utah

1996-1999 Residency, Anesthesiology/Critical Care Medicine  
The Johns Hopkins University  
Baltimore, Maryland

1999-2000 Fellowship, Critical Care Medicine, Surgical Intensive Care Unit  
The Johns Hopkins University  
Baltimore, Maryland

- 2000            Certificate, Methods in Clinical Research  
Welch Center, Dept. of Epidemiology and The Graduate Training Program in Clinical Investigation  
The Johns Hopkins University
- 2000            Certificate, Science of Clinical Investigation  
Schools of Medicine and Public Health  
The Johns Hopkins University
- 2001-2003      M.H.S., Clinical Investigation  
Johns Hopkins Graduate Training Program in Clinical Investigation  
Bloomberg School of Public Health  
Baltimore, Maryland

### **Professional Experience**

- 2000-present    Assistant Professor, Department of Anesthesiology and Critical Care Medicine  
The Johns Hopkins University School of Medicine
- 2001-present    Assistant Professor, Department of Surgery  
The Johns Hopkins University School of Medicine
- 2002- present    Faculty, VHA, Inc. Transformation of the ICU Collaborative
- 2003            Faculty, Methods in Clinical Research  
Welch Center, Dept. of Epidemiology and The Graduate Training Program in Clinical Investigation  
The Johns Hopkins University
- 2003-present    Faculty, Science of Clinical Investigation  
Schools of Medicine and Public Health  
The Johns Hopkins University
- 2004-present    Faculty, Keystone ICU Project  
Keystone Center for Patient Safety & Quality  
Michigan Hospital Association Health Foundation

### **RESEARCH ACTIVITIES**

#### **Publications:**

Peer-reviewed scientific articles

1.        **Berenholtz SM**, Klassett DV: Case Report - Lightning Strike Induced CVA. Resident and Staff Physician 41(7):54-56, 1995.
2.        **Berenholtz S**, Pronovost P, Dorman T: Evidence-based Anesthesiology. Curr Anesthesiology Rep. 2:425-431, 2000.
3.        Pronovost P, **Berenholtz S**, Dorman T, Merritt WT, Martinez EA, Guyatt GH: Evidenced-based Medicine in Anesthesiology. Anesth Analg 92(3):787-794, 2001.
4.        **Berenholtz S**, Pronovost P, Lipsett P, Dawson P, Dorman T: Assessing the effectiveness of critical pathways on reducing resource utilization in the surgical intensive care unit. Intensive Care Med 27(6):1029-1036, 2001.
5.        Pronovost PJ, Miller MR, Dorman T, **Berenholtz SM**, Rubin H. Developing and implementing measures of quality of ICU care. Curr Opin Crit Care 7(4):297-303, 2001.

6. Wu CL, **Berenholtz SM**, Pronovost PJ, Fleisher LA. A systematic review and analysis of postdischarge symptoms following outpatient surgery. *Anesthesiology* 96:994-1003, 2002.
7. **Berenholtz SM**, Pronovost PJ, Mullany D, Garrett E, Ness PM, Dorman T, Klag MJ. Predictors of transfusion for spinal surgery in Maryland, 1997–2000. *Transfusion* 42(2):183-189, 2002.
8. **Berenholtz SM**, Dorman T, Ngo K, Pronovost PJ. Qualitative Review of Intensive Care Unit Quality Indicators. *J Crit Care*.17(1):1-15, 2002.
9. Pronovost PJ, Jenckes M, To M, Dorman T, Lipsett PA, **Berenholtz S**, Bass EB. Reducing failed extubations in the intensive care unit. *Jt Comm J Qual Improv* 28(11):595-603, 2002.
10. Pronovost P, **Berenholtz S**, Dorman T, Lipsett P, Simmonds T, Haraden C. Improving Communication in the ICU using Daily Goals. *J Crit Care* 18(2):71-5, 2002.
11. **Berenholtz SM**, Dorman T, Pronovost PJ. Improving Quality and Safety in the ICU. *Contemporary Critical Care* 2003;1(1):1-10.
12. Nilsson KR, **Berenholtz SM**, Dorman T, Garrett E, Lipsett P, Kaufman HS, Pronovost PJ. Preoperative Predictors of Blood Transfusion in Colorectal Cancer Surgery. *J Gastrointest Surg* 2002;6:753-762.
13. Kozlow JH, **Berenholtz SM**, Garrett E, Dorman T, Pronovost PJ. Epidemiology and Impact of Aspiration Pneumonia in Patients Undergoing Surgery in Maryland, 1999-2000. *Crit Care Med* 2003;31(7):1930-1937.
14. **Berenholtz SM**, Pronovost PJ. Barriers to Translating Evidence Into Practice. *Curr Opin Crit Care* 2003; 9(4):321-325.
15. Pronovost PJ, **Berenholtz SM**, Ngo K, Holzmueller C, Haraden C, Resar R, Rainey T, Nolan T, Dorman T. Developing and pilot testing quality indicators in the intensive care unit. *J Crit Care* 2003;18(3):145-155.
16. Pronovost P, Weast B, Schwarz M, Wyskiel RM, Prow D, Milanovich S, **Berenholtz S**, Dorman T, Lipsett P. Medication Reconciliation: A Practical Tool to Reduce the Risk of Medication Errors. *J Crit Care* 2003;18(4):201-205.
17. **Berenholtz SM**, Milanovich S, Faircloth A, Prow DT, Earsing K, Lipsett P, Dorman T, Pronovost PJ. Improving Care for the Ventilated Patient. *Jt Comm J Qual Saf.* 2004;30(4):195-204.
18. Pronovost P, Hobson D, Earsing K, Lins E, Rinke ML, Emery K, **Berenholtz S**, Lipsett P, Dorman T. A Practical Tool to Reduce Medication Errors in Transfer from the ICU. *JCOM* 2004;11(1):26-33.
19. Schwengel DA, McGready J, **Berenholtz SM**, Kozlowski L, Nichols DG, Yaster M. Peripherally Inserted Central Catheters: a randomized, controlled, prospective trial in pediatric surgical patients. *Anesth Analg* (in press)

#### Book Chapters and Monographs

1. Pronovost P, **Berenholtz S**, Fleisher LA: Evidence-based medicine in anesthesiology. In: *Textbook on Conducting Research in Anaesthesia and Intensive Care*. Zbinden M (Editor), Butterworth-Heinemann, Woburn, MA, 2001.
2. **Berenholtz S**, Dorman T: Glucophage. In: *Essence of Anesthesia Practice*. Roizen MF, Fleisher LA (Editors), W.B. Saunders Co, Philadelphia, PA, 2002.
3. **Berenholtz S**, Dorman T: Glyburide - Oral Sulfonylureas. In: *Essence of Anesthesia Practice*. Roizen MF, Fleisher LA. (Editors), W.B. Saunders Co, Philadelphia, PA, 2002.
4. Pronovost PJ, **Berenholtz SM**. A Practical Guide to Measuring Performance in the Intensive Care Unit. VHA, Inc. 2002 Research Series, Volume 2, Irving, Texas, 2002.  
[https://www.vha.com/research/public/research\\_icu\\_meth.asp](https://www.vha.com/research/public/research_icu_meth.asp)
5. **Berenholtz S**, Pronovost P. Measuring Performance in the Intensive Care Unit. In: *Society of Critical Care Medicine 7<sup>th</sup> Critical Care Refresher Course 2003*. Zimmerman J (Editor), Society of Critical Care Medicine, Des Plaines, IL, 2003.
6. **Berenholtz SM**: Postoperative Respiratory Failure. In Cameron J (ed): *Current Surgical Therapy*, 8th ed. Elsevier, Philadelphia, 2003 (in press)

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7. Dorman T, **Berenholtz S**, Mendez-Tellez P, Newhouse R, Poe SS. Patient Safety as a Measure of Healthcare Quality. Chapter 1. In Newhouse R (ed): Measuring Safety. Jones and Bartlett Publishers, Inc, 2003 (in press)
8. **Berenholtz S**, Dorman T, Mendez-Tellez P. Safer Care for Patients on Mechanical Ventilation. Chapter 7. In Newhouse R (ed): Measuring Safety. Jones and Bartlett Publishers, Inc, 2003 (in press)
9. Pronovost PJ, **Berenholtz S**. Quality improvement. Chapter 81. In Miller RD (ed): Anesthesia, 6th ed. Elsevier, Philadelphia, 2004 (in press)
10. Pronovost PJ, **Berenholtz SM**. Improving Sepsis Care in the Intensive Care Unit: An Evidence-Based Approach. VHA, Inc. 2004 Research Series, Irving, Texas, 2004.  
[https://www.vha.com/research/public/sepsis\\_icu.pdf](https://www.vha.com/research/public/sepsis_icu.pdf)

Invited Reviews and Editorials (Non peer-reviewed)

1. **Berenholtz S**, Pronovost PJ. Invited commentary on: A qualitative study of increasing beta-blocker use after myocardial infarction: Why do some hospitals succeed? Journal Club of the Critical Care Assembly of the American Thoracic Society, May 2001;  
[www.thoracic.org/assemblies/cc/club30501.html](http://www.thoracic.org/assemblies/cc/club30501.html)
2. **Berenholtz SM**, Dorman T. Component MODS: Are we any closer to an ideal system? Crit Care Med 29(11), 2001.
3. **Berenholtz SM**, Pronovost PJ. Invited commentary on: Effect of treatment with low doses of hydrocortisone and fludrocortisone on mortality in patients with septic shock. Journal Club of the Critical Care Assembly of the American Thoracic Society, August 2002;  
[www.thoracic.org/assemblies/cc/ccjcfame.html](http://www.thoracic.org/assemblies/cc/ccjcfame.html)
4. **Berenholtz SM**, Dorman T. Anesthesia-Intensivists: Improving Quality and Safety in the Intensive Care Unit. American Society of Anesthesiologists Newsletter, February 2004.

**Sponsorship:**

**Active**

Title: "Developing Measures of Quality for Sepsis Care"  
Dates: 05/01/03 – 12/31/04  
Sponsor: VHA Health Foundation, Inc.  
Role on project: Co-Investigator  
Percent of effort: 10% (no salary support)

Title: "Aminocaproic Acid and Bleeding in Spinal Surgery"  
Dates: 09/01/02 - 08/31/07  
Sponsor: NIH/NHLBI- K23-HL70058-01  
Role on project: Principal Investigator, Patient-Oriented Mentored Career Development Award  
Percent of effort: 75% protected research time

Title: "Aminocaproic Acid and Bleeding in Spinal Surgery"  
Dates: 04/01/01-10/31/04  
Sponsor: General Clinical Research Center, The Johns Hopkins University  
Role on project: Principal Investigator  
Percent of effort: 0% (ancillary costs only)

**Past 3 years**

Title: "Intensive Care Unit Safety Reporting System (ICUSRS)"  
Dates: 09/01/01-08/31/02  
Sponsor: Agency for Healthcare Research and Quality

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Role on project: Co-Investigator  
Percent of effort: 5% (no salary support)

Title: "Aminocaproic Acid and Bleeding in Spinal Surgery"  
Dates: 02/01/01-09/01/02  
Sponsor: Clinician Scientist Award, The Johns Hopkins University  
Role on project: Principal Investigator  
Percent of effort: 75%

Title: "Aminocaproic Acid and Bleeding in Spinal Surgery"  
Dates: 01/01/01-11/31/02  
Sponsor: Eugene & Mary B. Meyer Center for Advanced Transfusion Practices and Blood Research  
Role on project: Principal Investigator  
Percent of effort: 15%

## **EDUCATIONAL ACTIVITIES**

### **Teaching:**

#### **Classroom instruction**

"Pathophysiology of Traumatic Shock", Trauma Orientation Program, Department of Nursing, The Johns Hopkins Hospital. 1998, 1999, 2000

Arterial Access and PA Waveforms", Advanced Diagnostics and Therapeutics course, School of Nursing, The Johns Hopkins University. 1998, 1999, 2000

"Invasive and non-invasive hemodynamic monitoring: How the machines work and what is really being measured", Resident lecture series, Department of Anesthesiology/Critical Care Medicine, The Johns Hopkins University. 1998, 1999, 2000

"Fellow's Course in Evidence-Based Medicine" (course co-director), Department of Anesthesiology/Critical Care Medicine, The Johns Hopkins University. 2000

"Treatment of ARDS in the ICU", Resident lecture series, Department of Anesthesiology/Critical Care Medicine, The Johns Hopkins University. 2001

"Methods in Clinical Research", Welch Center, Johns Hopkins School of Medicine July 2003, Small group leader

#### **Clinical instruction**

Surgical Intensive Care Unit (SICU): July 2000 through present, Attending physician in SICU provided lectures and instruction to medical students, anesthesia and surgery residents, and critical care fellows

Operative Anesthesia: July 2000 through present, Attending physician in operating room provided instruction to medical students, anesthesia residents, and anesthesia fellows

#### **Continuing Medical Education Instruction**

Advanced Cardiac Life Support Instructor, American Heart Association. 1995-2002

"Evidence-based Preoperative Evaluation", Perioperative Management Annual Course, Marco Island, Florida. March 2003.

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- “Are You Providing Safe Care?”, Perioperative Management Annual Course, Marco Island, Florida. March 2003.
- “Evidence-based Preoperative Testing”, Perioperative Management Annual Course, Aspen, Colorado. August 2003.
- “Are You Providing Safe Care?”, Perioperative Management Annual Course, Aspen, Colorado. August 2003.
- “Evidence-Based Medicine”, Perioperative Management Annual Course, Marco Island, Florida. March 2004.
- “Preoperative Testing: Is there a Right Test?”, Perioperative Management Annual Course, Marco Island, Florida. March 2004.
- “Improving Quality and Safety”, Perioperative Management Annual Course, Marco Island, Florida. March 2004.
- “Postoperative Fluid Administration: Colloid, Hypertonic or Isotonic?”, Perioperative Management Annual Course, Marco Island, Florida. March 2004.

### **Mentoring**

#### **Advisees**

Jeff Kozlow, B.S., July 2001 through present, Medical Student, Johns Hopkins University.

Kent Nilson, M.D., M.A., February 2002 through present. Resident, Department of Medicine, Johns Hopkins University.

Ashita Batavia, B.S., July 2002- December 2002. Medical Student, Johns Hopkins University.

### **Editorial Activities**

#### **Editorial Board appointments**

2002-present *Contemporary Critical Care*

#### **Journal peer review activities**

2002-present *Journal of General Internal Medicine*

2002-present Critical Care Journal Club, American Thoracic Society

2003-present *European Journal of Anaesthesiology*

2003-present *Critical Care Medicine*

2003-present *Transfusion*

2003-present *Journal of the American Medical Association*

### **CLINICAL ACTIVITIES**

#### **Certification**

##### **Medical licensure**

1995 State of Maryland (D#0053925)

##### **Boards and specialty certification**

2000 American Board of Anesthesiology

2001 American Board of Anesthesiology, Special Competence in Critical Care

#### **Service Responsibilities**

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Critical Care: Attending Physician in the Surgical Intensive Care Unit, 20% effort  
Operative Anesthesia: Attending physician in the Division of Critical Care Anesthesia, 5% effort

## **ORGANIZATIONAL ACTIVITIES**

### **Institutional Administrative Appointments**

Resident Representative, Transitional Program Review Committee, LDS Hospital, Salt Lake City, Utah. 1995-1996

Program Representative, Institutional Coordination Committee, Department of Internal Medicine, LDS Hospital, Salt Lake City, Utah. 1995-1996

Resident Representative, Education Committee, Department of Anesthesiology/Critical Care Medicine, The Johns Hopkins University School of Medicine. 1996-1997

Education Committee, Department of Anesthesiology/Critical Care Medicine, The Johns Hopkins University School of Medicine. 2000- 2003

Root Cause Analysis Team, The Johns Hopkins Hospital, Baltimore, Maryland. 2001

Hospital Epidemiology and Infection Control Committee, The Johns Hopkins Hospital, Baltimore, Maryland. 2002-present

Director, Performance Improvement, Adult Surgical Critical Care, The Johns Hopkins Hospital, Baltimore, Maryland. 2002-present

Medication Use Redesign Core Team, The Johns Hopkins Medical Institutions, Baltimore, Maryland 2004.

Root Cause Analysis Team, The Johns Hopkins Hospital, Baltimore, Maryland. 2004

### **Professional Societies**

Member, Society of Critical Care Medicine

Faculty, 2<sup>nd</sup> Annual Critical Care Fellows Professional Development Forum, Society of Critical Care Medicine, 2002

Faculty, Critical Care Congress, Society of Critical Care Medicine, 2002-present

Adult MCCAP Committee, Society of Critical Care Medicine, 2002-present

Member, American Society of Anesthesiologists

Faculty, American Society of Anesthesiologists Annual Meeting, 2002-present

Member, American Society of Critical Care Anesthesiologists

Member, American Federation for Medical Research

Member, American Medical Association

## **RECOGNITION**

### **Honors**

Alpha Omega Alpha Honor Medical Society

Richard H. Kirkland Scholarship for academic excellence

A.H. Robbins Scholarship for academic excellence

Richard L. Keenan Scholarship for research in anesthesiology

Outstanding dedication to Multidisciplinary Critical Care Fellowship (Teaching)

Clinician Scientist Award 2000

Clinician Scientist Award 2001

### **Invited Talks**

“Observational Studies in Critical Care”, Johns Hopkins Clinical Research Conference. November 2001.

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“Evidence-Based Medicine” (course co-director), Department of Anesthesiology/Critical Care Medicine, The Johns Hopkins University. April 2001

“Evidence-Based Medicine” (course co-director), Department of Anesthesiology/Critical Care Medicine, The Johns Hopkins University. April 2002

“Blood Transfusion Practice: Is there an opportunity to improve our practice?” Advanced Transfusion Practice Center Grand Rounds, The Johns Hopkins University. May 2002

“Impact of Organizational Structure on Patient Outcomes in the ICU”, VHA Collaborative: Transformation of the Intensive Care Unit, St. Louis. August 2002

“Implementing Clinical Measures of Quality”, VHA Collaborative: Transformation of the Intensive Care Unit, St. Louis. August 2002

“Quantifying Quality in the ICU”, Department of Anesthesiology and Critical Care Medicine Grand Rounds, The Johns Hopkins University. September 2002

“The Use of Evidence-Based Medicine to Assess the Value of Preoperative Evaluation”, American Society of Anesthesiologists Annual Meeting, Orlando, Florida. October 2002

“Improving Care for the Ventilated Patient”, VHA Collaborative: Transformation of the Intensive Care Unit, New Orleans, December 2002

“How to Succeed: Junior Faculty”, 2<sup>nd</sup> Annual Critical Care Fellows Professional Development Forum, San Antonio, Texas. January 2003.

“Improving ICU Quality and Safety”, 7th Annual Critical Care Refresher Course, San Antonio, Texas. January 2003.

“Critical Appraisal: Use of Pulmonary-Artery Catheters in High-Risk Surgical Patients”, Anesthesiology Year-in-Review, 32<sup>nd</sup> Critical Care Congress, San Antonio, Texas. January 2003.

“Improving ICU Quality and Safety”, Department of Anesthesiology Grand Rounds, Sinai Hospital, Baltimore, Maryland. February 2003.

“Improving Communication During ICU Rounds”, 23<sup>rd</sup> International Symposium on Intensive and Emergency Medicine, Brussels, Belgium. March 2003.

“Reducing Catheter-Related Blood Stream Infections”, 23<sup>rd</sup> International Symposium on Intensive and Emergency Medicine, Brussels, Belgium. March 2003.

“Improving ICU Quality and Safety”, 23<sup>rd</sup> International Symposium on Intensive and Emergency Medicine, Brussels, Belgium. March 2003.

“Transformation of the ICU”, Covenant Health senior leadership meeting, Knoxville, Tennessee. April 2003.

“Evidence-Based Medicine” (course co-director), Department of Anesthesiology/Critical Care Medicine, The Johns Hopkins University. April 2003

“Transformation of the ICU”, VHA Central Collaborative: Excellence of Clinical Outcomes in the ICU, Indianapolis, Indiana. June 2003.

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“Best Practices in the ICU: What is the Evidence?”, VHA Central Collaborative: Excellence of Clinical Outcomes in the ICU, Indianapolis, Indiana. June 2003.

“Improving Quality and Safety in the ICU” VHA Southeast ICU Benchmarking Forum, Orlando, Florida. October 2003.

“Best Practices in the ICU: Are you providing Evidence-Based Care?”, VHA Southeast ICU Benchmarking Forum, Orlando, Florida. October 2003.

“Evidence-Based Medicine: Critical Care”, Evidence-Based Medicine Expert Panel, American Society of Anesthesiologists Annual Meeting, Orlando, Florida. October 2003.

“Improving Clinical Outcomes”, VHA Gulf States: Trends and Tactics in Critical Care Management, New Orleans, Louisiana. October 2003.

“Unit-Based Quality Improvement”, Practical Approaches to Quality in Patient Care: A Tools & Solutions Symposium, Baltimore, Maryland. October 2003.

“Clinical Measures: Balanced and Focused”, VHA Oklahoma/Arkansas: Trends and Tactics in Critical Care Management, Oklahoma City, Oklahoma. November 2003.

“Measurement Strategies to Improve ICU Care”, Keystone Center for Patient Safety & Quality, MHA Health Foundation, Detroit, Michigan. February 2004.

“Ventilator Bundle: Improving Care for Patients on Mechanical Ventilation”, Keystone Center for Patient Safety & Quality, MHA Health Foundation, Detroit, Michigan. February 2004.

“Do Pulmonary Artery Catheters Improve Patient Outcomes: Critical Appraisal of Two Recent Studies”, Anesthesiology Year-in-Review, 33<sup>rd</sup> Critical Care Congress, Orlando, Florida. February 2004.