

**MATTHEW A. LEVIN, M.D.**  
[matthew.levin@mssm.edu](mailto:matthew.levin@mssm.edu)

**APPOINTMENTS/EMPLOYMENT**

7/1/96 – 6/30/97 Technical Marketing Associate  
Oracle Corporation, Redwood Shores, California

7/1/97 – 10/31/98 Technical Marketing Associate/Pre-Sales Engineer  
Pandescic, LLC, Sunnyvale, California

12/1/98 – 3/1/00 Technical Consultant, Systems Administrator  
Redshift Technologies, New York, New York

3/1/00 – 3/1/02 Software Engineer/System Administrator  
Blink.Com, New York, New York

9/1/02 – 06/15/04 Research Assistant, Department of Cardiothoracic Surgery  
Weill Cornell Medical College, New York, New York

7/1/13 – 6/30/17 Assistant Professor of Anesthesiology, Perioperative and Pain  
Medicine  
Icahn School of Medicine at Mount Sinai, New York, New York

11/23/15 – 6/30/17 Assistant Professor of Genetics and Genomic Sciences  
Icahn School of Medicine at Mount Sinai, New York, New York

7/1/17 – 12/31/21 Associate Professor of Anesthesiology, Perioperative and Pain  
Medicine  
Icahn School of Medicine at Mount Sinai, New York, New York

7/1/17 – 12/31/21 Associate Professor of Genetics and Genomic Sciences  
Icahn School of Medicine at Mount Sinai, New York, New York

10/25/21 – 12/31/21 Associate Professor of AI and Human Health  
Icahn School of Medicine at Mount Sinai, New York, New York

1/1/22 – present Professor of Anesthesiology, Perioperative and Pain Medicine  
Icahn School of Medicine at Mount Sinai, New York, New York

1/1/22 – present Professor of Genetics and Genomic Sciences  
Icahn School of Medicine at Mount Sinai, New York, New York

1/1/22 – present Professor of AI and Human Health  
Icahn School of Medicine at Mount Sinai, New York, New York

**GAPS IN EMPLOYMENT**

Not applicable

## **EDUCATION**

9/1/92-6/1/96

Bachelor of Science  
(Major: Electrical Engineering and Computer Science)

Massachusetts Institute of Technology  
Boston, Massachusetts

8/2/04-5/12/08

Doctor of Medicine with Distinction in Research  
Mount Sinai School of Medicine  
New York, New York

7/1/08-6/30/09

Intern, General Surgery  
Lenox Hill Hospital  
New York, New York  
Primary mentor: Paresh Shah MD

7/1/09-6/30/12

Resident, Anesthesiology  
The Mount Sinai Hospital  
New York, New York  
Primary mentor: David L. Reich, M.D.

7/1/12-6/30/13

Fellow, Cardiothoracic Anesthesia  
The Mount Sinai Hospital  
New York, New York  
Primary mentor: Gregory W. Fischer, M.D.

## **CERTIFICATION**

12/02/2023

Adult Cardiac Anesthesiology, The American Board of  
Anesthesiology

04/19/2013

Anesthesiology, The American Board of Anesthesiology #3242453

05/30/2013

Diplomate, Advanced Perioperative Transesophageal  
Echocardiography, The National Board of Echocardiography

01/2017

Diplomate in Clinical Informatics  
The American Board of Preventive Medicine

## **LICENSURE**

3/10/10

New York State #256459

## **HONORS/AWARDS**

5/2008

Dr. Joseph R. Jagust Award for Outstanding Medical Student in  
Anesthesiology, Icahn School of Medicine at Mount Sinai

- 6/2012 Outstanding Research in Anesthesiology as a resident, Department of Anesthesiology, Icahn School of Medicine at Mount Sinai
- 8/2020 Innovation in Anesthesiology, Department of Anesthesiology, Icahn School of Medicine at Mount Sinai
- 6/2024 Hearst Health Prize 2024. \$100,000 awarded for best data science application that has demonstrated a measurable improvement in human health. UCLA David Geffen School of Medicine.

## **PATENTS**

Not applicable

## **OTHER PROFESSIONAL ROLES**

### Extramural Service

- 2017 – 2023** Member, Research Committee, Society of Cardiovascular Anesthesiologists
- 2018 – 2020** Member, Committee on Cardiovascular and Thoracic Anesthesia, American Society of Anesthesiologists
- 2018 – present** Member, Committee on Informatics and Information Technologies, American Society of Anesthesiologists
- 2019 – 2020** Member, Steering Committee, Big Data in Healthcare Tel Aviv, Tel Aviv, Israel
- 2022 – present** At Large Member, Board of Directors, Society for Technology in Anesthesia

### Intramural Service

- 2016 – 2020** Member, MSH-MSQ OpTime Anesthesia Executive Steering Committee
- 2019 – present** Member, Data Use Committee, Mount Sinai Health System
- 2020 – 2022** Member, COVID-19 Observational Studies Steering Committee

### Memberships in Professional Societies

- 2011 – present** American Society of Anesthesiologists
- 2011 – present** Society for Technology in Anesthesia
- 2013 – present** New York State Society of Anesthesiologists
- 2013 – present** Society of Cardiovascular Anesthesiologists

## **RESEARCH PROFILE**

The primary areas of my research are intraoperative physiology, clinical informatics, and perioperative genomics.

### *Intraoperative Physiology and Outcomes*

I have published multiple large (30-50,000 patient) cohort studies examining the relationship between intraoperative physiology and postoperative outcomes. Several of these findings have been controversial, e.g., that hemodynamic variability is associated with decreased mortality, and that low tidal volume is associated with higher mortality. These studies have been widely cited within the anesthesiology literature. This work continues with a new focus on machine learning techniques and the associations of race and ancestry with intraoperative physiology.

### *Clinical Informatics and Decision Support*

I have published continuously since medical school on the use of information technology and informatics to improve quality, compliance and clinical operations, and on methodologies and system architectures. I have been PI or co-PI on two large pragmatic decision support trials examining the utility of clinician alerts. My work now focuses on the operational impact of machine learning models.

### *Perioperative Genomics*

In 2015 I was awarded a starter grant from the Society of Cardiovascular Anesthesiologists to investigate the genomics of vasoplegia, a state of profound hypotension sometimes seen after cardiopulmonary bypass. Preliminary analysis identified several potential variants associated with the condition. Work is ongoing to validate and replicate these findings. More recently I have investigated the relationship between self-reported ancestry and intraoperative blood pressure response to phenylephrine. I will continue this work to identify ways in which genetics and ancestry affect the response to surgical and anesthetic stress.

## **CLINICAL PROFILE**

As an active member of the Division of Cardiothoracic Anesthesia since 2013, my primary focus is the care of patients undergoing open-heart cardiac and thoracic surgical procedures, in particular complex mitral valve and aortic valve repairs. I work closely with my surgical colleagues as part of an interdisciplinary care team, providing expertise in intraoperative transesophageal echocardiography, cardiopulmonary physiology and pharmacology. I routinely provide anesthesia for children and adults with congenital cardiac defects undergoing percutaneous cardiac procedures in the cardiac catheterization lab. I am also often called upon to care for critically ill patients undergoing non-cardiothoracic procedures. I participate actively in the education and training of 7 cardiothoracic anesthesia fellows per year, as well as 24 residents per year, through intraoperative teaching and formal didactics.

During the COVID-19 pandemic, my expertise in respiratory physiology, in combination with my deep technical knowledge, was instrumental in the establishment of a temporary intensive care unit that provided overflow capacity for critically ill COVID-19 patients. I directed the conversion of anesthesia machines into temporary critical care ventilators and served as the expert consultant to my anesthesia and critical care colleagues on their use.

## **OVERALL IMPACT**

I have an active leadership role within both the Department of Anesthesiology and the Health System in the areas of informatics, data governance, big data, and machine learning. I am a thought leader in the area of perioperative informatics. The impact of my research is significant, with an h-index of 24. During the COVID-19 pandemic I have contributed to multiple studies and resulting publications examining the demographics, risk profiles, and clinical course of COVID-19 patients, as well as investigating novel solutions to patient ventilation.

## **DIVERSITY AND INCLUSION IMPACT**

I provide care for a diverse patient population undergoing open heart surgery, including underserved minority populations. My recent research has examined the effect of self-reported race and ancestry on intraoperative physiology and monitoring. I demonstrated that European Americans have a significantly greater blood pressure response to the vasopressor phenylephrine than African or Latino Americans, a finding that may lead to more personalized choice of vasopressor based on patient ancestry. In separate work I showed that a commonly used cerebral oxygenation monitor does not exhibit racial bias and can be safely used on patients of differing racial/ethnic backgrounds undergoing cardiac surgery. During the COVID-19 pandemic I worked with the Sudanese American Physicians Association to arrange for the donation of 100 BiPAP machines, as well as the ventilator circuits needed to adapt them for use as invasive ventilators, to The Sudan.

## **MENTORING PROFILE**

As a mentor to medical students, residents, and fellows with an interest in clinical informatics and perioperative physiology, I have provided expert guidance in the methodology needed to extract and analyze large sets of physiologic data. Under my tutelage these mentees have successfully presented their findings at national society meetings and published in the leading medical journals. One of my most recent mentees, Mr. Blaine Stannard, will graduate medical school with Distinction in Research based upon the work he did under my supervision. Several of my mentees have transitioned to industry where they currently hold senior roles.

## **GRANTS, CONTRACTS, FOUNDATION SUPPORT**

<b>Project</b>	<b>Role in Project</b>	<b>Dates</b>	<b>Award</b>	<b>Other Info</b>
Genomics of Vasoplegia  GCO# 15-1504	Principal Investigator	07/1/2015-06/30/2017 no cost extension to 06/30/2018	Society of Cardiovascular Anesthesiologists/International Anesthesia Research Society Starter Grant	\$50,000 over 2 years
Utilizing High-Resolution Patient Data to Prevent Avoidable Harm in the Post Anesthesia Care Unit GCO # PD16-21466	Co-Principal Investigator  PI: Samuel DeMaria, Jr. MD	12/01/2016-12/01/2017	Hospital Insurance Company/FOJ P Patient Safety Innovation Grant	\$50,000 over 1 year

Integration of Machine Learning and Clinical Decision Support to Prevent Postoperative Delirium in Patients with Cognitive Impairment	Co-Investigator PI: Ira Hofer MD	07/01/2022 – 06/30/2024	NIA AD/ADRD Health Care Systems Research Collaboratory	3%
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## **CLINICAL TRIALS PARTICIPATION**

<b>Project</b>	<b>Role in Project</b>	<b>Dates</b>	<b>Award</b>	<b>Other Info</b>
A Randomized Effectiveness Trial of Early Hemodynamic Support in Patients Demonstrating a Double Low Combination of Mean Arterial Pressure and Bispectral Index GCO# 10-0111	Co-investigator PI: David L. Reich MD	4/20/2011-02/11/2014	Departmental	NCT01545596
ReSCUE-ME: Realtime Streaming Clinical Use Engine for Medical Escalation	PI	6/2019 – 6/2020	Hospital	NCT04026555
Integration of Machine Learning and Clinical Decision Support to Prevent Postoperative Delirium in Patients with Cognitive Impairment	Co-Investigator PI: Ira Hofer MD	6/30/2023 –	NIA AD/ADRD Health Care Systems Research Collaboratory	NCT05777187

## **TRAINEES**

<u>NAME</u>	<u>LEVEL OF TRAINEE</u>	<u>ROLE IN TRAINING AND INCLUSIVE DATES OF TRAINING</u>	<u>TRAINING VENUE</u>	<u>TRAINEES' CURRENT STATUS &amp; INSTITUTION EMPLOYED</u>
David Ku, MD	Undergraduate	Mentor, MIT Student/Alumni Externship Program 01/2011	Department of Anesthesiology, Icahn School of Medicine at Mount Sinai	Senior Director, Business Development & Finance at Jasper Therapeutics
Adam Philips, MD	Resident	Research Collaborator 06/27/2012-08/12/2012	Department of Anesthesiology, Icahn School of Medicine at Mount Sinai	Cardiology Fellow, Beth Israel Deaconess
Carrie Atcheson (née Hamby), MD	Resident	Mentor 07/2012-06/2014	Department of Anesthesiology, Icahn School of Medicine at Mount Sinai	Physician Anesthesiologist at Southern Perioperative Services, PC
Thomas Joseph, MD, PhD	Resident	Mentor 9/2013-6/2016	Department of Anesthesiology, Icahn School of	Assistant Professor of Anesthesiology and Critical Care

			Medicine at Mount Sinai	at the Hospital of the University of Pennsylvania
Sean Batir	PhD Student	Mentor/Supervisor, MIT Student/Alumni Externship Program 01/2014	Department of Anesthesiology, Icahn School of Medicine at Mount Sinai	Principal of AI & Data Strategy, United States Department of Defense (Contract)
Gautham Prabhakar	Medical Student	Mentor/Supervisor, Foundation for Anesthesia Education and Research (FAER) Summer Training Program 6/2016 – 8/2016	Department of Anesthesiology, Icahn School of Medicine at Mount Sinai	Resident, Texas Tech University Health Science Center, Paul L. Foster School of Medicine
Blaine Stannard	Medical Student	Mentor/Supervisor, Foundation for Anesthesia Education and Research (FAER) Summer Training Program 6/2018 – 8/2018	Department of Anesthesiology, Icahn School of Medicine at Mount Sinai	Resident, Department of Anesthesiology, Icahn School of Medicine at Mount Sinai
Ryan Wang, MD	Resident, Fellow	Mentor 12/2018 – Present	Department of Anesthesiology, Icahn School of Medicine at Mount Sinai	Faculty, Department of Anesthesiology, Icahn School of Medicine at Mount Sinai
Priyank Boddhu	Medical Student	Mentor 01/2019 - Present	Department of Anesthesiology, Icahn School of Medicine at Mount Sinai	Medical Student, Icahn School of Medicine at Mount Sinai
Pranai Tandon	Fellow	Mentor, PCCSM Fellowship Research Program 5/2019 - Present	Department of Pulmonary and Critical Care Medicine, Icahn School of Medicine at Mount Sinai	Fellow, Pulmonary and Critical Care, Icahn School of Medicine at Mount Sinai
Kartik Menon	Medical Student	Mentor, 08/2021 – Present	Department of Anesthesiology, Icahn School of Medicine at Mount Sinai	Medical Student, Icahn School of Medicine at Mount Sinai
Lathan Liou	Medical Student	Mentor, 09/2022 – Present	Department of Anesthesiology, Icahn School of Medicine at Mount Sinai	Medical Student, Icahn School of Medicine at Mount Sinai
Emily Bachner	Medical Student, Resident	Mentor, 02/2022 – Present	Department of Anesthesiology, Icahn School of Medicine at Mount Sinai	Medical Student, Icahn School of Medicine at Mount Sinai
Phillip Susser	Resident	Mentor, 05/20223 – Present	Department of Anesthesiology, Icahn School of	Medical Student, Icahn School of

			Medicine at Mount Sinai	Medicine at Mount Sinai
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## **TEACHING ACTIVITIES**

<u>Teaching Activity/Topic</u>	<u>Level</u>	<u>Role</u>	<u>Indicate Level and Number of Learners Taught, and Venue</u>	<u>Number of hours week/month/yr.</u>	<u>Evaluation Summary</u>	<u>Years Taught</u>
Lecture: Resident Lecture in Cardiac Anesthesia/Physiology	Residents	Lecturer	Anesthesiology residents, 30 residents, morning didactic	1 30 minute lecture 3 times per year		2013 – present
Lecture: Research Methodologies and Statistical Analysis	Residents	Lecturer	Cardiothoracic Anesthesia Fellows, 7 fellows	1 60 minute lecture per year		2013 – present
Mentor: CT fellows journal club	Fellows	Mentor	Cardiothoracic Anesthesia Fellows, 7 fellows	7 60 minute lectures per year		2013 – present
Medical Student Research Elective in Medical Informatics	Medical Students	Elective director	Medical Students, 1 per elective	4 week elective		2015 – 2016

## **ADMINISTRATIVE LEADERSHIP APPOINTMENTS**

### **INTERNAL**

#### **Research or Clinical**

**2022 – present**

#### **Associate Vice Chair of Research, Department of Anesthesiology**

As Associate Vice Chair, I assist the Vice Chair with strategic planning, budgeting, and execution of all research activities within the Department.

**2015 – present**

#### **Director of Research Informatics, Department of Anesthesiology**

As Director of Research Informatics for the Department of Anesthesiology since June 2015, I am responsible for overall stewardship of our Departmental research infrastructure. This includes the perioperative data warehouse, web servers, and other research servers. I work closely with our Director of Business IT to maintain and update our clinical and research systems and manage our IT efforts.

**2016 – present**

#### **Co-Director, Clinical Data Science Team, Mount Sinai Health System**

At the behest of executive leadership, I co-founded and co-direct the Clinical Data Science (CDS) team for the Health System. The CDS team is focused on building and deploying real-time machine learning models to improve patient care and hospital operations. Under my leadership the team has grown to 10 members, with 5 machine learning models deployed across 6 sites within the Health System. These models have an estimated annual ROI of USD \$40 million.



**2020 – present**

**Director, Mount Sinai HELPS Innovate Innovation Lab**

The Innovation Lab was founded during the height of the COVID-19 pandemic to help address the potential shortage of mechanical ventilators. Operating out of the Department of Anesthesiology's HELPS high fidelity simulation and education center, the lab developed innovative solutions to the ventilator shortage. This included a flow control valve for using one ventilator to ventilate two patients simultaneously, novel ventilators such as the NASA/JPL ventilator, adaptation of BiPAP machines for use as invasive ventilators, and other efforts. At the peak, more than 40 physicians, residents and medical students from multiple disciplines were working in the lab. As Director, I coordinated with our external partners, organized testing of devices, directly participated in and led several of the efforts (flow control valves, NASA/Jet Propulsion Laboratory ventilator), and provided mentorship to junior lab members.

**2020 – present**

**Executive Committee, Mount Sinai Clinical Intelligence Center (MSCIC)**

MSCIC was created to provide a unified data platform for COVID-19 research, combining structured data from the electronic health record (EHR) with imaging, pathology, waveform and genetics data on a cloud-based platform. MSCIC has supported a diverse set of research initiatives, resulting in over 18 high profile publications to-date. In addition, MSCIC works closely with the CDS team to provide a “bench to bedside” pipeline to translate research models into clinical practice. As a member of the executive committee, I help to set overall strategy and direction for MSCIC.

**General Administration**

**2011 – present**

**Project Lead and System Signatory, Social Security Death Master File (DMF) certification**

The DMF (“death index”) is an invaluable resource for the health system for fraud prevention and research. Since 2011, I have been the official point of contact and signatory for the Health System's subscription to the DMF. In 2016 Congress mandated new, stricter requirements including external audit and certification for all entities wishing to use the DMF. I successfully led a team who obtained external certification and re-instituted our DMF subscription. This included deploying new hardware and software to download and store the DMF data in a secure, compliant environment.

**2017 – 2019**

**Project Lead, ROTEM integration**

ROTEM is a point-of-care coagulation test used during cardiac, liver transplant, and obstetric surgery. The devices were not integrated into the enterprise lab system and thus test results were not stored in the medical record. I successfully led a team who performed all necessary technical and configuration work so that ROTEM results are transmitted to the laboratory information

system. ROTEM results are now properly stored as part of the medical record and can be viewed, analyzed, and reimbursed.

**2016 – 2020**

**Clinical Lead, Epic Anesthesia Implementation**

I was the Clinical Champion and Clinical Informatics expert for the Health System migration to Epic Anesthesia. Implementation required extensive customization to ensure a smooth transition from the existing electronic anesthesia record. I provided critical oversight to all aspects of the implementation including interface design, user workflows, hardware configuration and installation. Under my guidance we successfully went live with Epic Anesthesia at two Health System campuses in 2018 and two in 2019, with minimal disruption of clinical operations or the anesthesia revenue stream.

**2020**

**COVID Intensive Care Unit**

I directed the conversion of a standard telemetry unit into an overflow intensive care unit for use during the COVID-19 crisis. This included direct oversight and responsibility for room conversions from step-down to ICU-level rooms, and deployment of anesthesia machines as ventilators. This was a complex effort that required close cooperation and coordination among facilities, network operations, clinical engineering, nursing, and perioperative management. We successfully deployed 28 anesthesia machines as ventilators, connected them to central station monitoring (GE CARESCAPE™) and developed the processes and workflow for their safe use. This Unit provided critical overflow ICU capacity during the height of the first wave of the pandemic.

**External**  
**2014**

**General Co-chair: 27<sup>th</sup> International Symposium on Computer-Based Medical Systems, New York, NY**

This international conference brought together more than 150 researchers from 41 countries for three days of meetings and presentations. As General Co-Chairman I was responsible for the overall organization and planning of the conference, including the call for papers, event logistics and planning, program schedule, and website and marketing materials.

**2018**

**Abstract Chair: Society for Technology in Anesthesia (STA) 2018 Annual Meeting, Miami, FL**

The annual meeting of the STA brings together more than 250 anesthesiologists, researchers, and industry members for 4 days of meetings and presentations. As Abstract Chair I was responsible for reviewing all submitted abstracts and selecting the Best in Show, Best Clinical Application Excellence in Technology and Honorable Mention winners.

**2019**

**Co-Chair: Society for Technology in Anesthesia (STA) 2019 Annual Meeting, Scottsdale, AZ**

The annual meeting of the STA brings together more than 250 anesthesiologists, researchers, and industry members for 4 days of meetings and presentations. As Co-chair I was responsible for designing and organizing the program, choosing the keynote speaker, and running the meeting.

## **PUBLICATIONS**

### **Peer Reviewed Original Contributions**

*†denotes co-authorship*

*††indicates co-senior authorship*

*\*published since last promotion*

1. Port JL, Kent MS, Korst RJ, Keresztes R, **Levin MA**, Altorki NK. Positron emission tomography scanning poorly predicts response to preoperative chemotherapy. *Ann Thorac Surg.* 2004; 77(1):254-9. PMID: 14726072.
2. Port JL, Kent M, Korst RJ, Lee PC, **Levin MA**, Flieder D, Altorki NK. Surgical resection for lung cancer in the octogenarian. *Chest.* 2004; 126(3):733-8. PMID: 15364749.
3. Port JL, Korst RJ, Lee PC, **Levin MA**, Becker DE, Keresztes R, Altorki NK. Surgical resection for residual N2 disease after induction chemotherapy. *Ann Thorac Surg.* 2005; 79(5):1686-90. PMID: 15854955.
4. Port JL, Andrade RS, **Levin MA**, Korst RJ, Lee PC, Becker DE, Altorki NK. Positron emission tomographic scanning in the diagnosis and staging of non-small cell lung cancer 2 cm in size or less. *J Thorac Cardiovasc Surg.* 2005; 130(6):1611-5. PMID: 16308006.
5. Flieder DB, Port JL, Korst RJ, Christos PJ, **Levin MA**, Becker DE, Altorki NK. Tumor size is a determinant of stage distribution in t1 non-small cell lung cancer. *Chest.* 2005; 128(4):2304-8. PMID: 16236888.
6. Wax DB, Beilin Y, **Levin MA**, Chadha N, Krol M, Reich DL. The effect of an interactive visual reminder in an anesthesia information management system on timeliness of prophylactic antibiotic administration. *Anesth Analg.* 2007; 104(6):1462-6. PMID: 7513642.
7. **Levin MA**, Krol M, Doshi AM, Reich DL. Extraction and Mapping of Drug Names from Free Text to a Standardized Nomenclature. *AMIA Annu Symp Proc.* 2007; 11:438-42. PMID: 18693874.
8. **Levin MA**, Lin, HM, Castillo JG, Adams DH, Reich DL, Fischer, GW. Early On-Cardiopulmonary Bypass Hypotension and Other Factors Associated With Vasoplegic Syndrome. *Circulation* 2009; 120:1664-1667. PMID: 19822810.
9. Reich DL, Porter C, **Levin MA**, Lin HM, Patel K, Fallar R, Serban S, Chai E, Nash IS, Vezina M, Silverstein JH. Data-Driven Interdisciplinary Interventions to Improve Inpatient Pain Management. *Am J Med Qual.* 2013; 28(3):187-95. PMID: 22942123.

10. De Maria S Jr, Nürnberg J, Lin HM, Contreras-Saldivar AG, **Levin MA**, Flax K, Groth D, Vullo J, Rocca J, Florman S, Reich DL. Association of intraoperative blood pressure instability with adverse outcomes after liver transplantation. *Minerva Anesthesiol.* 2013;79(6):604-16. PMID: 23511361.
11. **Levin MA**, McCormick PJ, Lin HM, Hosseinian L, Fischer GW. Low Intraoperative Tidal Volume Ventilation with Minimal PEEP is Associated with Increased Mortality. *Br J Anaesth.* 2014; 113(1):97-108. PMID: 24623057.
12. **Levin MA**, Fischer GW, Lin HM, McCormick PJ, Krol M, Reich DL. Intraoperative arterial blood pressure lability is associated with improved 30 day survival. *Br J Anaesth.* 2015;115(5):716-726. PMID: 26395645.
13. Philips AT, Deiner S, Mo Lin H, Andreopoulos E, Silverstein J, **Levin MA**. Propofol Use in the Elderly Population: Prevalence of Overdose and Association With 30-Day Mortality. *Clin Ther.* 2015;37(12):2676-85. PMID: 26548320.
14. **Levin MA**, Wanderer JP, Ehrenfeld JM. Data, Big Data, and Metadata in Anesthesiology. *Anesth Analg.* 2015; 121(6):1661-7. PMID: 26579664.
15. Badgeley MA, Shameer K, Glicksberg BS, Tomlinson MS, **Levin MA**, McCormick PJ, Kasarskis A, Reich DL, Dudley JT. EHDViz: Clinical dashboard development using open-source technologies. *BMJ Open.* 2016 Mar; 6(3):1-11. PMID: 27013597.
16. McCormick PJ, **Levin MA**, Lin HM, Sessler DI, Reich DL. Effectiveness of an Electronic Alert for Hypotension and Low Bispectral Index on 90-day Postoperative Mortality: A Prospective, Randomized Trial. *Anesthesiology.* 2016 Dec; 125(6):1113-1120 PMID: 27775995.
17. Heller JA, Kothari R, Lin H-M, **Levin MA**, Weiner M. Surgery Start Time Does Not Impact Outcome in Elective Cardiac Surgery. *J Cardiothor Vasc Anesth.* 2017 Feb;31(1):32-36. PMID: 28277245
18. Mandel-Portnoy Y<sup>†</sup>, **Levin MA**<sup>†</sup>, Bansilal S, Suprun M, Lin HM, Richardson LD, Fischer GW, Halperin JL. Low intraoperative heart rate volatility is associated with early postoperative mortality in general surgical patients: a retrospective case-control study. *J Clin Monit Comput.* 2016 Dec; 30(6):911-918. PMID: 26477036.
19. **Levin MA**, Joseph TT, Jeff JM, Nadukuru R, Ellis SB, Bottinger EP, Kenny EE. iGAS: A Framework for Using Electronic Intraoperative Medical Records for Genomic Discovery. *J Biomed Inform.* 2017 Mar; 67:80-89. PMID 28193464.
20. Wax DB, Hill B, **Levin MA**. Ventilator Data Extraction with a Video Display Image Capture and Processing System. Wax DB, Hill B, Levin MA. *J Med Syst.* 2017 Jun;41(6):101. Epub 2017 May 20. PMID: 28526944
21. \*Maheshwari A, McCormick PJ, Sessler DI, Reich DL, You J, Mascha EJ, Castillo JG, **Levin MA**, Duncan AE. Prolonged concurrent hypotension and low bispectral index ('double low') are associated with mortality, serious

- complications, and prolonged hospitalization after cardiac surgery. *Br J Anaesth*. 2017 Jul 1;119(1):40-49. PMID: 28974062  
*Drafting or revising critically important intellectual content*
22. \*Evans AS, **Levin MA**, Lin HM, Lee K, Weiner MM, Anyanwu A, Adams DH, Mittnacht AJC. Prognostic Value of Hyperlactatemia and Lactate Clearance After Mitral Valve Surgery. *J Cardiothorac Vasc Anesth*. 2018 Apr;32(2):636-643. PMID: 29129343
  23. \*Wax D, McCormick PJ, Joseph TT, **Levin MA**. An Automated Critical Event Screening System to Facilitate Pre-Anesthesia Record Review. *Anesth Analg*. 2018 Feb;126(2):606-610. PMID:29053113.
  24. \*McCormick PJ, Lin HM, Deiner SG, **Levin MA**. Validation of the All Patient Refined Diagnosis Related Group (APR-DRG) Risk of Mortality and Severity of Illness Modifiers as a Measure of Perioperative Risk. *J Med Syst*. 2018 Mar 22;42(5):81. PMID: 29564554.
  25. \*Spindel SM, Yanagawa B, Mejia J, **Levin MA**, Varghese R, Stelzer PE. Intermittent upper and lower body perfusion during circulatory arrest is safe for aortic repair. *Perfusion*. 2019 Apr;34(3):195-202. Epub 2018 Sep 5. PMID: 30183519.  
*Conception and Design, Data Acquisition, Data analysis and interpretation, drafting or revising critically important intellectual content*
  26. \***Levin MA**, Lin HM, Prabakar G, McCormick PJ, Egorova NN. Alive or dead: Validity of the Social Security Administration Death Master File after 2011. *Health Serv Res*. 2018 Dec 5. [Epub ahead of print] PMID: 30520023.
  27. \*Kass JL, Lakha S, **Levin MA**, Joseph T, Lin HM, Genden EM, Teng MS, Miles BA, DeMaria S Jr. Intraoperative hypotension and flap loss in free tissue transfer surgery of the head and neck. *Head Neck*. 2018 Nov;40(11):2334-2339. PubMed PMID: 30230116.  
*Data analysis and interpretation, drafting or revising critically important intellectual content*
  28. \*James LA, **Levin MA**, Lin HM, Deiner SG. Association of Preoperative Frailty With Intraoperative Hemodynamic Instability and Postoperative Mortality. *Anesth Analg*. 2019 Jun;128(6):1279-1285. doi: 10.1213/ANE.0000000000004085. PMID: 31094800.  
*Data analysis and interpretation, drafting or revising critically important intellectual content*
  29. \*Kia A, Timsina P, Joshi HN, Klang E, Gupta RR, Freeman RM, Reich DL, Tomlinson MS, Dudley JT, Kohli-Seth R, Mazumdar M, **Levin MA**. MEWS++: Enhancing the Prediction of Clinical Deterioration in Admitted Patients through a Machine Learning Model. *J Clin Med*. 2020 Jan 27;9(2). pii: E343. doi: 10.3390/jcm9020343. PMID:32012659

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*Drafting or revising critically important intellectual content*
14. \***Levin MA**, Burnett G, Villar J, Hamburger J, Eisenkraft JB, Leibowitz AB. Anesthesia Machine as an ICU Ventilator — A Near Miss During the COVID-19 Pandemic - Anesthesia Patient Safety Foundation. *APSF Newsletter*. 2021 Feb;36(1);34–36.
15. Burnett GW, Stannard B, Wax DB, Lin HM, Pyram-Vincent C, DeMaria S, **Levin MA**. Self-reported Race/Ethnicity and Occult Hypoxemia: Reply. *Anesthesiology*. 2022 Sep 1;137(3):371-372. doi: 10.1097/ALN.0000000000004292. PMID: 35767658.

### **Books and Book Chapters**

1. Wax D, **Levin MA**. Computers and Monitoring: information management systems, alarms, and drug delivery. In: Reich DL, editor. *Monitoring in Anesthesia and Perioperative Care*. 2011, New York, NY. Cambridge University Press, pp. 383-395.
2. \***Levin MA**. Defibrillators. In: Patel PM, Bhatt HV, Kim SJ, editors. *Basic Essentials: A Comprehensive Review for the Anesthesiology BASIC Exam*. 2018, Cambridge, UK. Cambridge University Press, pp. 23-28.

### **Non-Peer Reviewed Publications**

1. \***Levin MA**, Blake CM. Mind and Machine: Updates from the Society for Technology in Anesthesia Annual Meeting. *Anesthesiology News Special Edition* 2019.

### **INVITED LECTURES/PRESENTATIONS**

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|-----------|--|
| 10/2009   | Panelist, Data driven Performance Improvement Panel: Mining a Clinical Database to Drive Performance Improvement. American Society of Anesthesiologists Annual Meeting, New Orleans, LA. |
| 6/20/2013 | Panel Co-Chair: Big Data Systems and Services for Healthcare. 26th International Symposium on Computer-Based Medical Systems (CBMS 2013), Porto, Portugal.                               |

- 1/16/2014 Panelist: Defining Big Data & the Limitations of Traditional Analytical Approaches. Society for Technology in Anesthesia Annual Meeting 2014, Orlando, FL.
- 4/17/2014 Invited Speaker: Anesthesia Informatics on a Budget. Vanderbilt University Department of Anesthesiology, Division of Informatics, Nashville, TN.
- 1/10/2015 Panelist: Building a Perioperative Data Warehouse From Your AIMS Data. Society for Technology in Anesthesia Annual Meeting 2015, Scottsdale, AZ.
- 12/11/2015 Panelist: Building a Perioperative Data Warehouse. New York State Society of Anesthesiologists Annual Post-Graduate Assembly 69, New York, NY.
- 12/13/2015 Presentation: Vasoplegia: What it is, How to Treat it. New York State Society of Anesthesiologists 69<sup>th</sup> Annual Post-Graduate Assembly, New York, NY.
- 06/13/2016 Invited Speaker: A Case of Renal Cell Carcinoma, Right Atrial Thrombus and Pulmonary Emboli During Pregnancy Requiring Surgical Intervention. Grand Rounds, Department of Cardiology, Icahn School of Medicine at Mount Sinai, New York, NY.
- 12/11/2016 Presentation: Vasoplegia: What it is, How to Treat it. New York State Society of Anesthesiologists 70<sup>th</sup> Annual Post-Graduate Assembly, New York, NY.
- 07/25/2017 Invited Speaker: Pipelines and Patients: Automating Data Integration to Facilitate Perioperative Research. Duke University School of Medicine, Department of Anesthesiology, Division of Cardiothoracic Anesthesia, Durham, NC.
- 12/8/2017 Panelist: Ethical Guidelines, Technology, and Pay-for-Value are Driving Cutting Edge Practices. New York State Society of Anesthesiologists 71<sup>st</sup> Annual Post-Graduate Assembly, New York, NY.
- 12/10/2017 Presentation: Vasoplegia: What it is, How to Treat it. New York State Society of Anesthesiologists 71<sup>st</sup> Annual Post-Graduate Assembly, New York, NY.
- 12/07/2018 Presentation: Live Data analysis: Where is Decision Support Today. New York State Society of Anesthesiologists 72<sup>nd</sup> Annual Post-Graduate Assembly, New York, NY.
- 12/10/2018 Presentation: Vasoplegia: What it is, How to Treat it. New York State Society of Anesthesiologists 72<sup>nd</sup> Annual Post-Graduate Assembly, New York, NY.

- 04/16/2019 Presentation: Building a Clinical Data Science Pipeline: Realtime Machine Learning and Decision Support for Healthcare. Big Data TLV, Tel Aviv, Israel.
- 12/13/2019 Presentation: Vasoplegia: What it is, How to Treat it. New York State Society of Anesthesiologists 73<sup>rd</sup> Annual Post-Graduate Assembly, New York, NY.
- 01/19/2020 Presentation: Healthier Patients, Better Outcomes: Improving Clinical Care through Data Science and AI. ASA Practice Management 2020, Las Vegas, NV.
- 12/12/2021 Presentation: Vasoplegia: What it is, How to Treat it. New York State Society of Anesthesiologists 75<sup>th</sup> Annual Post-Graduate Assembly, New York, NY.
- 12/11/2022 Presentation: Vasoplegia: What it is, How to Treat it. New York State Society of Anesthesiologists 76<sup>th</sup> Annual Post-Graduate Assembly, New York, NY.
- 05/23/2023 Invited Speaker: Healthier Patients, Better Outcomes: Improving Clinical Care through Data Science and AI. Beth Israel Deaconess medical Center, Department of Anesthesia, Critical Care and Pain Medicine, Boston MA.
- 12/11/2023 Presentation: Vasoplegia: What it is, How to Treat it. New York State Society of Anesthesiologists 77<sup>th</sup> Annual Post-Graduate Assembly, New York, NY.
- 01/27/2024 Panel Presentation: Current Strategies for Vasoplegic Shock. Society of Thoracic Surgeons 60<sup>th</sup> Annual Meeting 2024, San Antonio Texas.

### **PRESENTATIONS AT NATIONAL MEETINGS**

- 10/15/2006 Oral Presentation, CompuRecord Users Group: **Levin MA**. Extracting physiologic data from CompuRecord for the purpose of large scale data mining and analysis. American Society of Anesthesiologists Annual Meeting, Chicago, IL.
- 10/2010 Poster Presentation: **Levin MA**, Jacobs J, Osborn I. A Case of Failed Intubation Secondary to Asymptomatic Tracheal Stenosis. American Society of Anesthesiologists Annual Meeting, San Diego, CA.
- 10/2010 Oral Presentation: **Levin MA**. A Hospital-Wide Project To Improve Inpatient Pain Scores and Post-Discharge Satisfaction. Presented at the American Society of Anesthesiologists Annual Meeting, San Diego, CA.



- 01/14/2011 Poster Presentation: **Levin MA**, McCormick PJ, Krol, M. Design and Implementation of an Anesthesia Data Warehouse using Open Source Tools and Software. Society for Technology in Anesthesia Annual Meeting, Las Vegas, NV.
- 01/18/2012 Poster Presentation: **Levin MA**. Integration of the Social Security Administration Death Master File into an Anesthesia Data Warehouse. Society for Technology in Anesthesia Annual Meeting 2012, Palm Beach, FL.
- 12/16/2012 Poster Presentation: **Levin MA**, McCormick PJ, Lin HM, Galati M, Hosseinian L, Fischer GW. Low Intraoperative Tidal Volume Ventilation is Associated with Increased 30-day Mortality. New York State Society of Anesthesiologists 66<sup>th</sup> Annual Post-Graduate Assembly New York, NY.
- 04/06/2013 Poster Presentation: **Levin MA**, Stone ME. Intraoperative Transesophageal Echocardiographic diagnosis of Inferior Vena Cava Occlusion following Multiple Valve Replacement for Rheumatic Disease. Society of Cardiovascular Anesthesiologists Annual Meeting, Miami, FL.
- 01/15/2014 Poster Presentation: McCormick PJ, **Levin MA**. Reproducible Research Using a Software Development Methodology. Society for Technology in Anesthesia Annual Meeting, Orlando, FL.
- 04/03/2016 Problem Based Learning Discussion: **Levin MA**. Every Pressor I can think of and still no BP! Managing vasoplegia. Society of Cardiovascular Anesthesiologists Annual Meeting 2016, San Diego, CA.
- 02/28/2018 Poster Presentation: **Levin MA**, Hill B, Bolaji O, Lee E, Son JH, Kouh M, Demaria JD. Utilizing High-Resolution Patient Data to Prevent Avoidable Harm in the Post Anesthesia Care Unit. FOJP/HIC 28<sup>th</sup> Health Care Risk Management Conference, New York, NY.
- 10/13/2018 Poster Presentation: Stannard B, Weiner MM, **Levin MA**. The Influence of Self-Reported Race on Regional Cerebral Oxygen Saturation Measurement During Cardiac Surgery. American Society of Anesthesiologists Annual Meeting, San Francisco, CA.
- 10/2/2020 Poster Presentation: Stannard B, Lakomkin N, Hadjipanayis C, **Levin MA**. Incidence of Trigemino-cardiac Reflex during Microvascular Decompression. American Society of Anesthesiologists Annual Meeting, Virtual Meeting.
- 01/11/2023 Poster Presentation: Menon KM, Tandon P, Lin HM, Ouyang Y, **Levin MA**. Association Of Mechanical Power With Reintubation In The Critically Ill: Machine Learning Outperforms Logistic Regression. Society for Technology in Anesthesia Annual Meeting 2023, Las Vegas, NV.
- 04/27/2024 Poster Presentation: Roberts A, **Levin MA**. Anterolateral Papillary Muscle Rupture Secondary To STEMI In The Setting of Cardiogenic Shock.

Society of Cardiovascular Anesthesiologists Annual Meeting 2024,  
Toronto, Canada.

**MEDIA RESOURCE EDUCATIONAL MATERIALS**

N/A