

## Sunny S. Lou, M.D. Ph.D.

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### EDUCATION

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2020- 2022	Barnes Jewish Hospital / Washington University <b>Fellowship, Adult Cardiothoracic Anesthesiology</b>	St Louis, MO
2017- 2022	Barnes Jewish Hospital / Washington University <b>Residency, Anesthesiology</b> <b>Internship, Anesthesiology</b>	St Louis, MO
2009- 2017	Stanford University School of Medicine <b>M.D., Ph.D., Chemical and Systems Biology</b>	Stanford, CA
2005- 2009	Massachusetts Institute of Technology <b>S.B., Biology</b>	Cambridge, MA

### LICENSES AND CERTIFICATION

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2023- present	Board Certification, American Board of Anesthesiology
2017- present	Missouri State Medical License

### HONORS AND AWARDS

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2024	<b>1<sup>st</sup> place – Best Clinical Abstract</b> , World Congress for Anaesthesia
2023	<b>Editorial Fellow</b> , British Journal of Anesthesia
2022	<b>Mentored Research Award</b> , International Anesthesia Research Society
2022	<b>Outcomes Research Fellow</b> , Multicenter Perioperative Outcomes Group
2022	<b>Alpha Omega Alpha</b> Honor Society
2021	<b>Team Award</b> for Quality Improvement, Periop Blood Mgmt, BJC Healthcare
2019	<b>Top 10%</b> , American Board of Anesthesiology BASIC Exam
2009	<b>Phi Beta Kappa</b> Honor Society
2008	<b>Barry M. Goldwater Scholarship</b>

### POSITIONS

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2024- present	<b>Assistant Professor</b> , Washington University Dept of Anesthesiology Divisions of Cardiothoracic Anesthesiology and Clinical Research Affiliate, Institute for Informatics
2022-2024	<b>Instructor</b> , Washington University Dept of Anesthesiology
2017-2022	<b>Resident/Fellow</b> , Washington University Dept of Anesthesiology NIH T32 appointee with mentor: Thomas Kannampallil, PhD Clinical informatics, clinical decision support, machine learning for healthcare
2017	<b>Research Fellow</b> , Google Health Mentor: Ming Jack Po, MD PhD Product design for artificial intelligence in medicine
2010-2017	<b>Doctoral Research</b> , Stanford University Mentor: Julie Theriot, PhD Quantitative microscopy, biophysics, genomics to study cell migration.

## RESEARCH SUPPORT

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<b>R01 HS029020</b> Agency for Healthcare Research and Quality, Role: Co-Investigator Integrating real-time clinical activity and behavioral responses for characterizing cognitive load and errors (IGNITE)	09/30/2022-07/31/2027 Annual Directs: \$281,814
<b>IARS Mentored Research Award</b> International Anesthesia Research Society, Role: PI Intelligent clinical decision support for perioperative blood management	10/01/2022-09/30/2024 Annual Directs: \$87,500
<b>Big Ideas Healthcare Innovation Competition</b> Washington University, Role: PI Intelligent clinical decision support for perioperative blood management	07/01/2022-06/30/2023 Annual Directs: \$50,000
<b>EHR-Use Metrics Research</b> American Medical Association Foundation, Role: PI Metrics for EHR Secure Chat Use	06/01/2022-12/31/2023 Annual Directs: \$50,000
<b>T32 GM108539</b> NIH/NIGMS, Role: Trainee Training Program in Anesthesiology Research	10/01/2020-09/31/2022 Annual Directs: \$447,060
<b>Big Ideas Healthcare Innovation Competition</b> Washington University, Role: PI Integrating real-time clinical activity for characterizing burnout (IGNITE)	07/01/2020-12/31/2021 Annual Directs: \$50,000

## SERVICE

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2021- present	<b>Member</b> , Barnes Jewish Hospital Perioperative Blood Management Committee Developed real-time reports to measure perioperative blood delivery and usage. Led quality improvement efforts to reduce blood product waste and to improve the efficiency of blood delivery to the operating rooms.
2021- present	<b>Ad hoc journal reviewer</b> , <i>Anesthesiology</i> , <i>British Journal of Anaesthesia</i> , <i>Anesthesia &amp; Analgesia</i> , <i>Annals of Surgery</i> , <i>Journal of the American Medical Informatics Association (JAMIA)</i> , <i>Journal of Biomedical Informatics</i>
2023- present	<b>Ad hoc grant reviewer</b> , NIH ZRG1 HSS-J, Washington University Big Ideas Healthcare Innovation Competition

## PUBLICATIONS

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**S.S. Lou**, Y. Liu, M.E. Cohen, C.Y. Ko, B.L. Hall, T. Kannampallil (2024) National multi-institutional validation of a surgical transfusion risk prediction model. *J. Am. Coll. Surg.* doi: 10.1097/XCS.0000000000000874

- L.R. Baratta, D. Harford, C.A. Sinsky, T. Kannampallil, **S.S. Lou** (2023) Characterizing the patterns of EHR-integrated secure messaging use: A cross-sectional study. *J. Med. Internet Res.* doi: 10.2196/48583
- S.S. Lou**, L.R. Baratta, D. Lew, D. Harford, M.S. Avidan, T. Kannampallil (2023) Comparison of anesthesia clinical workload estimated from electronic health record documentation vs billed Relative Value Units, *JAMA Network Open*. doi:10.1001/jamanetworkopen.2023.28514
- B. Bartek, **S.S. Lou**, T. Kannampallil (2023) Measuring the Cognitive Effort Associated with Task Switching in Routine EHR-based Tasks, *Journal of Biomedical Informatics*. doi: 10.1016/j.jbi.2023.104349
- S.S. Lou**, M.M. Dewey, M.L. Bollini, D.R. Harford, C. Ingold, T.S. Wildes, T.W. Stevens, J.L. Martin, B.J. Grossman, I. Kangrga (2023) Reducing perioperative red blood cell unit issue orders, returns, and waste using failure modes and effects analysis. *Transfusion*. doi: 10.1111/trf.17275
- S. Kim, **S.S. Lou**, L.R. Baratta, T. Kannampallil (2023) Classifying clinical work settings using EHR audit logs: a machine learning approach. *Am J Manag Care*. doi: 10.37765/ajmc.2023.89310
- S.S. Lou**, H. Liu, D. Harford, C. Lu, T. Kannampallil (2023) Characterizing the macrostructure of EHR work using raw audit logs: an unsupervised action embeddings approach. *Journal of the American Medical Informatics Association*. doi: 10.1093/jamia/ocac239
- H. Liu, **S.S. Lou**, B.C. Warner, D.R. Harford, T. Kannampallil, C. Lu (2022) HiPAL: A Deep Framework for Physician Burnout Prediction Using Activity Logs in Electronic Health Records. In: *Proceedings of the 28th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (KDD '22)*
- S.S. Lou**, D. Lew, D.R. Harford, C. Lu, B.A. Evanoff, J.G. Duncan, T. Kannampallil (2022) Temporal associations between EHR-derived workload, burnout, and errors: a prospective cohort study. *Journal of General Internal Medicine*. doi: 10.1007/s11606-022-07620-3
- S.S. Lou**, S. Kim, D. Harford, B.C. Warner, P.R.O. Payne, J. Abraham, T. Kannampallil (2022) Effect of Clinician Attention Switching on Workload and Wrong-Patient Errors. *British Journal of Anaesthesia*. 2022. doi: 10.1016/j.bja.2022.04.012
- S.S. Lou**, H. Liu, C. Lu, T.S. Wildes, B.L. Hall, T. Kannampallil (2022) Personalized surgical transfusion risk prediction using machine learning to guide preoperative type and screen orders. *Anesthesiology*. doi: 10.1097/ALN.0000000000004139
- S.S. Lou**, H. Liu, B.C. Warner, D. Harford, C. Lu, T. Kannampallil (2022) Predicting physician burnout using clinical activity logs: model performance and lessons learned. *Journal of Biomedical Informatics*. Online ahead of print. doi: 10.1016/j.jbi.2022.104015
- C.W. Goss, J.G. Duncan, **S.S. Lou**, K.J. Holzer, B.A. Evanoff, T. Kannampallil (2022) Effects of persistent exposure to COVID-19 on mental health outcomes among trainees: a longitudinal survey study. *Journal of General Internal Medicine*. Jan 22; doi: 10.1007/s11606-021-07350-y

K.J. Holzer, **S.S. Lou**, C.W. Goss, J. Strickland, B.A. Evanoff, J.G. Duncan, T. Kannampallil (2021) Effect of changes in EHR use during COVID-19 on physician trainee mental health. *Applied Clinical Informatics*, Jun 02, doi: 10.1055/s-0041-1731000

**S.S. Lou**, C.W. Goss, B.A. Evanoff, J.G. Duncan, T. Kannampallil (2021) Risk factors associated with physician trainee concern over missed educational opportunities during the COVID-19 pandemic, *BMC Medical Education*. Apr 17, doi: 10.1186/s12909-021-02665-0

**S.S. Lou**, M. Bethel, A.B. Reidy, M.A. Helwani (2021) Tracheobronchial Trauma from Double Lumen Tube Placement in Patients Undergoing Lung Transplantation, *Journal of Cardiothoracic and Vascular Anesthesia*. Apr 19, doi: 10.1053/j.jvca.2021.04.020

**S.S. Lou**, A.S. Kennard, E.F. Koslover, E. Gutierrez, A. Groisman, J.A. Theriot. (2021) Elastic wrinkling of keratocyte lamellipodia driven by myosin-induced contractile stress, *Biophysical Journal*, May 4;120(9):1578-1591. doi: 10.1016/j.bpj.2021.02.022

T. Kannampallil, J. Abraham, **S.S. Lou**, P.R.O. Payne (2020) Conceptual considerations for using EHR-based activity logs to measure clinician burnout and its effects. *Journal of the American Medical Informatics Association*, Dec 22. doi: 10.1093/jamia/ocaa305

M.J. Arcario, **S.S. Lou**, P.N. Taylor, S.H. Gregory (2020) Sinus of Valsalva Aneurysms: A Review with Perioperative Considerations. *Journal of Cardiothoracic and Vascular Anesthesia*, Dec 14. doi: 10.1053/j.jvca.2020.12.016

T.Y. Tsai, S.R. Collins, C.K. Chan, A. Hadjitheodorou, P.Y. Lam, **S.S. Lou**, H.W. Yang, J. Jorgensen, F. Ellett, D. Irimia, M.W. Davidson, R.S. Fischer, A. Huttenlocher, T. Meyer, J.E. Ferrell Jr, J.A. Theriot (2019) Efficient Front-Rear Coupling in Neutrophil Chemotaxis by Dynamic Myosin II Localization. *Developmental Cell*, Apr 22;49(2):189-205.e6. doi: 10.1016/j.devcel.2019.03.025.

E.L. Barnhart, J. Allard, **S.S. Lou**, A. Mogilner, J.A. Theriot (2017) Adhesion dependent wave generation in crawling cells. *Current Biology*, Jan 9; (27)1:27-38. doi: 10.1016/j.cub.2016.11.011

**S.S. Lou**, A. Diz-Munoz, O.D. Weiner, D.A. Fletcher, J.A. Theriot (2015) Myosin light chain kinase regulates cell polarization independently of membrane tension or Rho kinase. *Journal of Cell Biology*, Apr 27;209(2):275-88. doi: 10.1083/jcb.201409001.

## INVITED TALKS

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**S.S. Lou**, S Kumar, C.W. Goss, M.S. Avidan, S.H. Kheterpal, T. Kannampallil. Multi-center validation of a personalized surgical transfusion risk prediction model: a multi-center perioperative outcomes group study. (Invited oral presentation at the *International Anesthesia Research Society Annual Meeting*. Kosaka Best Abstract Nominee, May 19, 2024; and at the *World Congress of Anaesthesia*, Best Clinical Abstract Competition, Mar 6, 2024).

**S.S. Lou**, L. Baratta, D. Lew, D. Harford, M.S. Avidan, T. Kannampallil. Comparison of EHR-derived clinical workload and reimbursement. *American Medical Informatics Association Annual Symposium* (Invited oral presentation, Nov 13, 2023).

**S.S. Lou.** “Introduction to Raw EHR Audit / Event Log Research” in Using EHR Event Log Data for Operational and Research Insights Workshop,” *American Medical Informatics Association Annual Symposium* (Invited oral presentation, Nov 11, 2023).

**S.S. Lou,** S. Kumar, M.S. Avidan, S. Kheterpal, T. Kannampallil. External validation of a publicly available surgical transfusion risk prediction model: a multi-center perioperative outcomes group study. *Multicenter Perioperative Outcomes Group Retreat* (Invited oral presentation, Oct 13, 2023).

**S.S. Lou,** L. Baratta, D. Lew, D. Harford, M.S. Avidan, T. Kannampallil. Payments for anesthesiology services may be poorly calibrated with clinical workload. *Academy Health Annual Meeting* (Invited oral presentation, Jun 26, 2023).

**S.S. Lou,** L. Baratta, D. Lew, D. Harford, T. Kannampallil. Comparing audit log derived measures of workload with reimbursement. *National Research Network for EHR-Use Measures* (Invited seminar, Feb 03 2023).

**S.S. Lou,** S. Kim, D.R. Harford, B.C. Warner, P.R.O. Payne, J. Abraham, T. Kannampallil. Effect of Attention Switching on EHR-based Workload and Wrong-Patient Errors. *American Medical Informatics Association Annual Symposium* (Invited oral presentation, Nov 8 2022)

**S.S. Lou,** H. Liu, S. Kim, D. Lew, D.R. Harford, B.C. Warner, C. Lu, T. Kannampallil. Audit logs for the measurement of physician workload, cognitive burden, and burnout. *National Research Network for EHR-Use Measures* (Invited seminar, Mar 11 2022).

**S.S. Lou,** D. Lew, H. Liu, D.R. Harford, B.C. Warner, C. Lu, T. Kannampallil. Integrating real-time clinical activity for characterizing burnout and errors. *American Medical Association EHR-Use Research Summit* (Invited seminar, Dec 10 2021).

**S.S. Lou,** D. Lew, D.R. Harford, C. Lu, B.E. Evanoff, J.G. Duncan, T. Kannampallil. A longitudinal study of burnout and clinical workload measured with electronic health record audit logs. *American Medical Informatics Association Annual Symposium* (Invited oral presentation, Nov 1 2021).

**S.S. Lou,** J.A. Theriot. Myosin light chain kinase activity regulates the number of leading edges in zebrafish embryonic keratocytes. *Biophysical Society Annual Meeting*, 106, 2:1, 1236-Plat; doi: 10.1016/j.bpj.2013.11.1429. (Invited oral presentation, Feb 10 2014).

## TEACHING EXPERIENCE

2014	<b>Teaching Assistant</b> for MCP 222, a graduate course in light microscopy, Stanford University.
2010-2012	<b>Teaching Assistant</b> for INDE 216, a first year medical school course in cell biology and histology, Stanford University.
2008	<b>Instructor</b> , MIT Educational Studies Program, developed and taught a short course on cancer biology for high school students.
2007	<b>Teaching Assistant</b> for 5.07 Biochemistry, Massachusetts Institute of Technology.

## MENTORSHIP

2023- present	<b>Phillp Yang</b> , Anesthesiology Resident
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2023- 2024	<b>Peter Szatowski</b> , Anesthesiology Fellow
2022- present	<b>Sayantana Kumar</b> , Graduate Student, Computer Science and Engineering
2021- present	<b>Seunghwan (Nigel) Kim</b> , Graduate Student, Institute for Informatics
2021- present	<b>Laura Baratta</b> , MD PhD Student, Washington University
2020- 2022	<b>Hanyang (Eric) Liu</b> , Graduate Student, Department of Computer Science
2020- 2022	<b>Benjamin Warner</b> , Masters Student, Department of Computer Science
2021- 2022	<b>Krishna Bhat</b> , Anesthesiology Resident
2022	<b>Jonathan Song</b> , Research Assistant
2021	<b>Kate Hidahl</b> , Medical Student, University of Rochester; FAER Medical Student Summer Research Fellowship