Stanford



Lawrence Chu, MD, MS

Professor of Anesthesiology, Perioperative and Pain Medicine (MSD)

CLINICAL OFFICE (PRIMARY)

- **Anesthesia**

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ACADEMIC CONTACT INFORMATION

- **Stanford Medicine X**

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Bio

BIO

Larry Chu, MD is a Professor of Anesthesiology, Perioperative and Pain Medicine and Director of the Stanford Anesthesia Informatics and Media (AIM) Lab. Dr. Chu founded the START online educational program as well as the Learnly online learning ecosystem for post-graduate anesthesiology education. He is an NIH-funded clinical researcher and Director of the Stanford Anesthesia Summer Institutes (SASI), which provides immersive experiences with Stanford faculty and real patients, delivering unparalleled quality education, inspiring and challenging those with early health-career interests to delve deep into the realms of science, technology, and medicine.

Dr. Chu is also actively involved in research exploring the applications of artificial intelligence (AI) and large language models (LLMs) in Anesthesiology, focusing on improving patient-centered care through enabling co-produced team-based solutions with Everyone Included (www.everyoneincluded.org). He has received research funding from the National Institutes of Health (NIH) including RO1 and K-award grants, the Patient-Centered Outcomes Research Institute (PCORI), the World Health Organization, Pfizer, Lilly, Boehringer Ingelheim, and others. He is the founding co-editor-in-chief of the anesthesiology textbook "Manual of Clinical Anesthesiology" published by Wolters Kluwer. He has written 8 books and 85 peer-reviewed journal articles in academic anesthesiology and medicine. He is a former long-serving member of the editorial advisory board for The BMJ, one of the most influential general medical journals in the world.

CLINICAL FOCUS

- Anesthesia
- eHealth
- Emerging Technology and Medicine
- Precision Medicine
- Digital Health Efficacy and Validation
- Patient Partnership in Academic Medicine

ACADEMIC APPOINTMENTS

- Professor-Univ Med Line, Anesthesiology, Perioperative and Pain Medicine
- Member, Bio-X

ADMINISTRATIVE APPOINTMENTS

- Editorial Advisory Board, The BMJ, (2016-2023)
- Executive Director, Stanford Medicine X, (2011- present)
- Member, Committee on Resident Selection, Stanford University School of Medicine Department of Anesthesiology, (2007-2023)
- Electronic Media and Information Technology Committee, American Society of Anesthesiologists, (2002-2004)
- Trustee, California Medical Association, (2003-2004)
- Member, Editorial Board, MDNetGuide, (1999- present)
- Member, Educational Resources Committee, Society for Education in Anesthesia, (2003- present)
- Member, Web Site Committee, American Pain Society, (2007- present)
- Organizing Chair, Fourth World Congress on Social Media and Web 2.0 in Health, Medicine and Biomedical Research, (2010-2011)

HONORS AND AWARDS

- Excellence in Teaching Award, Stanford University Department of Biological Sciences (1998)
- Research Fellowship Grant, Foundation for Anesthesia Education and Research (1/2003-6/2004)
- Clinical Loan Repayment Program, National Institutes of Health (7/2003 - 7/2006)
- Career Development Award, National Institutes of Health (8/2004-8/2009)
- Innovation in Education Award, International Anesthesia Research Society (2011-2012)
- Independent Scientist Award, National Institutes of Health (2013 - 2018)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Editorial Advisory Board Member, BMJ (2016 - 2023)

PROFESSIONAL EDUCATION

- Internship: UCSF St Mary's Medical Center Dept of Internal Medicine (2000) CA
- Medical Education: Stanford University School of Medicine (1999) CA
- Fellowship: Stanford University Anesthesiology Residency (2004) CA
- Residency: Stanford University Anesthesiology Residency (2003) CA
- Board Certification: Anesthesia, American Board of Anesthesiology (2004)
- MS, Stanford University , Clinical Epidemiology (2006)
- Fellowship, Stanford Medical School , Clinical Pain Research (2004)
- Residency, Stanford Hospital , Anesthesiology (2003)
- Internship, St. Mary's Hospital , Internal Medicine (2000)
- MD, Stanford Medical School , Medicine (1999)

PATENTS

- Gary Peltz, David Clark, and Lawrence Chu. "United States Patent 9,226,918 Methods and compositions for treating or preventing narcotic withdrawal symptoms", Leland Stanford Junior University, Jan 5, 2016

LINKS

- Clinical Research Website: http://painresearch.stanford.edu
- Anesthesia Informatics Research Website: http://aim.stanford.edu
- Stanford Medicine X: http://medicinex.stanford.edu
- Stanford Anesthesia Summer Institute: http://sasi.stanford.edu

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

I have two lines of research, one involving educational informatics and use of technology in postgraduate medical education and another involving NIH-funded work in patient-oriented clinical research regarding opioid use and physiologic responses associated with acute and chronic exposure in humans.

For a full description of my educational informatics work, please see my website aim.stanford.edu.

My clinical research focuses on the study opiate-induced hyperalgesia in patients suffering from chronic pain.

I am currently conducting an NIH-funded five year double-blinded randomized controlled clinical study (NIGMS award 1K23GM071400-01) that prospectively examines the following hypotheses: 1) pain patients on chronic opioid therapy develop dose-dependent tolerance and/or hyperalgesia to these medications over time, 2) opiate-induced tolerance and hyperalgesia develop differently with respect to various types of pain, 3) opioid-induced hyperalgesia occurs independently of withdrawal phenomena, and 4) opiate-induced tolerance and hyperalgesia develop differently based on gender and/or ethnicity.

The study is the first quantitative and prospective examination of tolerance and hyperalgesia in pain patients and may have important implications for the rational use of opioids in the treatment of chronic pain.

CLINICAL TRIALS

- 5HT3 Antagonists to Treat Opioid Withdrawal and to Prevent the Progression of Physical Dependence, Not Recruiting
- Functional Magnetic Resonance Imaging of Opioid Withdrawal in Healthy Human Volunteers, Not Recruiting
- Inflammatory Responses to Acute and Chronic Opioid Exposure in Humans, Not Recruiting
- Opiate-Induced Tolerance & Hyperalgesia in Pain Patients, Not Recruiting
- Ostom-i Alert Sensor Quality of Life Validation, Not Recruiting
- Palonosetron and Hydroxyzine to Reduce Opioid Withdrawal, Not Recruiting
- Study on the Effect of a Beta Blocker on Increased Sensitivity to Pain in Humans Caused by Opioids, Not Recruiting
- A Study of Genetic Variation Influencing Pain and Response to Opioid Medications, Not Specified

Teaching

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Anesthesia (Fellowship Program)

Publications

PUBLICATIONS

- **State of Medical Education Research in Anesthesiology: Current Landscape and Future Directions-An Initiative of the Anesthesia Research Council.** *Anesthesia and analgesia*
  Wolpaw, J., Ambardekar, A., Nemergut, E. C., Carter, T., Chu, L., Labe, S., Duggan, B., Zisblatt, L., Martinelli, S. M., Roper, L., Desai, S., Mitchell, J. D., Edgar, et al
  2026; 143 (2): 290-304

- **Awake Flexible Scope Intubation in Critically Ill Patients With Physiologically Difficult Airways: A Prospective, Observational Case Series.** *Critical care explorations*
  Camiré, D. C., Ramaswamy, T. S., Chu, L. F., Mihm, F. G.
  2026; 8 (4): e1394

- **The state of medical education research in Anesthesiology: Current landscape and future directions - An initiative of the Anesthesia Research Council.** *Anesthesiology*
  Wolpaw, J., Ambardekar, A., Nemergut, E. C., Carter, T., Chu, L., Labe, S., Duggan, B., Zisblatt, L., Martinelli, S. M., Roper, L., Desai, S., Mitchell, J. D., Edgar, et al
  2026

- **Exploring clinician and patient perspectives on choice of general anaesthetic. A report of two U.S. surveys: an anesthesia clinician Multicenter Perioperative Outcomes Group survey and a patient Amazon Mechanical Turk survey.** *BJA open*
  Holzer, K. J., Hurwitz, R. M., Tellor Pennington, B. R., Politi, M. C., Vaughn, M. T., Chu, L., Price, A., Hicks, M., Avidan, M. S., Kheterpal, S.
  2026; 17: 100504

- **Rewarding Productivity, Hoping for Creativity.** *Anesthesiology*
  Chu, L. F., Wu, C. L., Tsai, M. H.
  2026

- **Large language model agents can use tools to perform clinical calculations.** *NPJ digital medicine*
  Goodell, A. J., Chu, S. N., Rouholiman, D., Chu, L. F.
  2025; 8 (1): 163

- **AnesthesiaChat: An Anesthesia-Specific Large Language Model Built from WikiAnesthesia**
  Goodell, A., Chung, P., Chu, L., Larson, B., Chu, S. N., Rishel, C.
  LIPPINCOTT WILLIAMS & WILKINS.2025

- **Preparing for The Silver Tsunami: The Potential for use of Big Data and Artificial Intelligence in Geriatric Anesthesia** *CURRENT ANESTHESIOLOGY REPORTS*
  Chu, L. F., Kurup, V.
  2025; 15 (1)

- **The Promise of Artificial Intelligence and Machine Learning in Geriatric Anesthesiology Education: An Idea Whose Time Has Come** *CURRENT ANESTHESIOLOGY REPORTS*
  Chu, L. F., Kurup, V.
  2025; 15 (1)

- **Open-Source Large Language Models in Anesthesia Perioperative Medicine: ASA-Physical Status Evaluation**
  Rouholiman, D., Goodell, A. J., Fung, E., Chandrasoma, J. T., Chu, L. F.
  LIPPINCOTT WILLIAMS & WILKINS.2024: 2779-2781

- **AnesthesiaChat: An Anesthesia-Specific Large Language Model Built from WikiAnesthesia**
  Goodell, A., Chung, P., Chu, L., Larson, B., Chu, S. N., Rishel, C.
  LIPPINCOTT WILLIAMS & WILKINS.2024

- **Perceived Workload Using Separate (Filtering Facepiece Respirator and Face Shield) and Powered Air-Purifying Respirator and Integrated Lightweight Protective Air-Purifying Respirator: Protocol for an International Multisite Human Factors Randomized Crossover Feasibility Study.** *JMIR research protocols*
  Price, A., Lin, Y. L., Levin, A. S., Tumietto, F., Almeida, R., Almeida, A., Ciofi-Silva, C. L., Fontana, L., Oliveira, N., Parisi, N. F., Mainardi, G. M., Cordeiro, L., Roselli, et al

2022; 11 (12): e36549

- **A mixed methods study on effectiveness and appropriateness of face shield use as COVID-19 PPE in middle income countries.** *American journal of infection control*
  Brainard, J., Hall, S., van der Es, M., Sekoni, A., Price, A., Padoveze, M. C., Ogunsola, F. T., Nichiata, L. Y., Hornsey, E., Crook, B., Cirino, F., Chu, L., Hunter, et al
  2022; 50 (8): 878-884

- **Combining Machine Learning, Patient-Reported Outcomes, and Value-Based Health Care: Protocol for Scoping Reviews.** *JMIR research protocols*
  Raclin, T., Price, A., Stave, C., Lee, E., Reddy, B., Kim, J., Chu, L.
  2022; 11 (7): e36395

- **Coproduction, Coeducation, and Patient Involvement: Everyone Included Framework for Medical Education Across Age Groups and Cultures.** *JMIR medical education*
  Price, A., Damaraju, A., Kushalnagar, P., Brunoe, S., Srivastava, U., Debidda, M., Chu, L.
  2021; 7 (4): e31846

- **PERSONAL PROTECTIVE EQUIPMENT (PPE) SEES THE LIGHT: LOW-COST METHYLENE BLUE PLUS LIGHT INACTIVATES SARS-COV-2 ON PPE INCLUDING MASKS AND RESPIRATORS**
  Lendvay, T. S., Chen, J., Harcourt, B. H., Scholte, F. E., Kilinc-Balci, F., Lin, Y., Lamb, M. M., Chu, L. C., Evans, D., Price, A., Lin, Y., Mores, C. N., Sahni, et al
  AMER SOC TROP MED & HYGIENE.2021: 8

- **Effects of a 2-Week Remote Learning Program on Empathy and Clinical and Communication Skills in Premedical Students: Mixed Methods Evaluation Study.** *JMIR medical education*
  Srivastava, U., Price, A., Chu, L. F.
  2021; 7 (4): e33090

- **Graduate medical education in anaesthesiology and COVID-19: lessons learned from a global pandemic.** *Current opinion in anaesthesiology*
  Chu, L. F., Kurup, V.
  2021

- **The Burnout Dyad: A Collaborative Approach for Including Patients in a Model of Provider Burnout.** *The Journal of continuing education in the health professions*
  Martinez-Hollingsworth, A., Hicks, M., Dobrota, S., Chu, L. F.
  2021

- **Patient and Public Involvement in research: A journey to co-production.** *Patient education and counseling*
  Price, A., Clarke, M., Staniszewska, S., Chu, L., Tembo, D., Kirkpatrick, M., Nelken, Y.
  2021

- **Addressing Personal Protective Equipment (PPE) Decontamination: Methylene Blue and Light Inactivates SARS-CoV-2 on N95 Respirators and Medical Masks with Maintenance of Integrity and Fit.** *Infection control and hospital epidemiology*
  Lendvay, T. S., Chen, J., Harcourt, B. H., Scholte, F. E., Lin, Y. L., Kilinc-Balci, F. S., Lamb, M. M., Homdayjanakul, K., Cui, Y., Price, A., Heyne, B., Sahni, J., Kabra, et al
  2021: 1-83

- **An evidence review of face masks against COVID-19.** *Proceedings of the National Academy of Sciences of the United States of America*
  Howard, J., Huang, A., Li, Z., Tufekci, Z., Zdimal, V., van der Westhuizen, H., von Delft, A., Price, A., Fridman, L., Tang, L., Tang, V., Watson, G. L., Bax, et al
  2021; 118 (4)

- **Household Materials Selection for Homemade Cloth Face Coverings and Their Filtration Efficiency Enhancement with Triboelectric Charging.** *Nano letters*
  Zhao, M., Liao, L., Xiao, W., Yu, X., Wang, H., Wang, Q., Lin, Y. L., Kilinc-Balci, F. S., Price, A., Chu, L., Chu, M. C., Chu, S., Cui, et al
  2020

- **Managing ICU surge during the COVID-19 crisis: rapid guidelines.** *Intensive care medicine*
  Aziz, S., Arabi, Y. M., Alhazzani, W., Evans, L., Citerio, G., Fischkoff, K., Salluh, J., Meyfroidt, G., Alshamsi, F., Oczkowski, S., Azoulay, E., Price, A., Burry, et al
  2020

- **Inflammatory Response to Chronic Opioid Exposure in Humans**
  Mathi, K., Dobrota, S. D., Lee, T. J., Sayyid, Z. N., Rouholiman, D., Gamble, J. G., Encisco, E. M., Rico, T., Maecker, H. T., Chu, L. F.
  AMER ASSOC IMMUNOLOGISTS.2020
- **Bridging the implementation gap of machine learning in healthcare** *BMJ INNOVATIONS*
  Seneviratne, M. G., Shah, N. H., Chu, L.
  2020; 6 (2): 45-47
- **Critical patient insights from the same-day feedback programme at Stanford Health Care.** *BMJ open quality*
  Luna, A. n., Price, A. n., Srivastava, U. n., Chu, L. F.
  2020; 9 (3)
- **I Tweet, Therefore I Learn: An Analysis of Twitter Use Across Anesthesiology Conferences.** *Anesthesia and analgesia*
  Schwenk, E. S., Jaremko, K. M., Park, B. H., Stiegler, M. A., Gamble, J. G., Chu, L. F., Utengen, A. n., Mariano, E. R.
  2019
- **Peripheral Nerve Blocks for Hand Procedures REPLY** *NEW ENGLAND JOURNAL OF MEDICINE*
  Chandrasoma, J., Harrison, T., Chu, L. F.
  2018; 379 (22): 2182
- **Peripheral Nerve Blocks for Hand Procedures.** *The New England journal of medicine*
  Chandrasoma, J., Harrison, T. K., Ching, H., Vokach-Brodsky, L., Chu, L. F.
  2018; 379 (10): e15
- **Peripheral Nerve Blocks for Hand Procedures** *NEW ENGLAND JOURNAL OF MEDICINE*
  Chandrasoma, J., Harrison, T., Ching, H., Vokach-Brodsky, L., Chu, L. F.
  2018; 379 (10)
- **Internet searches for opioids predict future emergency department heroin admissions.** *Drug and alcohol dependence*
  Young, S. D., Zheng, K., Chu, L. F., Humphreys, K.
  2018; 190: 166-169
- **A Flawed Design Produces Flawed Results Reply** *JOURNAL OF ADDICTION MEDICINE*
  Chu, L. F., Sun, J., Clemenson, A., Erlendson, M. J., Rico, T., Cornell, E., Obasi, H., Sayyid, Z. N., Encisco, E. M., Yu, J., Gamble, J. G., Clark, J.
  2018; 12 (3): 252–53
- **Reply to Dr Peltz.** *Journal of addiction medicine*
  Chu, L. F., Sun, J., Clemenson, A., Erlendson, M. J., Rico, T., Cornell, E., Obasi, H., Sayyid, Z. N., Encisco, E. M., Yu, J., Gamble, J. G., Clark, J. D.
  2018; 12 (3): 252–53
- **Improving Health-Related Quality of Life of Patients With an Ostomy Using a Novel Digital Wearable Device: Protocol for a Pilot Study.** *JMIR research protocols*
  Rouholiman, D. n., Gamble, J. G., Dobrota, S. D., Encisco, E. M., Shah, A. G., Grajales Iii, F. J., Chu, L. F.
  2018; 7 (3): e82
- **Patient-Centric Strategies in Digital Health** *DIGITAL HEALTH: SCALING HEALTHCARE TO THE WORLD*
  Chu, L. F., Shah, A. G., Rouholiman, D., Riggare, S., Gamble, J. G.
  edited by Rivas, H., Wac, K.
  2018: 43–54
- **Internet searches for opioids predict future emergency department heroin admissions.** *Drug and alcohol dependence*
  Young, S. D., Zheng, K., Chu, L. F., Humphreys, K.
  2018; 190: 166–69
- **Ondansetron does not prevent physical dependence in patients taking opioid medications chronically for pain control.** *Drug and alcohol dependence*
  Chu, L. F., Rico, T., Cornell, E., Obasi, H., Encisco, E. M., Vertelney, H., Gamble, J. G., Crawford, C. W., Sun, J., Clemenson, A., Erlendson, M. J., Okada, R., Carroll, et al
  2018; 183: 176–83

- **Ondansetron Does Not Reduce Withdrawal in Patients With Physical Dependence on Chronic Opioid Therapy.** *Journal of addiction medicine*
  Chu, L. F., Sun, J., Clemenson, A., Erlendson, M. J., Rico, T., Cornell, E., Obasi, H., Sayyid, Z. N., Encisco, E. M., Yu, J., Gamble, J. G., Carroll, I., Clark, et al
  2017

- **Factors Contributing to Anesthesia Residents' Learner Engagement and Learning Experience in a Mobile App: A Mixed-Method Design Study**
  Traynor, A., Wang, K., Ngai, L., Chu, L.
  LIPPINCOTT WILLIAMS & WILKINS.2017: 102–3

- **Cytokine signature associated with disease severity in chronic fatigue syndrome patients.** *Proceedings of the National Academy of Sciences of the United States of America*
  Montoya, J. G., Holmes, T. H., Anderson, J. N., Maecker, H. T., Rosenberg-Hasson, Y. n., Valencia, I. J., Chu, L. n., Younger, J. W., Tato, C. M., Davis, M. M.
  2017; 114 (34): E7150–E7158

- **How Social Media is Changing the Practice of Regional Anesthesiology.** *Current anesthesiology reports*
  Schwenk, E. S., Chu, L. F., Gupta, R. K., Mariano, E. R.
  2017; 7 (2): 238–45

- **Patient Participation at Health Care Conferences: Engaged Patients Increase Information Flow, Expand Propagation, and Deepen Engagement in the Conversation of Tweets Compared to Physicians or Researchers.** *Journal of medical Internet research*
  Utengen, A. n., Rouholiman, D. n., Gamble, J. G., Grajales Iii, F. J., Pradhan, N. n., Staley, A. C., Bernstein, L. n., Young, S. D., Clauson, K. A., Chu, L. F.
  2017; 19 (8): e280

- **Palonosetron and hydroxyzine pre-treatment reduces the objective signs of experimentally-induced acute opioid withdrawal in humans: a double-blinded, randomized, placebo-controlled crossover study.** *American journal of drug and alcohol abuse*
  Erlendson, M. J., D'Arcy, N., Encisco, E. M., Yu, J. J., Rincon-Cruz, L., Peltz, G., Clark, J. D., Chu, L. F.
  2016: 1-9

- **One Month of Oral Morphine Decreases Gray Matter Volume in the Right Amygdala of Individuals with Low Back Pain: Confirmation of Previously Reported Magnetic Resonance Imaging Results.** *Pain medicine*
  Lin, J. C., Chu, L. F., Stringer, E. A., Baker, K. S., Sayyid, Z. N., Sun, J., Campbell, K. A., Younger, J. W.
  2016; 17 (8): 1497-1504

- **Teaching the 21st Century Learner: Innovative Strategies and Practical Implementation.** *International anesthesiology clinics*
  Chandrasoma, J., Chu, L. F.
  2016; 54 (3): 35-53

- **Palonosetron and hydroxyzine pre-treatment reduces the objective signs of experimentally-induced acute opioid withdrawal in humans: a double-blinded, randomized, placebo-controlled crossover study** *The American Journal of Drug and Alcohol Abuse*
  Erlendson, M., D'Arcy, N., Encisco, E., Yu, J., Rincon-Cruz, L., Peltz, G., Clark, D. J., Chu, L. F.
  2016: 1-9

- **"Nothing about us without us"-patient partnership in medical conferences.** *BMJ (Clinical research ed.)*
  Chu, L. F., Utengen, A., Kadry, B., Kucharski, S. E., Campos, H., Crockett, J., Dawson, N., Clauson, K. A.
  2016; 354: i3883-?

- **Acute opioid withdrawal is associated with increased neural activity in reward-processing centers in healthy men: A functional magnetic resonance imaging study.** *Drug and alcohol dependence*
  Chu, L. F., Lin, J. C., Clemenson, A., Encisco, E., Sun, J., Hoang, D., Alva, H., Erlendson, M., Clark, J. D., Younger, J. W.
  2015; 153: 314-322

- **A Survey of Resident Educational Technology Preferences from 374 Anesthesiology Residents**
  Ngai, L. K., Eng, R. L., Erlendson, M. J., Chu, L. F.
  LIPPINCOTT WILLIAMS & WILKINS.2014

- **A Pilot Study to Measure the Impact of Blended Learning on Intern Wellness and Burnout**
  Wen, L., Ratner, E., Harrison, T., Chu, L., Mariano, E., Roberts, S., Wang, T., Udani, A.
  LIPPINCOTT WILLIAMS & WILKINS.2014

- **STARTPrep: A 12-Month Multi-Institutional Online Preparatory Course for the American Board of Anesthesiology Part1 Basic Examination**
  Eng, R., Roberts, S. E., Grove, W., Ngai, L., Bartsch, J., Fuller, A. J., Chu, L. F.
  LIPPINCOTT WILLIAMS & WILKINS.2014
- **THE IMPACT OF A FLIPPED CLASSROOM ON INTERN WELLNESS AND BURNOUT: A PILOT STUDY**
  Wen, L., Ratner, E., Harrison, K., Chu, L., Mariano, E., Roberts, S., Udani, A.
  LIPPINCOTT WILLIAMS & WILKINS.2014: S101
- **Laryngeal Mask Airway in Medical Emergencies REPLY** *NEW ENGLAND JOURNAL OF MEDICINE*
  Lighthall, G., Harrison, T., Chu, L. F.
  2014; 370 (9): 883–84
- **Laryngeal Mask Airway in Medical Emergencies** *NEW ENGLAND JOURNAL OF MEDICINE*
  Wang, H. E., Callaway, C. W., Soar, J.
  2014; 370 (9): 882–83
- **The development of pediatric fluid resuscitation: an interview with Dr. Frederic A. 'Fritz' Berry** *PEDIATRIC ANESTHESIA*
  Mai, C. L., Yaster, M., Chu, L., Ahmed, Z., Firth, P. G.
  2014; 24 (2): 217-223
- **RapidRead: step-at-a-glance crisis checklists** *Pervasive Health*
  Cirimele, J., Wu, L., Leach, K., Card, S., Harrison, T., Chu, L., Klemmer, S. R.
  2014: 25–32
- **Supporting crisis response with dynamic procedure aids** *Proceedings of the 2014 conference on Designing interactive systems*
  Wu, L., Cirimele, J., Leach, K., Card, S., Chu, L., Harrison, T., Klemmer, S. R.
  2014: 315–24
- **The MOOClet Framework: Improving Online Education through Experimentation and Personalization of Modules** *Social Science Research Network*
  Williams, J. J., Li, N., Kim, J., Whitehill, J., Maldonado, S., Pechenizkiy, M., Chu, L., Heffernan, N.
  2014
- **Videos in clinical medicine: Laryngeal mask airway in medical emergencies.** *New England journal of medicine*
  Lighthall, G., Harrison, T. K., Chu, L. F.
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- **Laryngeal Mask Airway in Medical Emergencies** *NEW ENGLAND JOURNAL OF MEDICINE*
  Lighthall, G., Harrison, T. K., Chu, L. F.
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- **SUCCESSFUL TRANSITION TO ANESTHESIA RESIDENCY TRAINING: A MULTICENTER STUDY OF AN ONLINE DISTANCE-LEARNING PROGRAM DESIGNED TO PREPARE INTERNS FOR ANESTHESIA RESIDENCY TRAINING**
  Erlendson, M. J., Ngai, L., Garbin, M., Chu, L. F.
  LIPPINCOTT WILLIAMS & WILKINS.2013: 17–18
- **INTERACTIVE COGNITIVE AIDS FOR CRITICAL EVENTS IN ANESTHESIA**
  Cirimele, J., Cirimele, J., Wu, L., Chu, L., Harrison, K., Card, S., Klemmer, S.
  LIPPINCOTT WILLIAMS & WILKINS.2013: 13–14
- **IMPRINT: A BLENDED-LEARNING ONLINE AND SIMULATION-BASED CURRICULUM TO PROMOTE INTERN WELLNESS AND INCREASE MEDICAL KNOWLEDGE DURING THE CB-1 YEAR**
  Udani, A., Clemenson, A., Harrison, K., Garbin, M., Chu, L.
  LIPPINCOTT WILLIAMS & WILKINS.2013: 70–71
- **SOCIAL MEDIA-BASED DISTRIBUTION OF ANESTHESIA EDUCATIONAL CONTENT: UTILIZATION OF THE ANESTHESIA ILLUSTRATED EDUCATIONAL WEBSITE**
  Clemenson, A., Sun, J., Erlendson, M., Chu, L. F.
  LIPPINCOTT WILLIAMS & WILKINS.2013: 15–16

- **THE USE OF MOBILE COMPUTING DEVICES IN ANESTHESIA RESIDENT EDUCATION: A CROSS-SECTIONAL SURVEY STUDY**
  Sun, J. S., Clemenson, A. M., Garbin, M. C., Chu, L. F.
  LIPPINCOTT WILLIAMS & WILKINS.2013: 68–69

- **Daily cytokine fluctuations, driven by leptin, are associated with fatigue severity in chronic fatigue syndrome: evidence of inflammatory pathology** *JOURNAL OF TRANSLATIONAL MEDICINE*
  Stringer, E. A., Baker, K. S., Carroll, I. R., Montoya, J. G., Chu, L., Maecker, H. T., Younger, J. W.
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- **Preparing Interns for Anesthesiology Residency Training: Development and Assessment of the Successful Transition to Anesthesia Residency Training (START) E-Learning Curriculum.** *Journal of graduate medical education*
  Chu, L. F., Ngai, L. K., Young, C. A., Pearl, R. G., Macario, A., Harrison, T. K.
  2013; 5 (1): 125-129

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  Stringer, E. A., Baker, K. S., Carroll, I. R., Montoya, J. G., Chu, L., Maecker, H. T., Younger, J. W.
  2013; 11: 93-?

- **Interactive cognitive aids in medicine** *CHI '13 Extended Abstracts on Human Factors in Computing Systems*
  Wu, L., Cirimele, J., Leach, K., Card, S., Chu, L., Harrison, K., Klemmer, S.
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