

**BIOGRAPHICAL SKETCH**

NAME: Adrian H. Zai, MD, Ph.D., MPH.

eRA COMMONS USER NAME: ADRIANZAI

POSITION TITLE: Chief Research Informatics Officer, U Mass Chan Medical School

**EDUCATION/TRAINING**

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Boston University, Boston, MA	BA.	5/1992	Chemistry
Boston University School of Medicine, Boston, MA	MD.	5/2001	
Boston University School of Medicine, Boston, MA	Ph.D.	5/2001	Pathology
MetroHealth Medical Center, Cleveland, OH (Case Western Reserve University)	Residency	6/2004	Internal Medicine (categorical)
Massachusetts General Hospital, Boston, MA NLM/Harvard-MIT Division of Health Science and Technology	Fellowship	6/2007	Medical Informatics
Harvard School of Public Health, Boston, MA	MPH.	6/2007	Healthcare Management

**A. Personal Statement**

As Chief Research Informatics Officer at the U Mass Chan Medical School, I am responsible for the informatics infrastructure supporting clinical research at our organization. I also serve as the Director of the NIH-funded CTSA institutional Research Informatics Core (RIC). I designed this institutional core, jointly sponsored by the UMass Center for Clinical and Translational Sciences (UMCCTS) and the Department of Population and Quantitative Health Sciences (PQHS), to achieve synergy across the many different informatics-related components and activities at UMMS.

As the former Research Director at MassGeneralBrigam, I have led the Digital Health eCare Research Core to support all research studies requiring integration to Epic Systems. Furthermore, as the former Clinical Director of Population Informatics at the Massachusetts General Hospital's Laboratory of Computer Science for 17 years, I have also led the design, development, and implementation of a population health management (PHM) information technology (IT) platform.

Finally, I am an Associate Professor at the Department of Population and Quantitative Health Sciences. My research expertise lies in improving population health outcomes by leveraging informatics and digital health technologies.

Ongoing and recently completed projects that I would like to highlight include:

UL1 TR001453-05A1, NIH/NCATS

Luzuriaga (PI)

06/30/20 – 05/31/25

**University of Massachusetts Center for Clinical and Translational Science (UMCCTS)**

The goals of the UMass Center for Clinical and Translational Science (UMCCTS) are to move laboratory discoveries into treatments for patients and to train a new generation of researchers. Center activities support cores, services, and training programs that facilitate greater efficiency and productivity of investigators across the five UMass campuses.

R01HL146782: NIH/NHLBI

Taveras (PI)

03/01/19-02/29/24

### **Implementation of Childhood Obesity Treatment Innovations to Improve Outcomes of Low-Income Children: The Connect for Health II Study**

The primary objectives of this proposed study are to develop and test implementation strategies to accelerate the uptake and adoption of research evidence generated by the *Connect for Health* trial across two socio-ecologic levels, e.g. in pediatric primary care settings and among families. To achieve these goals and objectives, we will work with large health care systems in Massachusetts with a strong track record of research collaboration that deliver care to low-income children.

DI-2017C3-9005: PCORI

Taveras (PI)

11/01/18-10/31/21

### **Dissemination and Implementation of Effective Childhood Obesity Treatment Innovations**

The long-term goal of this proposed study is to reduce obesity prevalence and related disparities by improving the care and outcomes of low-income children with obesity. Our primary objectives are to promote and facilitate the uptake of research evidence generated by the *Connect for Health* trial in federally-qualified health centers and evaluate the effectiveness of our proposed dissemination and implementation strategies.

**CarePassport:** Industry-funded

Zai (PI)

09/1/2018-08/31/20

A cost-effectiveness comparison study between a patient-centered mobile application and an EHR-based patient portal to assess patients on Integrating Home-Based Monitoring for Undiagnosed Atrial Fibrillation into Clinical Care Source.

**Partners Population Health Management** Zai (PI)

09/01/11-03/31/17

Development and Implementation of TopCare at all primary care practices affiliated to Massachusetts General Hospital and Brigham and Women's Hospital to support the Partners Pioneer Accountable Care Organization initiative.

## **B. Positions, Scientific Appointments, and Honors**

### **Positions and Scientific Appointments**

2021 - Chief Research Informatics Officer, U Mass Chan Medical School (UMMS)  
2021 - Associate Professor, Department of Population and Quantitative Health Sciences, UMMS  
2018 - 2021 Director of Clinical Trials, MGH Center for Innovation and Digital Health  
2017 - 2021 Research Director, Digital Health eCare, MassGeneralBrigham  
2009 - 2021 Assistant Professor in Medicine, Harvard Medical School  
2008 - 2021 Assistant in Medicine, Massachusetts General Hospital (MGH)  
2008 - 2021 Clinical Director of Population Informatics, MGH

### **Honors**

2013 Nathaniel Bowditch Award  
2013 Partners Excellence Award  
2007 HIMSS Dvora Brodie Scholarship recipient  
1998 Henry I. Russek Award for excellence in graduate research  
1994 American Heart Association Fellowship

## **C. Contributions to Science**

### **1. TopCare: A Population Health Management IT platform.**

Population health management initiatives have been challenging to operationalize partially because existing health IT systems are traditionally designed for acute care in a fee-for-service environment instead of continuous population care in a value-based setting. To address this challenge, I led the design and development of TopCare ("**T**echnology **O**ptimized for **P**opulation **C**are in **A** Resource-limited **E**nvironment") to provide an IT framework optimized for a value-based care environment. Today, TopCare has grown into a comprehensive, integrated PHM IT system supporting research and operational PHM initiatives, including

successfully implementing the Pioneer ACO program at Partners HealthCare. In 2012, Partners selected TopCare to support its network-wide operational PHM initiative in primary care, which is comprised of 300,000 primary care patients managed by ~1500 clinical providers at MGH and BWH across several patient populations, including:

- Diabetes
- Hypertension
- Coronary Artery Disease
- Cerebral Vascular Disease
- Peripheral Vascular Disease
- Primary Cancer Screening (Cervical, Colorectal, Breast, Lung)

TopCare is unique in the following way – it was created from the ground up to manage outcomes utilizing a set of integrated tools to enable care teams to drive the desired outcomes through iterative, continuous improvement processes. TopCare has the following integrated tools:

- Data Integration Architecture
- Population Data Warehouse
- Registries and Rosters
- Analytics
- Patient Attribution
- Care Coordination
- Interventions
- Patient Navigation and Engagement

TopCare delivers real-time information to administrators, physicians, nurses, and care teams to manage their patient populations effectively. Key to the TopCare solution is a clinical recommendation application, which effectively ties a provider's patient data to individualized action plans for the care teams. By integrating tightly with the clinical workflow, TopCare enables care teams to link patient populations to prospective interventions.

- a. Ashburner JM, Horn DM, O'Keefe SM, **Zai AH**, Chang Y, Wagle NW, Atlas SJ. Chronic disease outcomes from primary care population health program implementation. *Am J Manag Care*. 2017 Dec;23(12):728-735. PMID: 29261239.
- b. Percac-Lima S, Ashburner JM, **Zai AH**, Chang Y, Oo SA, Guimaraes E, Atlas SJ. Patient Navigation for Comprehensive Cancer Screening in High-Risk Patients Using a Population-Based Health Information Technology System: A Randomized Clinical Trial. *JAMA Intern Med*. 2016 Jul 1;176(7):930-7. doi: 10.1001/jamainternmed.2016.0841. PMID: 27273602.
- c. Atlas SJ, **Zai AH**, Ashburner JM, Chang Y, Percac-Lima S, Levy DE, Chueh HC, Grant RW. Non-visit-based cancer screening using a novel population management system. *J Am Board Fam Med*. 2014 Jul-Aug;27(4):474-85. doi: 10.3122/jabfm.2014.04.130319. PMID: 25002002.
- d. **Zai AH**, Grant RW, Estey G, Lester WT, Andrews CT, Yee R, Mort E, Chueh HC. Lessons from implementing a combined workflow-informatics system for diabetes management. *J Am Med Inform Assoc*. 2008 Jul-Aug;15(4):524-33. doi: 10.1197/jamia.M2598. Epub 2008 Apr 24. PMID: 18436907; PMCID: PMC2442271.

## 2. Incorporating optimization in the workflow design process.

Considerable evidence supports the efficacy of reminder systems for preventive services. However, fewer studies have focused on the effectiveness and efficiency of such systems when applied in routine practice settings on an ongoing basis. While health IT systems are designed for a broad user audience, they must be optimized to local workflow needs to be effective. Optimization guided by analytical models can highlight system bottlenecks and process inefficiencies. Operations research, unlike more traditional techniques (e.g., regression analysis), involves analytical methods capable of accounting for uncertain care environments constrained by limited resources. In particular, operations research techniques can lead to opportunities for more effective and finer-tuned control of operations, practical solutions for reducing costs, and increased worker productivity and employee morale.

Simulation modeling is an alternative method capable of examining increasingly complex, real-life healthcare systems with few mathematical assumptions. Simulation provides a valuable environment to examine numerous what-if scenarios without affecting real-time system operations. Although requiring more time to build, debug, and validate, simulation models have been used to improve a wide range of healthcare processes, including inpatient bed allocation, patient flow optimization, and hospital process evaluation.

However, the role of queueing theory and simulation models to evaluating health IT systems is still being defined. My goal is to learn how to use operations research techniques to simulate changes in patient outreach staffing levels, modifications to user workflow within the IT system, and changes in clinical recommendations. These techniques could be used to optimize intervention impact in both continuous improvement processes and clinical trials.

- a. Ashburner JM, Lee PR, Rivet CM, Barr Vermilya H, Lubitz SA, **Zai AH**. The Implementation and Acceptability of a Mobile Application for Screening for Atrial Fibrillation at Home. *Telemed J E Health*. 2021 Nov;27(11):1305-1310. doi: 10.1089/tmj.2020.0427. Epub 2021 Feb 22. PMID: 33606553.
- b. Percac-Lima S, Singer DE, Cronin PR, Chang Y, **Zai AH**. Can Text Messages Improve Attendance to Primary Care Appointments in Underserved Populations? *J Health Care Poor Underserved*. 2016;27(4):1709-1725. doi: 10.1353/hpu.2016.0157. PMID: 27818433.
- c. **Zai AH**, Kim S, Kamis A, Hung K, Ronquillo JG, Chueh HC, Atlas SJ. Applying operations research to optimize a novel population management system for cancer screening. *J Am Med Inform Assoc*. 2014 Feb;21(e1):e129-35. doi: 10.1136/amiajnl-2013-001681. Epub 2013 Sep 16. PMID: 24043318; PMCID: PMC3957383.
- d. **Zai AH**, Farr KM, Grant RW, Mort E, Ferris TG, Chueh HC. Queuing theory to guide the implementation of a heart failure inpatient registry program. *J Am Med Inform Assoc*. 2009 Jul-Aug;16(4):516-23. doi: 10.1197/jamia.M2977. Epub 2009 Apr 23. PMID: 19390108; PMCID: PMC2705255.

### 3. Linking patients at high-risk patients to appropriate interventions.

Most readmission predictive models traditionally provide a risk score as to how likely a patient is to be readmitted prematurely. However, few are designed to link the right patients to the appropriate intervention.

Patients at high risk for readmission should be provided with appropriate support services before or after discharge from the hospital to capitalize on the benefits of available interventions. However, given that the number of high-risk patients is large, the cost of services is high, and staffing constraints are ubiquitous, some services may only be available to a small subset of patients. Therefore, to best match patients and their problems to appropriate services, we need to understand why an algorithm labels patients as high-risk. Unfortunately, knowledge about patients has proven challenging to capture electronically, thereby making it difficult to use it as a readmission risk predictor. My work intends to capture that information with a predictive algorithm and develop a decision support tool that can sort patients along other dimensions (e.g., psychosocial) rather than just a biomedical one. By so doing, we believe that patients identified by such an algorithm will be better matched for high-intensity interventions that involve provider-patient interactions.

- a. Cronin PR, Greenwald JL, Crevensten GC, Chueh HC, **Zai AH**. Development and implementation of a real-time 30-day readmission predictive model. *AMIA Annu Symp Proc*. 2014 Nov 14;2014:424-31. PMID: 25954346; PMCID: PMC4419988.
- b. Wasfy JH, Strom JB, O'Brien C, **Zai AH**, Luttrell J, Kennedy KF, Spertus JA, Zelevinsky K, Normand SL, Mauri L, Yeh RW. Causes of short-term readmission after percutaneous coronary intervention. *Circ Cardiovasc Interv*. 2014 Feb;7(1):97-103. doi: 10.1161/CIRCINTERVENTIONS.113.000988. Epub 2014 Jan 14. PMID: 24425587.
- c. **Zai AH**, Ronquillo JG, Nieves R, Chueh HC, Kvedar JC, Jethwani K. Assessing hospital readmission risk factors in heart failure patients enrolled in a telemonitoring program. *Int J Telemed Appl*. 2013;2013:305819. doi: 10.1155/2013/305819. Epub 2013 Apr 27. PMID: 23710170; PMCID: PMC3655587.
- d. Watson AJ, O'Rourke J, Jethwani K, Cami A, Stern TA, Kvedar JC, Chueh HC, **Zai AH**. Linking electronic health record-extracted psychosocial data in real-time to risk of readmission for heart failure. *Psychosomatics*. 2011 Jul-Aug;52(4):319-27. doi: 10.1016/j.psych.2011.02.007. PMID: 21777714; PMCID: PMC4452280.

Complete List of Published Work on the PubMed website:

<https://www.ncbi.nlm.nih.gov/pubmed/?term=adrian+zai>