

BIOGRAPHICAL SKETCH

NAME	Kharrazi, Hadi H.K.		
eRA COMMONS	kharrazi		
POSITION TITLE	Associate Professor & Co-Director		
EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE	DATE	FIELD OF STUDY
Dalhousie University, Halifax, Canada	PhD	2008	Interdisciplinary (<i>Medicine/Computer Sciences</i>)
Dalhousie University, Halifax, Canada	MHI	2005	Health Informatics
TUMS-IUMS, Tehran, Iran	MD	2003	Medicine

(A) Personal Statement

Leadership: Dr. Kharrazi is the co-director of the Johns Hopkins Center for Population Health IT (CPHIT) at the Johns Hopkins School of Public Health, with a joint appointment at the School of Medicine. His research focuses on population health IT solutions that provide direct population-based decision support to providers, patients, and payers. His expertise includes assessing the needs and impact of health IT on care delivery, designing interoperable platforms for population health, developing and evaluating advanced predictive models for risk stratification using a diverse set of data sources (EHRs, claims, geo-social data), and evaluating new quality metrics across various denominators and healthcare workflows.

Research: Dr. Kharrazi has been the PI of several federal grants and contracts (e.g., ONC, AHRQ, CMS, VHA) with special focus on population health informatics. Within the context of population health IT, his research focuses on the application of informatics solutions to advance the science of population health analytics such as: evaluating the added-value of new sources of data (e.g., social determinants of health [SDoH]) in population health analytics; assessing challenges of data quality on population health studies; and, utilizing health information exchange infrastructure to develop population health analytic platforms (e.g., linking new data types and centralizing risk stratification efforts while addressing SDoH needs).

Teaching: Dr. Kharrazi also has an extensive record on education. He has developed more than a dozen courses in health informatics. He is the Co-PI of an ONC award to develop a national curriculum for population health informatics and train more than 9000 healthcare professionals nationally. He has been part of the NLM training programs, and, has participated in curriculum development of two certificate programs (funded by ONC) and one training module (funded by PCORI). He is currently the director of the DrPH Informatics track program at the Johns Hopkins School of Public Health, and the director of the PhD and MSc programs in Health Informatics at the Johns Hopkins School of Medicine.

Dr. Kharrazi has in-depth expertise with health information technology and population health informatics. In this project, Dr. Kharrazi will serve as a subject matter expert on population health IT and analytic concepts, and provide support with data type and data quality challenges. Following are sample publications supporting his expertise in population health IT, predictive modeling of utilization, and various data sources (e.g., claims and EHR data):

- [1] **Kharrazi H**, Chi W, et al. Comparing population-based risk-stratification model performance using data extracted from electronic health records versus administrative claims. *Med Care*. 2017; 55(8): 789-796
- [2] **Kharrazi H**, Chang HY, et al. Enhancing the prediction of healthcare costs and utilization by including outpatient BMI values to diagnosis-based risk models. *Med Care*. 2018; 56(12): 1042-1050.
- [3] **Kharrazi H**, Lasser E, Yasnoff WA, et al. A proposed national research and development agenda for

population health informatics: Summary recommendations from a national expert workshop. *J Am Med Inform Assoc*; 2017; 24(1): 2-12

- [4] **Kharrazi H**, Wang C, Scharfstein D. Prospective EHR-based clinical trials: The challenge of missing data. *J Gen Intern Med*. 2014; 29(7): 976-978

(B) Positions and Honors

■ **Positions and Employment**

2019 – Now Associate Professor

Johns Hopkins School of Public Health, Health Policy and Management (HPM)

Johns Hopkins School of Medicine, Division of Health Sciences and Informatics (DHSI)

Co-Director, Center for Population Health IT (CPHIT)

2012 – 2019 Assistant Professor

Johns Hopkins School of Public Health, Health Policy and Management (HPM)

■ **Other Experience and Professional Memberships**

2012 – Now Member, Academy Health (AH) (HIT Interest Group Advisory Committee)

2005 – Now Member, American Medical Informatics Association (AMIA) (PHI Executive Committee)

2009 – Now Member, National Institute of Health Informatics (NIHI), Canada

■ **Honors**

2019 – 2020 Technology Transfer Award #2, Johns Hopkins University

2017 – 2018 Technology Transfer Award #1, Johns Hopkins University

2013 – 2014 Faculty Innovation Fund Award, Johns Hopkins University

2005 – 2009 Canadian Institute of Health Research Award, Dalhousie University (Canada)

2003 – 2005 Nova Scotia Graduate Student Award, Dalhousie University (Canada)

(C) Contribution to Science

■ **Population Health Informatics – Risk Stratification**

My research focuses on the application and evaluation of informatics solutions within the context of population health. This emerging and rapidly growing domain of research and development is called “Population Health Informatics” (PHI). A key role of PHI is to improve the population health analytic cycle, which starts with data collection, followed by data preparation, data mining, model development & validation, knowledge sharing, and finally closing the process by a learning health system that applies these models and feeds new data back in the loop. I am specifically interested to assess the opportunities and challenges of integrating non-traditional data sources to improve population health analytics and eventually enhance public health interventions and outcomes.

My work has contributed to community health IT solutions, population-based decision support systems, and population-wide predictive models to forecast utilization and specific health outcomes (e.g., suicide death). Some of my work has been devoted to the research and development of the Johns Hopkins ACG (hopkinsacg.org), which is considered one of the top patient-level population-wide risk prediction solutions nationally and globally. The ACG system offers a unique approach to measuring morbidity that improves accuracy in evaluating provider performance, identifying patients at high risk, forecasting healthcare utilization and setting equitable payment rates. Billions of dollars per year are now routinely exchanged using ACGs in almost every U.S. State and in 16 + nations. Over 1100+ peer reviewed articles have been

published that apply and evaluate ACGs. Following are publications led by me further enhancing population risk stratification models:

- [1] Chang HY, Hatef E, Ma X, Weiner JP, **Kharrazi H**. Impact of Area Deprivation Index on the performance of claims-based risk adjustment models in predicting healthcare costs and utilization. *Popul Health Manag.* 2020; [in-press]
- [2] Chang H-Y, Kan HJ, Shermock KM, Alexander CG, Weiner JP, **Kharrazi H**. Integrating e-prescribing and pharmacy-claim data for predictive modeling: comparing costs and utilization of health plan members who fill their initial medications with those who do not. *J Manag Care Spec Pharm.* 2020 [in-press]
- [3] Lemke K, Gudzone KA, **Kharrazi H**, Weiner JP. Assessing markers from ambulatory laboratory tests for predicting high-risk patients. *Am J Manag Care.* 2018; 24(6) e190-e195
- [4] Chang HY, Richards TM, ..., **Kharrazi H**. Evaluating the impact of prescription fill rates on risk stratification model performance. *Med Care.* 2017; 55 (12): 1052-1060

■ **Population Health Informatics – Data Identification & Extraction**

Finding external data sources that can be merged with a given population-level data source is often a burdensome task. Systematically reviewing these data sources and developing “data catalogs” that can make them readily available to population health researchers is an approach to overcome this problem. Funded by AHRQ and NIH, I and my colleagues have devised a framework on how to systematically review data sources (not publications), what data specs should be coded, and how the data should be presented. Following are publications supporting the data identification efforts:

- [1] Bennett WL, ..., **Kharrazi H**, Stuart EA, et al. Methods for evaluating natural experiments in obesity: a systematic review. *Ann Intern Med.* 2018; 168(11) 791-800
- [2] Wilcox HC, **Kharrazi H**, Wilson RF, et al. Data linkage strategies to advance youth suicide prevention: a systematic review for a national institute of health pathways to prevention workshop. *Ann Intern Med.* 2016; 165 (11): 779-785

A major contribution of PHI to population health analytic is providing new methods to extract novel types of data from various data sources. For example, the free-text of EHR includes ample information about individual patients that can be used in risk stratification efforts; however, this extra information is often missing in encoded fields of EHRs. In a prior study we assessed the value of free-text in identifying geriatric syndromes (which are predictable for utilization). We also assessed how the physician's mention of frailty in the free-text is associated with this information. We are currently evaluating the added-value of free-text for social determinants of health as well as various predictors of suicide death. Following are list of publications supporting our data extraction methods for population health markers:

- [1] **Kharrazi H**, Anzaldi L, Hernandez L, Davison A, Boyd CM, Leff B, Kimura J, Weiner JP. Measuring the value of electronic health record's free text in identification of geriatric syndromes. *J Am Geriatr Soc.* 2018; 66(1) 1499-1507
- [2] Anzaldi LJ*, Davison A, ..., **Kharrazi H**. Comparing clinician descriptions of frailty and geriatric syndromes using electronic health records: a retrospective cohort study. *BMC Geriatrics.* 2017; 17(247) 1-7
- [3] Chen T, Dredze M, Weiner JP, ..., **Kharrazi H**. Extraction of geriatric syndromes from EHR's clinical notes: assessment of statistical natural language processing methods. *JMIR Med Inform.* 2019; 7(1): e13039
- [4] Hatef E, Rouhizadeh M, ..., **Kharrazi H**. Assessing the availability of social and behavioral determinants data in structured and unstructured EHRs: a retrospective analysis of a multi-level healthcare system. *JMIR Med Inform.* 2019; 7(3): e13802

■ **Social Determinants of Health**

I have extensively collaborated with experts in the social determinants of health (SDoH) domain. SDoH explains a large variation of healthcare outcomes including utilization and costs. My research has mainly focused on integrating individual or geographical-level SDoH with clinical data (e.g., EHRs or claims data) to improve the prediction of various outcomes such as hospitalization, emergency room admission, and medical cost. These efforts have led our research team to investigate potential biases in our predictive models of care (e.g., models being biased toward a specific race or socio-economic status of patients). We have also started to examine potential disparities in our modeling techniques. Following are some of the publications supporting my work in SDoH and population health:

- [1] Tan M, Hatef E, Taghipoor E, Vyas K, **Kharrazi H**, Gottlieb L, Weiner JP. Including social and behavioral determinants in predictive models: trends, challenges, and opportunities. *JMIR Med Inform*. 2020 [in-press]
- [2] Hatef E, **Kharrazi H**, Searle KM, et al. The association between neighborhood socioeconomic and housing characteristics with hospitalization: results of a national study of veterans. *J Am Board Fam Med*. 2019; 32(6) 890-903
- [3] Chen T, Dredze M, Weiner JP, **Kharrazi H**. Identifying vulnerable older adult populations by contextualizing geriatric syndrome information in clinical notes of EHRs. *J Am Med Inform Assoc*. 2019; 26(8-9): 787-795
- [4] Hatef E, Weiner JP, **Kharrazi H**. A public health perspective on using EHRs to address social determinants of health: The potential for a national system of local community health records in the United States. *Int J Med Inform*. 2019; 124: 86-89

■ **Public Health Informatics**

Population health IT/informatics overlaps considerably with public health. Prior to joining Johns Hopkins, my research at Indiana University was focused on the application of health IT innovation within the traditional public health research. My recent work in this area has propelled the notion of merging and/or “bridging” population health IT efforts and public health IT efforts:

- [1] **Kharrazi H**, Lehmann HP. Role of Population Health Informatics in Understanding Data, Information and Knowledge. In Joshi A (Ed.) *Population Health Informatics*. 2017; 65-89. Jones and Bartlett Learning. ISBN: 978-1-28-410396-0
- [2] Bae J, Ford EW, **Kharrazi H**, Huerta TR. Electronic medical record reminders and smoking cessation activities in primary care. *Addict Behav*. 2017; 16(77): 203-209
- [3] Karami A, Dahl AA, Turner-McGrievy G, **Kharrazi H**, Shaw JG. Characterizing diabetes, diet, exercise, and obesity comments on Twitter. *Int J Inf Manage*. 2017; 38: 1-6
- [4] **Kharrazi H**, Weiner JP. IT-enabled community health interventions: challenges, opportunities, and future directions. *Generating Evidence & Methods to Improve Patient Outcomes (eGEMs)*. 2014; 2 (3): 1-9

• **Complete List of Published Work in My Bibliography**

- PubMed: <https://www.ncbi.nlm.nih.gov/myncbi/10eHcnhXecnkr/bibliography/public/>
- All Publications (including ones not indexed by PubMed): <http://hkharrazi.com/?section=pub>

(D) Research Support

■ **Ongoing** (recent; only if served as PI or Co-PI)

- **Advancing Maryland's Statewide Suicide Data Warehouse to Improve Individual and Population-level Mortality Prediction and Prevention**
H. Kharrazi (PI) 2020 – 2024 NIMH (R01MH124724)
- **Assessing disparities in occurrence and outcomes of type 2 diabetes ADEs in minority populations using real world administrative claims and electronic health records**
H. Kharrazi (MPI) 2020 – 2022 FDA CERSI (5U01FD005942)
- **Developing and Assessing the Validity of Claims-based Indicators of Frailty & Functional Disabilities and Testing their Use in Other Data (EHRs and linked EHR-claims)**
H. Kharrazi (PI) 2020 – 2022 AHRQ ACTION-IV (2020.K72AS19.25505)
- **Behavioral, Social and Systems Science: Extracting Social Science Data from Epic Electronic Health Record System**
H. Kharrazi (PI) 2020 – 2020 NIH CTSA Nexus (UL1 TR001079)
- **Novel Predictive Model for Risk stratification of Congestive Heart Failure Patients at Discharge**
H. Kharrazi (PI) 2020 – 2021 Johns Hopkins Tech Transfer

■ **Completed** (selected; only if served as PI or Co-PI)

- **Development and Testing the Geo-Social [Risk Prediction and Visualization] Analytic Platform (GSAP)**
H. Kharrazi (PI) 2017 – 2020 DST Health & JHMI Solutions
- **Addressing Suicide Research Gaps: Understanding Mortality Outcomes in the Mid-Atlantic Region**
H. Kharrazi (PI), H. Wilcox (Co-PI) 2018 – 2020 NIMH (R56MH117560)
- **Analytical Framework to Project Utilization for VHA Veteran at the Population Level**
H. Kharrazi (PI), J. Wiener (Co-PI) 2014 – 2019 Veteran Health Administration
- **Baltimore Falls Reduction Initiative Engaging Neighborhoods and Data (B'FRIEND)**
H. Kharrazi (PI) 2016 – 2018 RWJF DASH & JHU inHealth
- **Workforce Training to Educate Health Care Professionals in Health Information Technology**
H. Kharrazi (Co-PI), H. Lehmann (MPI) 2015 – 2017 ONC Health IT (WF-WF-15-300)
- **A Community HIE-based Hospital Readmission Risk Prediction & Notification System**
H. Kharrazi (PI) 2013 – 2015 AHRQ (R21HS022578)
- **Evaluation of Stage 3 Meaningful Use Objectives among Eligible Hospitals**
H. Kharrazi (PI) 2013 – 2015 AHRQ ACTION-II RFTO #32
- **Utilizing Maryland's HIE to Prototype a Readmission Prediction Model**
H. Kharrazi (PI) 2013-2014 JHU Faculty Innovation Fund
- **Clinical Knowledge Hub - Conceptual Integration of Rules, Data Sets, and Queries**
H. Kharrazi (PI) 2010 – 2012 NLM (R01LM009897)