HEALTH
UNIVERSITY OF UTAH

Department of Biomedical Informatics

2021 Highlights

LETTER FROM THE CHAIR

As I wrap up my first year (well, almost a full year) of serving as your chair, I have been reflecting upon how we have continued to strive for excellence in our core missions of research and education regardless of the ever-changing world around us. Even though we are still navigating the COVID-19 pandemic and overcoming the challenges of working and teaching in a hybrid work environment, our commitment and dedication to train the next generation of biomedical informaticians as well as advance our field have remained unwavering. The following pages highlight these achievements over this past year as well as set the stage for more to come.

Thank you to our faculty, staff, and students for your perseverance in these trying and uncertain times and for your enthusiasm to conduct groundbreaking science. I am deeply grateful for your commitment and contribution this past year and entrusting me to serve by your side.

I am also proud of the translational science published by the DBMI community that unveils discoveries about SARS-CoV-2 distribution, progression, and treatments.

Yves Lussier, MD, FACMI

I am excited to see what is in store for 2022. We will be moving forward with our Strategic Initiatives to extend the reach and impact of our department over the coming years. These initiatives include expanding our education and training programs, broadening and augmenting our research portfolio, building upon our existing expertise with new faculty hires and promotions, and working closely with our local and national healthcare and industry partners to improve the health and wellness of our communities.

Cheers to a happy and healthy new year,
Yves

DBMI'S HOLIDAY SOCIAL ***December 2, 2021 at Squatters Pub***

RESEARCH

Our research portfolio covers a broad range of domains and applications including translational informatics, public and population health informatics, clinical research informatics, and clinical informatics. In 2021, we continued to expand our portfolio of grant funded research in collaboration with investigators throughout the University, the Utah community, and other institutions nationwide.

NEW GRANTS

- NIH/NIAID - Immuno-Genetic Basis for Human Disseminated Coccidioidomycosis (Galgiani and Lussier, MPIs). The genetic underpinning of Disseminated Coccidioidomycosis (DCM) will be investigated in ~400 subject with European and African ancestry using novel single-subject transcriptome analyses (N-of-1-pathways) informing targeted sequencing.
- NIH/NIAID - Systems-level genetic patterns underlying disseminated coccidioidomycosis in humans (Lussier, PI). Disseminated coccidioidomycosis (DCM) is a rare and potentially life-threatening consequence of infection by Coccidioides spp. We will be the first to conduct genome-wide pathway analyses (exome and GWAS) on the human genetic variants and complex patterns that underlie susceptibility to DCM, using DNA collected from over 500 people.
- National Institute of Child Health & Human Development - SCALE-UP Counts (Yelena Wu and David Wetter, MPIs; Del Fiol, co-I). In collaboration with school districts in Salt Lake County, this project aims to use text messaging and patient navigation interventions to increase the uptake of at-home Covid-19 testing and vaccination among school children and staff.
- NHGRI - Real-time genetic diagnosis at the point of care (Williams, PI [Geisinger]; Del Fiol, site PI; Kawamoto, co-I). In collaboration with Geisinger and Intermountain Healthcare, this project aims to investigate clinical decision support tools to allow clinicians to use genetic information for real time genetic diagnosis through dynamic virtual genetic panels.

Guilherme Del Fiol, MD, PhD
Vice-Chair, Research

- NCATS supplement - INCLUDE (Korenberg and Facelli, MPIs; Gouripeddi co-I). grant supplement to study cognitive disorders in Down syndrome pedigrees.
- NCATS National COVID Cohort Collaborative (N3C) Supplement (Facelli, site PI; Gouripeddi, co-I). Utah will contribute patient records according to the N3C specifications and train a Ph.D. student on N3C informatics methods to assure the continuous development of the translational science workforce.
- VAHSRD IIR - Enhancing Geriatric Pain Care with Contextual Patient Generated Data Profiles (Butler PI; Gibson co-I).The overall goal of this clinical trial is to examine strategies to improve the integration of patient generated data into clinical care for older veterans with chronic pain.
- Patient-Centered Outcomes Research Institute - CER-NET (O'Rorke, PI; Gouripeddi co-I).

Research, continued

- National Academy of Science/Medicine Healthy Longevity Catalyst Awards (Gouripeddi and Facelli, MPIs): Award to understand the Bidirectional Effects of Exposures and Aging.
- University of Utah/Meaningful Use - **S**urgical **C**omplication **OU**tcome **T**ool (SCOUT) (Bucher, PI; Gouripeddi, Hurdle, Facelli, Shi, co-Is). Implementation study using a natural language processing tool (SCOUT) to improve surgical complication detection from EHR data; reduce fatigue of chart review staff; and greatly increase the number of charts that can be reviewed per year without expanding review personnel.
- University of Utah - Emerging COVID-19/SARS-CoV-2 Research (Facelli and Gouripeddi, MPIs). Characterizing Local COVID-19 Emergent Phenomenon and Mitigation Using Computational Modeling.

CURRENT GRANTS

- NCATS – *SCALE-UP Utah* (Rachel Hess, David Wetter, Del Fiol, MPIs; Gibson, Kawamoto, co-Is). In collaboration with the University CCTS, the Huntsman Center for HOPE, the Utah Department of Health and the Association for Utah Community Health, the project aims to increase the uptake of COVID-19 testing among underserved communities across Utah using EHR and text-messaging interventions.
- CDC – *Colorectal Cancer Screening Community Program* (Del Fiol, PI; Gibson, co-I). In collaboration with the Huntsman Center for HOPE, the Utah Department of Health and the Association for Utah Community Health, the project aims to increase the uptake of colorectal cancer screening among underserved communities across Utah using multi-level interventions including provider reminders in the EHR, patient reminders via text-messaging, and provider feedback through quality reports.
- CDC- *Diabetes Prevention Program* (Gibson, PI) The aim of this trial is to test the real-world efficacy of Mobile 360° Videos and a motivational coaching approach known as Motivation and Problem Solving (MAPS) as scalable interventions to increase enrollment in the DPP. If effective, they have tremendous potential to be scaled up to help prevent diabetes nationwide. Data on DPP enrollment and 4-week engagement are the key outcomes of the study. In addition, data on the mechanisms of action, cost-effectiveness and scalability of the interventions will be collected.
- NIGMS - Timely Response to In-Hospital Deterioration Through Design of Actionable Augmented Intelligence (Melanie Wright [Idaho State], PI; Del Fiol, site PI; Abdelrahman, Kawamoto, co-Is). In collaboration with Idaho State and Duke University, the project aims to investigate human-centered artificial intelligence (AI) approaches to reduce harm from late response to sepsis and acute kidney injury, and generate design principles to ensure that AI solutions can be used effectively by clinicians to improve patient care.
- NCCIH – Nonpharmacologic Pain Management in FQHC Primary Care Clinics (Julie Fritz, PI; Gibson, Del Fiol, co-Is). In collaboration with the Huntsman Center for HOPE and the Association for Utah Community Health, the goal of this project to identify effective strategies for providing nonpharmacologic alternatives to opioid pain management for patients with back

Facts 2021

- 11 Research Faculty
- 46 Grants & Contracts
- $3,601,566 Research Expenditures
- 124 Publications
- 11 Publications/faculty
- 28 Mean H-Index
- 10,439 Citations

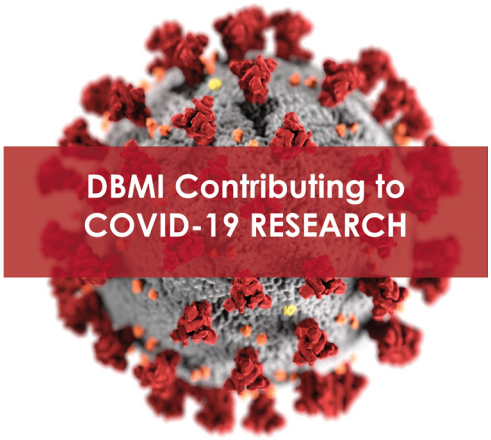
pain in low income and rural communities using telehealth solutions.

- *NIH - Promoting Real World Implementation of an Evidence-Based Weight Management Intervention in Primary Care* (Molly Conroy, Kawamoto, MPIs; Weir, co-I). This project will implement an innovative, EHR-facilitated weight loss maintenance intervention (MAINTAIN PRIME) using existing clinical resources and evaluated for its real-world impact. MAINTAIN PRIME will be conducted in 14 primary care practices affiliated with the University of Utah and will capitalize on advances in health IT and team-based care models to deliver the intervention with minimal support from research staff.
- *NIMH-R01 – Prediction of suicide death using EHR and polygenic risk scores* (Jyotishman Pathak, PI [Cornell], Hilary Coon Site-PI, Abdelrahman Co-I). Use machine learning methods to develop risk models of suicide death vs. suicide attempt in two large, population-ascertained samples. Data resources will include comprehensive electronic health records, demographics, familial risks, autopsy records, and polygenic risks.
- *NRF, Korea - Machine learning-based approaches to functionally annotate genetic variants in Alzheimer's disease* (Younghee Lee, PI). This project will implement a machine learning method that predict an mRNA expression with genetic variant information. It will also contribute to annotate a function of unknown genetic variants.
- ITP, Korea – Incheon 200G project: Build of a life-log based personal health data (Younghee Lee, PI). In the collaboration with the Eone Diagnomics Genome Center and Inha University hospital, Korea, University of Utah Asia campus Department of Biomedical Informatics will build an integrative dataset of personal health records comprising genetic data, lifelog data, and annual health checkup data from 200 healthy individuals. This data will be a valuable resource for predicting genetic and non-genetic factor affecting a health and identifying a personal risk factor for a health.
- Gordon and Betty Moore Foundation (Barbara Jones, PI; Weir, co-I). Development of a machine learning tool to provide feedback to physicians on diagnostic accuracy in the ED for pneumonia.
- VA HSR&D IIR – *Continuous Wearable Monitoring Analytic to Improve Outcomes in Heart Failure – Link-HF2 Multicenter Implementation Study* (Josef Stehlik, PI; Weir, Co-I). The study evaluates the implementation of a wearable telemetry device that collects and physiological data and uses a predictive algorithm to alert providers. The goal is to avert hospitalizations through early intervention.
- AHRQ U18 – *EHR-integrated lung cancer shared decision making* (Kawamoto, PI; Del Fiol, Kukhareva, co-Is). In collaboration with Population Health Sciences (Angie Fagerlin) and University of Michigan (Tanner Caverly), the project aims to investigate the effect of a SMART on FHIR app on shared decision making for lung cancer screening. The app is available for free on the Epic App Orchard and is being deployed across multiple health systems.
- NIA R03 (Younghee Lee, PI) *Integration Analysis of Alternative Splicing in Alzheimer's Disease*. The focus is targeting alternative splicing by integrating multi-omics and AD-related endophenotype data to identify new therapeutic targets and diagnostics.
- Huntsman Cancer Institute Seed grant (Younghee Lee, PI) *Develop a splicing decision model to identify functionally actionable cancer-specific somatic and rare germline variants.*
- PCORI *QuitSmart Utah* in collaboration with the Huntsman Cancer Institute (David Wetter, PI; Del Fiol, Gibson, and Kawamoto, co-Is). Through a randomized controlled trial, the study is assessing the effect of CDS interventions for tobacco cessation in federally qualified health centers that provide care for underserved communities throughout Utah.
- U24 NCI (Del Fiol and Kawamoto, MPIs) focused on population-based CDS to identify patients who meet guideline-based

criteria for genetic evaluation of breast and colorectal cancer risk based on family history documentation in the EHR. Collaborators include DBMI (Charlene Weir), Huntsman Cancer Institute (Josh Schiffman, Wendy Kohlmann), Internal Medicine (Rachel Hess, Michael Flynn), and Intermountain (Pallavi Ranade).

- U01 NCI – BRIDGE Trial in collaboration with the Huntsman Cancer Institute (Kim Kaphingst & Saundra Buys, MPIs; Kawamoto and Del Fiol, co-Is). BRIDGE is a multi-site randomized controlled trial (University of Utah and NYU) investigating automated conversational agent for education and outreach for patients who meet guideline-based criteria for genetic evaluation of hereditary breast, ovarian and colorectal cancer. The study leverages infrastructure enabled by the NCI U24 grant above led by PIs Del Fiol and Kawamoto.
- University of Utah CCTS (Facelli and Gouripeddi, co-Is). A large focus of the Department in the last 10 years has been on providing informatics support to clinical translational research and conducting research on translational informatics. We play a central role in all four arms of the CCTS.
- NHGRI center grant awarded to UNC Chapel Hill, Geisinger, ACMG, Kaiser Permanente, and the University of Utah (Jonathan Berg, PI [UNC Chapel Hill]; Karen Eilbeck, site PI). ClinGen aims to build an authoritative resource that defines the clinical relevance of genes and variants for use in precision medicine and research. The DBMI sub award focuses on providing tools and curation to integrate clinical and genomic knowledge for the ClinGen Resource with EHR systems.
- NCATS Recruitment Innovation Center (Paul Harris [Vanderbilt], PI; Gouripeddi, site PI; Facelli and Del Fiol, co-Is) focused on methods and resources to improve clinical trial education, recruitment, and enrollment.
- HITACHI (Kawamoto and Weir, PIs) *Clinical Decision Support System* (CDSS) to Optimize Disease Management. This project is evaluating the impact of providing personalized pharmacotherapy outcome predictions within the EHR using the SMART on FHIR interoperability framework.
- R01 NHGRI (Eilbeck, PI) *Community Driven Framework for Genome Based Clinical Diagnostics.* This grant provides novel algorithms to define sequence variants and by developing file formats and software to communicate this information, using guidance from the clinical diagnostic community.
- T32 NIDDK (Eilbeck, Fisher, PIs) Interdisciplinary Training Program in Computational Approaches in Diabetes and Metabolism Research. The focus is to provide students with funding for stipend, travel, insurance and training related expenditures to further their training programs.
- T15 NLM (Eilbeck, PI) Biomedical Informatics Training Grant. The focus is to provide students with funding for stipend, travel, insurance and training related expenditures to further their training programs.
- T15 Supplement (Eilbeck, PI) Biomedical Informatics Training Grant Supplement.
- T15 SPUR Supplement (Eilbeck, Facelli, PIs). Biomedical Informatics Training Grant Supplement –SPUR.
- ECHO Supplement (Facelli, site PI) Utah Center for Clinical and Translational Science UL1 Supplement. National Institute Center for Advancing Translational Science.
- Helping End Addition Longterm (HEAL) initiative Pain Management Effectiveness Research Network (HEAL-ERN), supplement to the Trial Innovation Network (Dean, PI). Informatics focus is data harmonization across HEAL initiatives NIH-wide. (Informatics team is Sward co-I; Gouripeddi, Guo, Staes collaborators).
- NIA - Less is More: Context-Relevant Views of EHRs: (Boxwala, PI; Weir, site PI). The focus is to develop technology to create context-relevant views of EHRs for hospitalists.
- AHRQ - Improving Patient Safety and Clinical Cognitive Support through eMAR Redesign (Weir, Site PI)

Our faculty continue to contribute to the University of Utah's research goal to create a brighter future for all of us. See what some of our faculty are doing (DBMI faculty are bolded):



1. **Mistry S, Gouripeddi R, Facelli JC**. Data-driven identification of temporal glucose patterns in a large cohort of nondiabetic patients with COVID-19 using time-series clustering, JAMIA Open, Volume 4, Issue 3, July 2021.

2. Li H, Baldwin E, Zhang X, **Kenost C**, Luo W, Calhoun EA, An L, Bennett CL, **Lussier YA**. Comparison and impact of COVID-19 for patients with cancer: a survival analysis of fatality rate controlling for age, sex and cancer type. BMJ Health Care Inform. 2021 May;28(1):e100341.

3. Wang Y, Li B, **Gouripeddi R, Facelli JC.** Human activity pattern implications for modeling SARS-CoV-2 transmission. Comput Methods Programs Biomed. 2021;199:105896.

4. Chang EH, Willis AL, Romanoski CE, Cusanovich DA, **Pouladi N**, **Li J, Lussier YA**, Martinez FD. Rhinovirus Infections in Individuals with Asthma Increase ACE2 Expression and Cytokine Pathways Implicated in COVID-19. Am J Respir Crit Care Med. 2020 Sep 1;202(5):753-755.

So What? A Tribute to Dr. Reed M. Gardner, PhD, FACMI

by R. Scott Evans, MS, PhD, FACMI
(excerpt from the Applied Clinical Informatics Journal; 12:179-181)

Background

Dr. Reed M. Gardner, PhD, FACMI, a pioneer and noted international leader in the field of Medical Informatics passed away on November 27, 2020. Dr. Gardner earned a Bachelor of Science in electrical engineering in 1960 and a PhD in Biophysics and Bioengineering in 1968 from the University of Utah, United States. He was one of the first graduate students of Dr. HomerWarner and after graduation continued to work with Dr. Warner at LDS Hospital in Salt Lake City, Utah. He later served as co-director of the Medical Informatics department at LDS Hospital in the late 1980s and early 1990s while Dr. Warner continued as chair of the Department of Medical Informatics at the University of Utah. After Dr.Warner retired, Dr. Gardner became the Chair of the Department ofMedical Informatics at the University of Utah from 1996 to 2005. After retiring in 2005, Dr. Gardner continued to participate in projects, reviewed submitted publications for various peer reviewed journals, and was a valued contributor to books.

Personal Contributions

Dr. Gardner was one of the principal developers and evaluators of one of the first electronic medical records known as the HELP System (Health Evaluation through Logical Processing). Early in his career, he independently developed an innovative new arterial line pressure sensor but did not pursue the patent. He also helped standardize pulmonary function testing, monitoring cardiac output and spirometry in intensive care units (ICUs), use of clinical decision support in the ICU, helped move from hard copy radiology film to a picture archiving and communication system (PACS), computer alerts for laboratory data, computerized blood ordering and helped develop the early Medical Information Bus used in ICUs to pull data from patient monitors and other medical equipment into the EMR. Dr. Gardner was active in public policy, helped build the nation's electronic health record interoperability policies, and was active in standards development. He supported security for patient data in the EMR and helped implement early password

protection. After a visit to Kenya, he also became interested in the evolution and necessity of EMR use in third-world countries using OpenMRS.

International and National Contribution to the Field

During his career, Dr. Gardner was a sought-after visiting professor at leading academic medical centers around the world and a frequent presenter and panel expert at many national and international meetings, and was known for his substantial expertise, enthusiasm, and communication skills. He had extensive and innovative academic and research interests including hospital informatics systems, computerized medical decision-making, and clinical decision support, computerization of critical care, automation of clinical processes, medical informatics education, and public health informatics.

Dr. Gardner served 8 years on the American Medical Informatics Association (AMIA) Board of Directors and was AMIA President from1996 to 1997. In 1997, the U.S. Food and Drug Association (FDA) was thinking of regulating CDS as medical devices. Dr. Gardner is one of the authors and instigators of AMIA's recommendation for a risk-based approach to regulation of clinical software through the use of local software oversight committees to monitor CDS. The AMIA proposal was accepted by the FDA and still guides the regulatory approach today. Dr. Gardner was also an influential and a driving force behind the development of the board certification in Clinical Informatics for physicians through the American Board of Preventive Medicine. He served as chair of the Core Content committee, and the resulting document still serves as the study guide for the Clinical Informatics Board Exam. Former Utah governor and subsequent secretary of the Health and Human Services in the U.S. Mike Leavitt attributed his interest in health information technology to numerous conversations he had with Dr. Gardner. Mr. Leavitt then supported the creation of the Office of the National Coordinator for health care technology and early efforts that laid the foundation for Health Information Technology for Economic and Clinical Health Act. In 2005, Dr. Gardner was the recipient of the Morris Collen Award, which is the highest award given by the American College of Medical Informatics. He continued to serve on several editorial boards of informatics and clinical journals and in 2006 received the Legacy of Life Award for Scientific Achievement from the Intermountain Health Care Research and Medical Foundation.

Teacher and Mentor

Dr. Gardner was a colleague in Informatics Education in Health care and in 1998 was instrumental in getting the University of Utah as one of the charter members of International Partnership of Health Informatics Education. The other charter members were the University of Amsterdam, Netherlands, Universities in Heidelberg/Heilbronn, Germany, University of Minnesota, US, the University for Health Informatics and Technology Tyrol, Austria and the University of Washington in Seattle, United States. This partnership grew out of the 1996 idea at the University of Amsterdam that teaching programs should be "internationalized" and stimulate students to carry out part of their studies at universities abroad, with the aim to become more aware of the increasingly important international environment.

Moreover, Dr. Gardner was influential in interesting many people inmedical informatics along with encouraging graduate students and young colleagues to do good research. No matter how good you thought your manuscript or dissertation was, you knew it would return marked up with his "red pen" that was always in his shirt pocket. Every project proposal or idea would be open to a discussion based on whether it was sound science and the inevitable question "so what?"; meaning how would it improve patient care and how would you prove it? He was raised on a sheep farm and if your explanation was not precise, he would say "you've got to explain that better for an old sheepherder like me." While he combined a tough critique and tireless efforts

to get work as precise as possible, he provided constant encouragement and stimulated all to improve their work. He was generous with his time and attention and when timelines got close, he could be seen giving graduate students and colleagues feedback on a manuscript or project at his kitchen table in the evening. He knew how to get people involved and get approval from hospital administrators and said medical informatics is 10% technology and 90% sociology. Colleagues and former students have related on how his contributions have enhanced the scientific and educational rigor of Medical Informatics, how he promoted and expected academic freedom and scholarly debate and understood how engineering could help transform medicine. Dr. Gardner's work is proof of the impact of our field on medicine and we all valued his pragmatic approach and his focus on the fundamentals.

Many of his colleagues wonder if there is anyone in the field of Medical Informatics that he did not touch. In 2005, the annual University of Utah's Dr. Reed M. Gardner Award for Faculty Excellence was established to acknowledge the contributions of faculty members to the Department of Biomedical Informatics and Nursing Informatics. The award was created by students to acknowledge the achievements of faculty members in the areas of teaching, mentoring, and service to the departments. Dr. Gardner will be sorely missed. His legacy in helping to expand the impact of the first department of biomedical informatics in a school of medicine in the United States and his innovation in the field will continue. This tribute to Dr. Gardner is based on many memories and comments collected from his colleagues and former graduate students.

Multiple Choice Questions

1. Which of Dr. Reed Gardner's contributions still serves as a regulatory approach today?
   a. The methods to develop electronic medical records.
   b. Standards used for pulmonary function testing.
   c. Recommendation for regulation of clinical software through the use of local software oversight committees.
   d. Computerized blood ordering.

Correct Answer: Option c is the correct answer. This proposal drafted by Dr. Gardner for AMIA was accepted by the U.S. Food and Drug Association and still guides the regulatory approach today.

2. Dr. Reed Gardner's "inevitable question" about a project referred to?
   a. Would the project be worth the time and cost to develop it?
   b. Would it improve patient care and how would you prove it?
   c. Would the project be supported by hospital administration?
   d. Would the project be generalizable?

Correct Answer: Option b is the correct answer. Dr. Gardner's "So what" question referred to could you prove it improved patient care.

We Bid a Fond Farewell to Mike Conway

We were sad to say goodbye to Dr. Mike Conway this fall as he set sail for Australia. A member of our department since 2014, Mike had restructured the hands-on component in our public health informatics course and had many collaborations across the health campus and beyond. He has taken a position as a senior lecturer in digital health at the University of Melbourne Computer Science Department. After a couple of weeks in quarantine he has settled into his new role. We wish him all the best in this new endeavor.

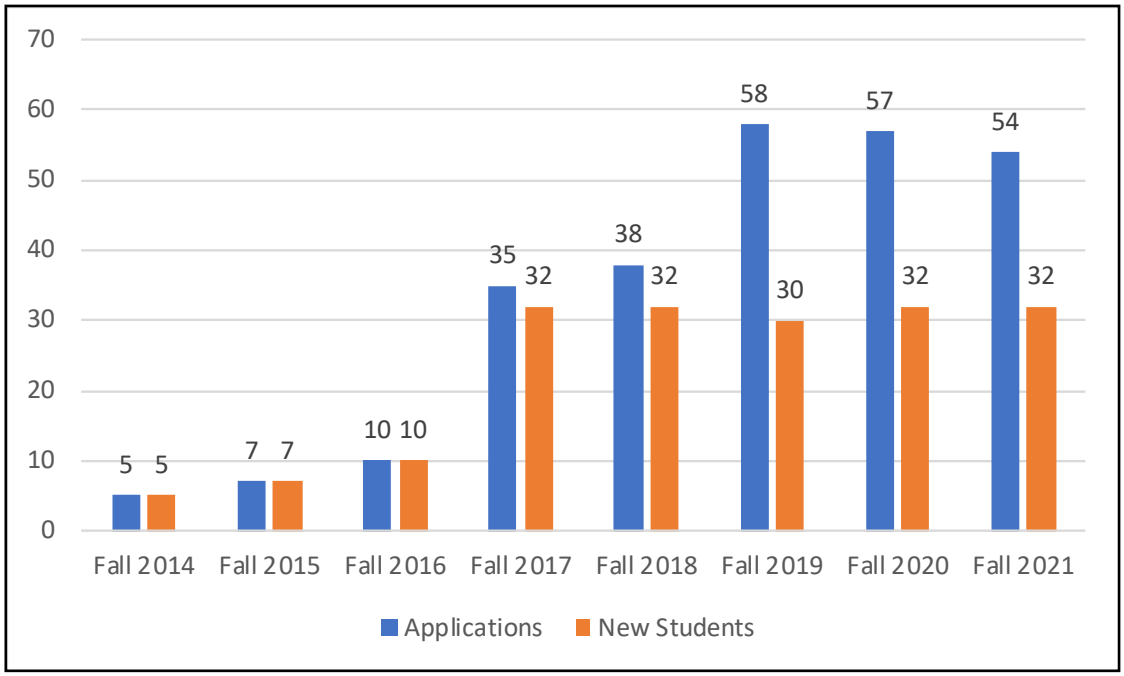
EDUCATION

MS PROGRAM

We are excited with the quality and breadth of our Masters' students cohort again this year. Despite an unusual year, with recruitment occuring remotely, we have 69 students enrolled in the program, 54 applicants applied last fall and again, 32 were accepted after a rigorous admission process. See graphic below with the progression in the last seven years.

Karen Eilbeck, MSc,PhD
Vice-Chair, Education

NTMS ADMISSION PROGRESSION



PHD PROGRAM

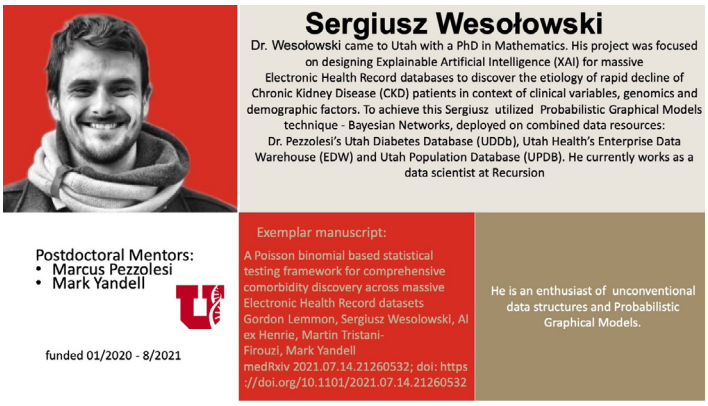
21 PhD students and four postdoctoral trainees are participating in our programs. We have 2 training grants that support student lead research. We also have several dual-mentored students who are embedded in research labs.

TRAINING GRANTS

The Computational Approaches to Diabetes and Metabolism Research (CADMR) was awarded in July for another 5 years. This is a dual mentored program for 3 predocs and 2 postdocs. We are currently appointing two new postdocs who will begin in January and will be recruiting for 3 new predocs this coming summer.

TRAINEE HIGHLIGHT

Sergiusz Wesołowski recently finished his CADMR sponsored training and has taken a data scientist position at Recursion in Salt Lake City. His manuscript is currently in press at PLoS Digital Health. An Explainable Artificial Intelligence Approach for Predicting Cardiovascular Outcomes using Electronic Health Records. Sergiusz Wesolowski; Gordon Lemmon; Edgar Hernandez; Alex Henrie; Thomas Miller; Derek Weyhrauch; Michael Puchalski; Bruce Bray; Rashmee Shah; Vikrant Deshmukh; Rebecca Delaney; Joseph Yost; Karen Eilbeck; Martin Tristani-Firouzi; Mark Yandell.



The **NLM Training grant,** in its 25th year in the department, went up for renewal in May and we are optimistic to see a further 5 years of funding. This is a vital program in the department that supports predoctoral and postdoctoral trainees for up to 4 years of education. This year the training grant conference was again virtual, this time hosted by the University of Washington. Seven of our trainees presented at this forum, listed below:

- Michael Watkins. ResultsMyWay: combining FHIR, CQL, and informational resources to create a newborn screening application
- Jay Kitt. Investigation of the Link between Air Pollution, Sleep Apnea, and Underlying Pulmonary Disorders
- Amber Kiser. Improving Model Transferability in Electronic Health Record Data
- Ryzen Benson. Assessing role of smoking in colorectal polyp risk using natural language processing
- Peter Taber. A Sampling Method and Preliminary Taxonomy for COVID-19 Public Health Guidance
- John Chamberlin. Mitigation of sample-specific biases in single cell- and nucleus-RNA-seq
- Sejal Mistry. Clustering Environmental Triggers of Pediatric Type 1 Diabetes Mellitus

DBMI Reaches 500+ Graduates Milestone

Our department has reached a new milestone in educating over 500 Phd and MS students (521 grads to be exact)! We currently have 3 MD/PhD students, 18 PhD students, and 69 MS students.

Granting our first informatics PhD in the United States in 1965, we have graduated more PhDs than any other program in the world. Our department has also granted more MD/PhDs than any other department in the University of Utah's School of Medicine.

Kudos go to our education team, Dr. Damian Borbolla, Dr. Karen Eilbeck, Barb Saffel, Robert Barber and Shiva Sanavi who work hard to elevate our students' educational experience! Congratulations!

OTHER TRAINING GRANT NEWS

Our student Jared Anderson (PI: Tracey Lamb, Pathology) won a slot on the School of Medicine's Immunology Training Grant. Jared is developing bioinformatics tools for single cell RNA seq to explore the immune response to malaria. He has developed a new algorithm he has called "SpliceCluster" to resolve phenotypically similar immune cell subsets.

GRADUATION 2021

After a year off, convocation happened in May. Drs Lussier, Eilbeck and Borbolla supported our graduates and posed for photos afterwards. All of our graduates are employed, some highlighted below.

- Rey Johnson graduated with a MS and now is working for Project Ronin, a cancer intelligence platform. He presented in our business seminar and now is looking forward to keeping the connection with our department by joining our IAB and hiring our graduates.
- Jennifer Hales, a respiratory therapist, graduated with a MS and now is working for the Epic team in our Health system.
- Kyle Cornwall, a software engineer, graduated with his MS and is currently Clinical Data and Analytics Director at b.well Connected Health.
- Phung Matthews, a PharmD, graduated with an MS and became a clinical informatics analyst at 3M.
- Andreas Martinson, BA accounting, graduated with his MS and is now employed as a data analyst at Castel.

From left to right: Truc Thuy Vuong, Phung Matthews, Michael Watkins, Karen Eilbeck, Yves Lussier, Adam Rich, Camille Whicker, Jennifer Hales, Rey Johnson, Kyle Cornwall, Andreas Martinson, Damian Borbolla

- Michael Watkins defended his PhD in August and has taken a postdoctoral position at the University of Chicago.
- Truc Thuy Vuong, a biologist graduated with an MS and is now working towards her PhD in Indiana.

DBMI BY THE NUMBERS

Current MS Students
58 (on campus)
12 (online)

Current PhD Students
21 PhD
2 PostDoc

2021 Graduates
23 MS
4 PhD

Alumni
521

AMIA LIEAF MEETING

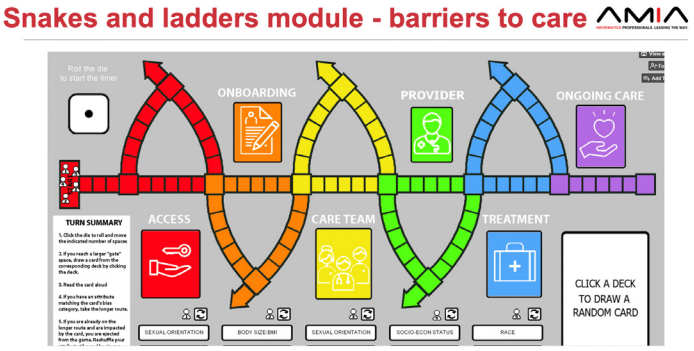
This year the AMIA Educator Forum meeting transitioned into the Learning Informatics and Education Academic Forum (LIEAF) and met in San Diego before the main AMIA Symposium. DBMI and partners made a splash with several well attended talks and panels.

Panel: Four Weddings and No Funeral

Damian Borbolla, Karen Eilbeck, Keaton Morgan, and Catherine Staes discussed how four distinct informatics programs work together to educate trainees for diverse backgrounds. In keeping with the wedding theme, the panelists wore vintage wedding hats much to the amusement of the audience.

Ignite Talk

Health System Science provides an opportunity for informatics education within the medical school. Karen Eilbeck presented work with Damian Borbolla about game-based modules for



Health System Science education, using disparity in healthcare as the domain problem.
AMIA accreditation subcommittee: Damian Borbolla presented: Delineation of Practice and Foundational Domains: Tools for Seeking Alignment (https://amia.org/education-events/linking-informatics-and-education-academic-forum-lieaf/delineation-practice-and)

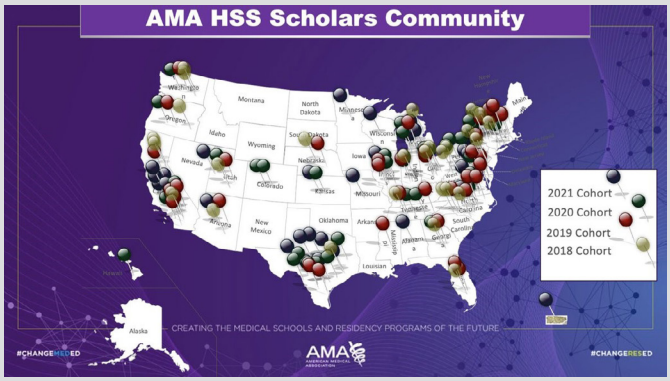
Finally, Damian Borbolla was nominated to be chair of the AMIA academic forum and Karen Eilbeck was nominated to be a member at large. Both were surprised and honored to be approached by the nomination committee.

UNDERGRADUATE MEDICAL EDUCATION

DBMI faculty are actively engaged in medical education. We have 7 core educators who have taken on diverse educational roles within the School of Medicine.
Course Director Karen Eilbeck Co-directs Host and Defense
Domain Expert for Informatics: Damian Borbolla and Karen Eilbeck split this role.
Case Based Learning Facilitator: Julio Facelli, Bernie LaSalle, Ram Gouripeddi, Karen Eilbeck, Damian Borbolla, Bryan Gibson, Bruce Bray.
Our faculty members guide medical students through every course in the first 2 years of the curriculum.
Layers of Medicine Facilitator: Bryan Gibson.
Chair Elect of the School of Medicine Curriculum Committee: Karen Eilbeck

FACULTY HIGHLIGHT: Damian Borbolla

- AMA Scholar. He graduated from the American Medical Association Health System Science Scholar Program, there are only 4 scholars from Utah.
- MedEdMorphosis is a system wide refresh of medical education at our institution. While several of our faculty participated in the MedEdMorphosis initiative, Damian led one of the 'envisioning the forest' working groups to develop proposals to improve diversity and support.
- He led a team to develop and deploy Health System Science modules to medical students and mentored medical student Steven Grossen to present this work at the AMA ChangeMedEd conference.



CURRICULUM COMMITTEE UPDATES

With support from the Epic team and the expertise of DBMI instructors, Damian Borbolla, Keaton Morgan and Casey Rommel, we have deployed a teaching instance of Epic. This tool was implemented this past fall in BMI 6010 Foundations of Healthcare. Students used Epic to learn how to navigate the medical record to find relevant patient information, document clinical encounters and build Clinical Decision support roles (BPas). Students really enjoyed the activities, and we are hoping to incorporate Epic in other courses in the future.

DBMI offered a course in Deep Learning for the first time in 2021. Dr. Samir Abdelrahman developed and taught the course with very positive feedback from the students. The course has been added to the Data Science track in the MS program. We are also happy to tell you that these courses are now electives for the Data Science Program on main campus highlighting our OneU mindset.

THE EDUCATION ADMIN TEAM

Thank you to Barb Saffel, Robert Barber and Shiva Sanafi for the amazing support they give our department.

Reed Gardner Award for Faculty Excellence

We're proud to announce the winners of the Reed M. Gardner Award for Faculty Excellence for 2020 and 2021. This award was created by the students in the Departments of Biomedical Informatics and Nursing Informatics to acknowledge the achievements of faculty members in the areas of teaching, mentoring, and service to the departments and is a competitive nomination and decision process.

We are pleased to acknowledge Catherine Staes as the winner for 2021. As she stated when told, "I really value my role as an educator and want to build up the next generation." She is a valued member of our education team!

In addition, our last year's winner for 2020 is Damian Borbolla. Unfortunately, the pandemic hit at just the time when the students voted on the winner so this wasn't awarded to Dr. Borbolla at that time. Dr. Borbolla is another very valued member of our faculty. When he was told that he received this award, his response was, "this is a great honor, the best award I received in my professional career."

Congratulations to Drs. Staes and Borbolla. They represent our faculty well!

Diving into Problem Solving in the Informatics Way

Francine Stirling loves to get creative. Whether it's finding time to read a good book while staying busy as a mom to three children or juggling full-time work with the challenge of completing graduate school, Stirling thrives on finding solutions.

Stirling spent ten years as an academic program manager for three different departments at the University of Utah, working with students to advance their educational and professional goals. Stirling created curriculum and led advising efforts for the Professional Science and Technology Program, the PhD Bioscience Program, and the Biomedical Informatics Department. In these areas, she was surrounded by the latest curriculum and exciting advancements in programming, medical data science, and other information technologies. Eventually, she took note of the encouragement she gave others, and decided to begin her own master's program in the Department of Biomedical Informatics (DBMI).

Working with a wide variety of students and faculty in different specialties, managing team members, and developing complex courses of study meant Stirling already had credible career experience. Her familiarity with classes and requirements needed in the DBMI's master's program gave her an edge, but she didn't feel like she needed a purely scientific background to be successful. While many of her classmates came from science-based majors, her education in communications, and professional management skills, proved to be equal assets.

"A bachelor's degree is important, but it doesn't need to be rooted in technology or science," Stirling explains. "I felt like my perspective added a lot of value."

Stirling initially worried that her technical knowledge might be too weak to excel in her courses, but the curriculum in her track quickly brought her up to speed.

"Your strengths balance your weaknesses," Stirling explains. "My background helped me see things in a different light, and I felt my curiosity kick in to tackle the areas I knew less about."

The program, much like the data technology industry itself, is nimble. Students can choose from different tracks best suited to their needs and interests.

Stirling opted for the clinical informatics track, which is a broader area of study. According to Damian Borbolla, MD, MS, and director of the DBMI master's program, this track gives students a solid knowledge base applicable to many areas in the field such as health systems, information technology companies, and biotech industries. Students build upon foundational skills like database design, clinical decision support, leadership, and health care standards. They leave the program primed to contribute to a workforce focused on data improvement.

The hybrid learning mode featuring both online and in-person classes was an ideal balance of engagement and flexibility for Stirling.

"The way this master's program is set up is really accommodating for non-traditional students or those working full-time," Stirling says. "Making this advancement wouldn't have been an option if I'd had to go to class during the day."

To view the entire article, please see HERE.

CLINICAL OPERATIONS

Faculty, fellows, and staff in the Department collaborate closely with clinical stakeholders at the University of Utah and beyond to improve patient care and the provider experience. Some highlights of the Department's engagement in clinical operations are described below.

REIMAGINE EHR INITIATIVE

The University's ReImagine EHR initiative continues to be a national leader in the design, development, implementation, and evaluation of interoperable digital innovations that are integrated with the EHR to improve patient care and the provider experience (https://reimagineehr.utah.edu/). Dr. Ken Kawamoto, Vice-Chair for Clinical Operations and Associate Chief Medical Information Officer for the health system, leads this initiative in close collaboration with a number of faculty, fellows, staff, and operational leaders across the University of Utah, including Drs. Guilherme Del Fiol, Charlene Weir, Damian Borbolla, Bryan Gibson, Bruce Bray, Polina Kukhareva, Teresa Taft, Keaton Morgan, Rick Bradshaw, Salvador Rodriguez, Emerson Borsato, and Doug Martin in the Department. The ReImagine EHR initiative has implemented over 10 standards-based, EHR-integrated solutions. An overview of the ReImagine EHR initiative and key projects is available in JAMIA Open at https://academic.oup.com/jamiaopen/article/4/3/ooab041/6333015. Many of the efforts that are a part of this initiative are supported by research grants and are described in the Research section of the newsletter.

RESIDENT INFORMATICS PROGRAM

The Resident Informatics Program is an institution-wide education program that aims to teach resident physicians the fundamental knowledge and skills of clinical informatics. The program was created in 2021 by Dr. Keaton Morgan during the last year of his National Library of Medicine postdoctoral fellowship. Keaton has since transitioned to faculty and continues to lead the program. To date, the program has had 22 residents from 8 different medical specialties participate. New this academic year was the creation of the Innovation Track. This specialized track is supported by DBMI and focuses on health IT innovation. Resident physicians in the track collaborate with DBMI faculty and students to create a health IT product. There are two participants in the Innovation Track this year.

Kensaku Kawamoto, MD, PhD, MHS Vice-Chair, Clinical Operations

NOTABLE RECOGNITIONS

Notable recognition and achievement in the clinical informatics realm over the past year include the following:

- The ReImagine EHR initiative's Disease Manager SMART on FHIR application won First Place in the AMIA/HL7 FHIR® Applications Showcase at the AMIA 2021 Annual Meeting.
- Continued success in securing grants in clinical informatics, including a number of the grants listed in the Research section of the newsletter.

INDUSTRY ADVISORY BOARD

IABtalks

In 2021, we continued to host our IABtalks event virtually in April and in October. The engagement during the presentations continued to be very successful but the opportunity to network and visit with other attendees was sorely missed. We don't know when we'll get back to life as we knew it before the pandemic but hope that we can continue to present interesting and thoughtful presentations to our students, industry and government professionals in the biomedical informatics field.

In April, Dr. Benjamin Zaniello, the Chief Medical Officer at Collective Medical presented, "Healthcare Informatics IRL: Insights, Opportunities, Pitfalls". In October, Rob Reynolds, COO, and Bryn Rhodes, CTO, both from Alphora, presented, "HL7® FHIR® & Clinical Decision Support". We were also delighted to hear from our own faculty members, Drs. Ken Kawaoto and Guilherme Del Fiol who discussed their work for the ReImagine EHR initiative at the University of Utah Health. At both events, we heard from a panel of students highlighting their experiences.

Growth of the IAB

The IAB continues to draw companies and organizations from Utah and nationally. We currently have 31 companies/organizations that partner with our department with several more in the pipeline. They are all enthusiastic supporters of the IAB's mission of building relationships between industry and academics to advance biomedical informatics.

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Inherent
Intermountain Healthcare
INTEROPION
PathNet
Redstone
RŌNIN Cancer intelligence for the N of 1
SafeLane Health technology @ work
SALT LAKE COUNTY HEALTH DEPARTMENT
STRATAMETRICS
HEALTH PLANS UNIVERSITY OF UTAH
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EQUITY, DIVERSITY, AND INCLUSION

This past Spring, the Office of Health Equity, Diversity and Inclusion (OHEDI) in the School of Medicine brought together departmental leadership with the goal of creating a diversity council to build community, coordinate efforts, share best practices and resources, and assist with the implementation of diversity plans across the school. Damian Borbolla and Colleen Kenost are serving as DBMI's representatives on this committee. In an effort to bring EDI to the forefront of our departmental core missions, we have established our own committee to develop departmental best practices around EDI, assist with the implementation of departmental diversity goals, and create a more equitable and inclusive workplace, aligned with the strategic initiatives and missions of DBMI and the University.

Current members include Damian Borbolla (Co-Chair), Colleen Kenost (Co-Chair), Polina Kukhareva, Lourdes Valdez, and Ryzen Benson. We are looking forward to advancing departmental EDI efforts in 2022 and welcome any suggestions and ideas to ensure we provide a welcoming environment for all.

DBMI ALUMNI AWARDS

Each year our alumni vote on a graduate who has made an outstanding achievements in biomedical informatics. Dr. Vawdrey is a worthy recipient!

David Vawdrey, PhD, FACMI '07

Dr. Vawdrey is Chief Data Informatics Officer at Geisinger. He is responsible for implementing transformational technologies and leveraging Geisinger's advanced data and informatics infrastructure to create value for patients, health plan beneficiaries, clinicians, and research investigators across nine hospital campuses, over 100 clinics, the 500,000-member Geisinger Health Plan, and the Geisinger Commonwealth School of Medicine.

Dr. Vawdrey was the founding director of New York-Presbyterian Hospital's Value Institute, where he created a team of health data scientists and quality improvement experts to promote high-value healthcare. An Associate Professor at Columbia University's Department of Biomedical Informatics, Dr. Vawdrey is passionate about informatics education, and he has taught and advised many graduate and post-doctoral students.

Congratulations David!

The Good Notes blog, managed by the Public Affairs team at University of Utah Health, shares stories about new services, technology, research findings, as well as interesting personalities from across the health care system. In October 2021, Dr. Yves Lussier was asked to share his Biomedical Informatics story (see below).

Pioneering a New Era of Biomedical Informatics

The opportunity to lead the Department of Biomedical Informatics at the University of Utah almost seems like destiny. The research of medical informatics pioneers and clinicians at the U shaped my career and many others. I am humbled to serve with the best in the field and train the next generation of biomedical informaticists.

Bridging Technology and Medicine

My interest in medicine and engineering began at an early age. I started programming at age 13. By the time I was 18, I was a seasoned programmer and had launched my own consulting company. Around this same time, I discovered computers could not reason with medical data. I went on to complete three engineering internships with IBM and calculated that I could make a better living in programming than I could in medicine. However, I saw an opportunity to contribute to computing with the language of medicine and improve health care. While some computer-assisted diagnostic tools existed at that time, they were not available commercially.

I decided that pursuing both medicine and engineering would allow me to help bridge this gap. After 17 years of exciting clinical practice—where I saw what health information systems were capable of—I decided to focus my career entirely on translational informatics, research and development, and leadership. That is where I felt I could have the most impact.

Serendipitous Circumstances

A number of rare opportunities and chance encounters shaped my path in biomedical informatics. In 1990, while I was a family medicine resident at Centre Hospitalier Universitaire de Sherbrooke in Quebec, Canada, they implemented electronic health records (EHRs). At that time, less than one percent of hospitals in the world operated with EHRs. I had the opportunity to be mentored by Roger Côté, MD, and then, as an editorial board member of the College of American Pathologists, contribute to transforming Côté's nomenclature—Systematized Nomenclature of Medicine (SNOMED)—into electronic form. Now used globally, SNOMED makes it possible for the computer to reason with medical facts. Today, the nomenclature of medicine includes more than 350,000 concepts and continues to grow.

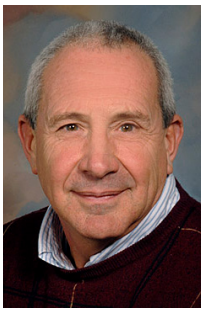
When I was hired as a post-doctoral student at Columbia University, the founding chair of the biomedical informatics department was Paul Clayton, PhD. Clayton came from the Department of Biomedical Informatics at the University of Utah, the nation's first biomedical informatics department. At the U, he collaborated on groundbreaking research and development, including the HELP EHR and proving that EHR-anchored clinical decision support tools improve antibiotic therapy outcomes and reduce surgical complications. Clayton created a subculture at Columbia patterned after the innovative, collaborative culture at the U. His primary criteria for those he hired was "nice, hardworking, and smart."

To read the full article, please see HERE.

FACULTY AWARDS AND HONORS

Damian Borolla, MD, MS

A special issue of the International Journal of Medical Informatics on "Leveraging Data and Information Systems on the Sustainable Development Goals" was recently published, DBMI faculty Damian Borbolla (Assistant Professor) and David Novillo Ortiz (DBMI Adjunct faculty and World Health Organization, Regional Office for Europe) together with Heimar De Fatima Marin (Federal University of São Paulo, São Paulo, Brazil), Yuri Quintana (Harvard Medical School, Boston, MA) and John Holmes (University of Pennsylvania, Philadelphia, PA) are the editors.



Julio Facelli, PhD

Dr. Facelli has been elected to serve on the AMIA Diversity Equity and Inclusion Committee. This committee guides and executes AMIA's strategic goals and objective related to diversity, equity, and inclusion. He has also been selected to serve as a co-Chair on the Retention and Advancement subcommittee. This subcommittee focused on growing a diverse set of AMIA leaders.

Ramkiran Gouripeddi, MBBS, MS and Julio Facelli, PhD

The National Academy of Medicine awarded a "Catalyst Phase of the National Academy of Medicine Healthy Longevity Global Competition" to Drs. Ramkiran Gouripeddi and Julio Facelli for their project that seeks to address the challenge of generating aging exposomes. Their team will evaluate if these aging exposomes will be useful in studying the bidirectional effects of exposures and aging.

Kensaku Kawamoto, MD, PhD, MHS, FACMI, FAMIA

The Digital Healthcare Research Program at AHRQ (Agency for Healthcare Research and Quality) recently highlighted Dr. Ken Kawamoto's research project, "Decision Precision+: Increasing Lung Cancer Screening for At-Risk Patients", which was funded by AHRQ for $1,184,380. His research aims to enable widespread implementation of Decision Precision+ to increase lung cancer low-dose computed tomography screenings and help prevent lung cancer deaths.

The ReImagine EHR initiative's Disease Manager SMART on FHIR application won First Place in the AMIA/HL7 FHIR® Applications Showcase at the AMIA 2021 Annual Meeting.

Aaron Quinlan, PhD

Aaron Quinlan, PhD and his team were awarded a grant through the Chan Zuckerberg Initiative (CZI) for Essential Open Source Software. Dr. Quinlan's project, "Improving the Analytical Flexibility of bedtools" was one of 35 awarded. Biomedical research increasingly relies on computational methods, and open source software has become foundational to the majority of today's research in the field.

STUDENT SCHOLARSHIPS, AWARDS & HONORS

RICHARD A. FAY & CAROL M. FAY FELLOWSHIP

The Richard A. Fay and Carol M. Fay Endowed Graduate Fellowship was established by Mr. and Mrs. Richard A. Fay in memory of Homer Warner, MD, PhD. The expendable funds are administered by the department chair, and are designated to support graduate students' training, and this year, we were able to provide three fellowships. The recipients are:

Amber Kiser

Janette Vazquez

Lourdes Valdez

ROLLAND H. REITER SCHOLARSHIP

The Rolland H. Reiter Scholarship is awarded to a masters student chosen based on their interest and contributions to the clinical application of biomedical informatics with an emphasis on enhancing quality and/or reducing waste in medicine. Applicants must be working full-time in health informatics at a hospital, a health care system, or a private software or service company related to health care informatics. The award goes towards their tuition up to $6,000. This year's recipient is Jeffrey Bernhardt.

Jeffrey Bernhardt

DR. JOYCE MITCHELL TRAVEL AWARD

This endowment to celebrate Dr. Mitchell's legacy as the department's Chair from 2005 to 2012 will be used primarily to provide travel assistance to a worthy Biomedical Informatics student who has been accepted to present at a meeting or has been invited to participate at a meeting or other scholarly activity. This year's recipient, Dr. Keaton Morgan was able to travel to the AMIA Annual Symposium, where he participated on a panel discussion with three U of U DBMI faculty members. They discussed how inter-professional collaboration has enhanced the education programs at DBMI.

Keaton Morgan, MD

BRUCE A. HOUTCHENS, MD STUDENT PAPER PRIZE

This award was established in memory of Bruce A. Houtchens, MD and it is hoped that this award will stimulate gifted students to open new horizons of medical technology and seek better ways of integrating medical technology into medical education and clinical practice. This $2,000 award recognizes a student's peer-reviewed, accepted paper that expresses original ideas in the areas of health informatics or telemedicine. This year's recipient is Janette Vazquez, a PhD candidate.

Janette Vazquez

FACULTY SCHOLARLY ACTIVITY

KEYNOTES

Lussier, Yves
Inaugural keynote, Center for AI and Medicine, University of Washington School of Medicine, Jan 6 2021. Personalizing medicine beyond precision: single-subject studies (S3) substantially increase the clinician interpretation and signal-to-noise ratio of 'Omics-derived machine learning classifiers.

GRAND ROUNDS

Del Fiol, Guilerme
Practical applications of machine learning in healthcare: challenges and research gaps. McMaster Speaker Series on Machine Learning in Health: Opportunities & Challenges. Department of Health Research Methods, Evidence, and Impact. McMaster University, Ontario, Canada. December 16, 2021.

Facelli, Julio
Exposure Health Informatics: Infrastructure and Applications. University of Nevada Las Vegas, Nevada Institute of Personalized Medicine, Grand Rounds Speaker. December 2, 2021.

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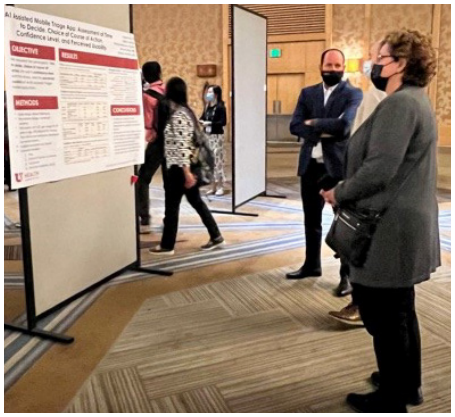
AMIA Annual Symposium, San Diego, CA

October 30 - November 3, 2021



AMIA Dinner

SYMPOSIUM PRESENTATIONS

Our Department's students, alumni, and faculty had a very strong showing in almost all presentation categories.

LIEAF (Education Forum) Ignite style talk: Health System Science provides an opportunity for informatics education within the medical school. K. Eilbeck, D. Borbolla, University of Utah

LIEAF (Education Forum) Panel: Four Weddings and No Funeral: Integrating Cross-disciplinary Informatics Training at the University of Utah.
K. Morgan, C. Staes, K. Eilbeck and D. Borbolla, University of Utah

Workshop: A review of fundamentals on using Clinical Quality Language (CQL) for Clinical Decision Support (CDS) and detailed use cases with interactive Q&A
Burton, M, Mayo Clinic; K. Kawamoto, University of Utah, B. Rhodes, Dynamic Content Group; B. Lober, University of Washington; M. Coarr, The MITRE Corp.; D. Carlson, Clinical Cloud Solutions, LLC.

Workshop: Clinical Decision Support Standards Using Health Level Seven International's Fast Healthcare Interoperability Resources: Latest Developments and What You Need to Know.
P. Haug, Intermountain Health Care; K. Kawamoto, University of Utah; Bryn Rhodes, Dynamic Content Group; G. Del Fiol, University of Utah; Howard Strasberg, Wolters Kluwer Health; Robert Jenders, Charles Drew University/UCLA.

Panel: Career Development Issues for Women in Biomedical Informatics within Professional Organizations
D. Wei, Stockton University; R. Rizvi, IBM Watson Health; K. Taylor, AMIA; G. Jackson, IBM Watson Health; O. Ogunyemi, Charles Drew University of Medicine and Science; B. Alghamdi, Case Western Reserve University; W. Hersh, Oregon Health & Science University; P. Kukhareva, University of Utah; D. Pandita, Hennepin Healthcare; M. Sordo, Massachusetts General Hospital; D. Tao, St. Louis University.

Panel: Addressing the Digital Divide to Promote Health Equity.
B. Gibson, University of Utah; G. Del Fiol, University of Utah; D. Wetter, Huntsman Cancer Institute; C. Schlechter, University of Utah.

Panel: Adapting EHRs to Support Ongoing Provider Diagnostic Calibration.
J. Adler-Milstein, UCSF School of Medicine; R. el-Kareh, University of California San Diego; A. Olson, University of Minnesota Medical School Twin Cities; B. Rosner, UCSF; C. Weir, University of Utah.

Featured Presentation: AHIC Update
J. Hales, Intermountain Healthcare; C. Ivory, Vanderbilt University Medical Center.

Poster: AI Assisted Mobile Triage App: Assessment of Time to Decide, Choice of Course of Action, Confidence Level, and Perceived Usability
A. Rich, P. Matthews, C. Wicker, D. Borbolla, University of Utah

Poster: Impact of Comorbidity Profiles on Pain Trajectories in Breast Cancer Patients by Using Electronic Health Record Data
K. Sward, University of Utah

Panel: Stewardship Considerations in the Development and Implementation of Shareable SMART on FHIR Applications: Case Studies on Multiple Chronic Condition Care Planning and Chronic Pain Management
D. Dorr, Oregon Health & Science University; R. Gamache, AHRQ; K. Kawamoto, University of Utah; L. Marcial, RTI; S. Haque

Poster: Cohort Discovery with Unified Medical Language System Query Expansion
A. Post, Huntsman Cancer Institute

Poster: Colorectal Polyp Extraction System (CoPEx): A Natural Language Processing Pipeline to Extract Colorectal Polyp Characteristics from Pathology Reports
R. Benson, University of Utah

Oral Presentation - Designing and Evaluating Clinical Informatics Interventions: Challenges and Solutions to Promoting Evaluation Practices in Software Development Process within an Academic Medical Center
P. Kukhareva, University of Utah

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