State of the Program, State of the Field

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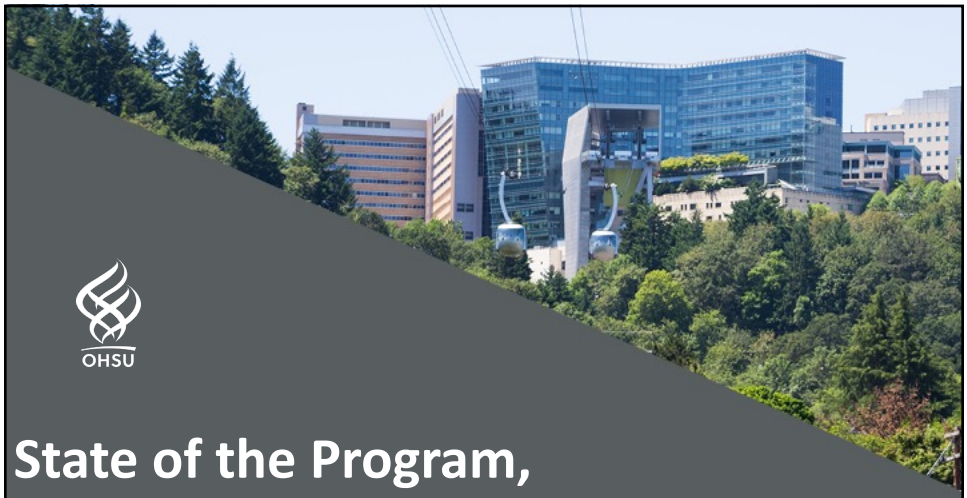

State of the Program, State of the Field

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Agenda for this talk

- State of the Program
  - Department
  - Research
  - Education
  - Faculty
- State of the Field
  - COVID-19 impact
  - Beyond the pandemic
- Open Discussion: Where Next?

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Department of Medical Informatics & Clinical Epidemiology (DMICE)

- Academic department in School of Medicine that provides leadership, discovery and dissemination of knowledge in
  - Bioinformatics and computational biomedicine
  - Clinical epidemiology
  - Health and clinical informatics
- Mission fulfilled through programs of research, education, and service
- Programs, faculty, and students recognized internationally for accomplishment and innovation
- Web – https://www.ohsu.edu/informatics
- Blog – https://blogs.ohsu.edu/health-data

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A challenging year and a half for DMICE

- Transition to remote work
  - Last 18 months have shown that DMICE can function as a virtual organization
  - Return to office plans squelched by Delta
- Informatics is a “people” field
  - Fortunately have tools to keep connected, including social media
- Department finances strong
  - FY 20 and 21 budget targets met

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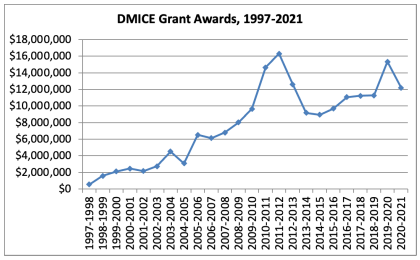
DMICE research productivity 1997-2021

- Total external funding 1997-2021: $189M
- Publications 2014-2020
  - 2014-2015 – 88
  - 2015-2016 – 109
  - 2016-2017 – 101
  - 2017-2018 – 101
  - 2018-2019 – 110
  - 2019-2020 – 92
  - 2020-2021 – 117
- Publications in top journals 2020-2021
  - JAMIA: 5
  - Journal of General Internal Medicine: 4
  - PLoS ONE: 2
  - Annals of Internal Medicine: 16
  - JAMA: 5
  - BMJ: 3



DMICE Grant Proposals and Funding Rate

Year	Proposals	Funded
2016-2017	48	21 (47%)
2017-2018	42	29 (66%)
2018-2019	47	31 (66%)
2019-2020	57	32 (56%)
2020-2021	50	26/40 (65%)

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Educational programs continue to be robust

- NIH (NLM) training grant funded continuously since 1992
  - Largest and second-longest training grant at OHSU
  - Hosted 2020 NLM Trainees meeting – first ever in virtual format
- Graduate program since 1996
  - Master's since 1996, PhD since 2003
- Use of online learning since 1999
- AMIA 10x10 ("ten by ten") program since 2005
  - Adaptation of BMI 510 introductory course, completed by almost 2900 people
- Educational grants – ONC 2011-2015, BD2K 2014-2017
  - New grant recently funded as part of NIH Harnessing Data Science for Health Discovery and Innovation in Africa (DS-I) initiative in collaboration with University of Cape Town
- Clinical informatics for medical students since 2013
- ACGME-accredited Clinical Informatics Fellowship since 2015
  - 5-6 other fellowship programs also using OHSU online courses
- Annual update in Clinical Informatics continuing education
  - Completed second year and planning for third year

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Wide reach and many distinguished alumni

International students from (among others): Singapore, Thailand, Argentina, Egypt, Israel, Saudi Arabia, Zimbabwe, China, and more

Degree	Total	BCB	HCIN
BCRT	473	0	473
MS	398	64	334
PHD	34	14	20
Total	905	78	827

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Some recent accomplishments of program alumni in academia

- Peter Embi, MD (Postdoc and MS, 2002)
  - Just appointed Chair of Department of Biomedical Informatics at Vanderbilt U
  - Formerly President and CEO, Regenstrief Institute
- Adam Wright, PhD (PhD [first], 2007)
  - Just award AMIA Lindberg Award for Innovation in Informatics
  - Professor, Department of Biomedical Informatics at Vanderbilt U
- Jayashree Kalpathy-Cramer, PhD, MS (Postdoc and MS, 2009)
  - Associate Professor of Radiology at Harvard Medical School
- Surendra Dasari, PhD (PhD, 2008)
  - Associate Professor of Biomedical Informatics at Mayo Clinic
- Adam Rule, PhD (Postdoc, 2021)
  - Assistant Professor, Information School, University of Wisconsin

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More accomplishments: alumni now members of our faculty

- Paul Gorman, MD (Postdoc, 1992)
- Joan Ash, PhD, MBA, MLS; Professor (NLM Individual Fellowship, 1994)
- Aaron Cohen, MD, MS; Professor DMICE (Postdoc and MS, 2005)
- Eilis Boudreau, MD, PhD; Professor (Postdoc, 2006)
- Vishnu Mohan, MD, MS; Associate Professor (MS, 2009)
- Steven Bedrick, PhD; Associate Professor (PhD, 2010)
- Michael Mooney, PhD; Assistant Professor (PhD, 2011)
- Lisa Karstens, PhD, MS; Assistant Professor (Postdoc and MS, 2012)
- Michelle Hribar, PhD; Assistant Professor (Postdoc, 2015)
- James Jacobs, MD; Assistant Professor (Postdoc, 2017)
- Dana Womack, PhD; Assistant Professor (PhD, 2018)
- Ben Orwoll, MD, MS; Assistant Professor (CI and MS, 2018)

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Current enrollment

Major / Degree/ Certificate	Bioinformatics & Computational Biomedicine (BCB)	Health & Clinical Informatics (HCIN)	Total
PhD	7	8	15
MS Thesis	7	1	8
MS Non-Thesis	8	31	39
Graduate Certificate	N/A	36	36
Total	22	76	98

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Faculty

- Among the most accomplished informatics faculty anywhere in the country or world
- These slides have a *sampling*; see Web site for complete list
  - https://www.ohsu.edu/school-of-medicine/medical-informatics-and-clinical-epidemiology/faculty-and-trainees

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Faculty in institutional and national leadership roles

- David Dorr – Chief Research Information Officer, OHSU
- Karen Eden – Past President, Faculty Senate, OHSU
- Paul Gorman – Assistant Dean, Rural Medical Education, OHSU
- Shannon McWeeney – Director, Computational Biomedicine, Knight Cancer Institute
- Vishnu Mohan – Program Director, OHSU Clinical Informatics Fellowship
- Cynthia Morris – Co-PI, OCTRI; Co-PI BUILD EXITO

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DMICE is a team

- Faculty
  - Broad array of interests and accomplishments
  - Hopefully will present at this conference this year
- Staff
  - Department – Anne, Meaghan, Alicia, Kathryn, Monica
  - Edu – Andrea, Diane, Lauren, Lynne, Virginia, Kate
  - Others who support individual faculty and projects
- Students and fellows
  - Presenting and defending their work at this conference, NLM trainees meeting, and in other venues
  - Making valuable contributions to research, teaching, and other activities of department
- Communications
  - Follow us on Twitter: @OHSUInformatics
  - Post in our blog: https://blogs.ohsu.edu/health-data/

State of the field

- Informatics lessons from the pandemic
- Rest of field has not stood still
  - Machine learning (ML) and artificial intelligence (AI)
  - Improving the electronic health record (EHR)
  - Data interoperability and 21st Century Cures Rule
  - Certification of informatics professionals

Informatics lessons from the pandemic

- Our public health information infrastructure not up to the task (Maani, 2020; Gottlieb, 2021)
  - Additional limitations of clinical trials infrastructure (Gottlieb, 2021)
- Our professional and general information channels are easily abused (next slide)
- Data and algorithm inadequacies exacerbate health disparities and impede racial justice (later)

Professional and general information channels abused

- Disinformation spread widely by small number of people (Disinformation Dozen, 2021)
- Spread by automated means on social media, e.g., Facebook (Ayers, 2021)
- Ideology-driven anti-science encourages violence and kills (Hotez, 2021; Hotez, 2021)


The New York Times

NEW YORK, TUESDAY, SEPTEMBER 28, 2021

Covid Politics Are Walloping Red America

Concentration of Cases in Right-Leaning Areas

DAVID LEONHARDT

THE MORNING

The Partisan Tilt of Vaccination Rates ...

... And Deaths From the Coronavirus

(Leonhardt, 2021; via @EricTopol)

Information channels abused (cont.)

- System overwhelmed with publications (Urban, 2021)
- Retracted papers still cited (Piller, 2021)
- Published but retracted and low-quality studies make it into systematic reviews (Lawrence, 2021)
- Preprints speed dissemination of information – good and bad (Fraser, 2021)
  - Largest clinical trial of ivermectin riddled with errors and other problems, withdrawn from preprint server (Gideon, 2021; Reardon, 2021)
  - Simple dominator error on vaccine adverse effects quickly weaponized by anti-vaxx groups (Miller, 2021)

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But there is a better way: recent experience

- Germany and Austria
- Proof of vaccination to enter country and most tourist and indoor venues
- Contact-tracing widely used
- Luca app stores vaccine information and performs contact-tracing
- Easily available rapid testing

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ML and AI successes and challenges

- Continued success with well-curated data sets but need translation (Hersh, 2021)
  - Recent example – in screening mammography, studies mostly poorly designed and retrospective; inferior to radiologists (Freeman, 2021)
- Other concerns
  - Widely used algorithms in Epic EHR a case study in limitations of proprietary algorithms (Ross, 2021) – despite some successes (Tarabichi, 2021)
  - Need "algorithmovigilance" (Embi, 2021)
  - Dataset "shifts" due to changes in technology, population and setting, and clinician or patient behavior (Finlayson, 2021)
  - There are ways to study algorithms properly, e.g., clinical deterioration risk in a prospective cohort study (Escobar, 2020)
  - CDS studies rarely (0.3%) replicated (Coiera, 2021)

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A bright spot is growing sources of quality data

- US-based – National COVID Cohort Collaborative (N3C; Haendel, 2020)
  - https://covid.cd2h.org/
  - https://ncats.nih.gov/n3c
- International
  - Consortium for Clinical Characterization of COVID-19 by EHR (4CE; Brat, 2020)
    - https://covidclinical.net/
  - OpenSAFELY – UK-based collection of 24M primary care patient records from National Health Service (Williamson, 2020)
    - https://opensafely.org/

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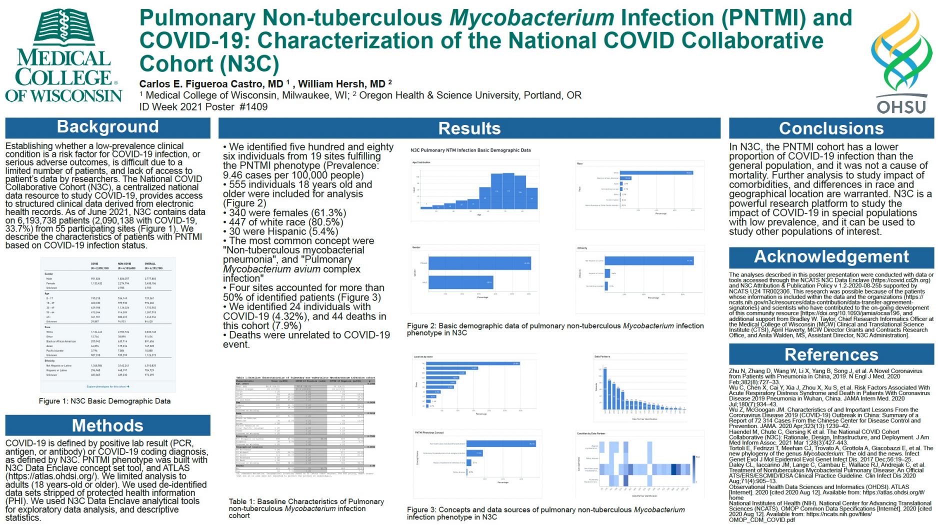
Example of N3C use



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Data standards: Cures Act Final Rule

- https://www.healthit.gov/curesrule/
- FHIR-based access to all data elements
  - Release 4 – https://hl7.org/FHIR/
- Open APIs – based on SMART
- Easy export of data for single patients and EHR systems
- No gag clauses or information blocking

Allergies and Intolerances
- Substance (Medication)
- Substance (Drug Class)
- Reaction

Assessment and Plan of Treatment
- Assessment and Plan of Treatment

Care Team Members
- Care Team Members

Clinical Notes
- Consultation Note
- Discharge Summary Note
- History & Physical
- Imaging Narrative
- Laboratory Report Narrative
- Pathology Report Narrative
- Procedure Note
- Progress Note

Goals
- Patient Goals

Health Concerns
- Health Concerns

Immunizations
- Immunizations

Laboratory
- Tests
- Values/Results

Medications
- Medications

Patient Demographics
- First Name
- Last Name
- Previous Name
- Middle Name (including Middle Initial)
- Suffix
- Birth Sex
- Date of Birth
- Race
- Ethnicity
- Preferred Language
- Current Address
- Previous Address
- Phone Number
- Phone Number Type
- Email Address

Problems
- Problems

Procedures
- Procedures

Provenance
- Author Time Stamp
- Author Organization

Smoking Status
- Smoking Status

Unique Device Identifier(s) for a Patient's Implantable Device(s)
- Unique Device Identifier(s) for a Patient's Implantable Device(s)

Vital Signs
- Diastolic Blood Pressure
- Systolic Blood Pressure
- Body Height
- Body Weight
- Heart Rate
- Respiratory Rate
- Body Temperature
- Pulse Oximetry
- Inhaled Oxygen Concentration
- BMI Percentile (2 - 20 Years)
- Weight-for-length Percentile (Birth - 36 Months)
- Head Occipital-frontal Circumference Percentile (Birth - 36 Months)

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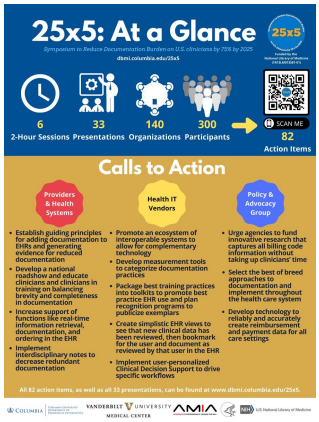
Improving the EHR

- Continued burden of clinician time and contribution to burnout
- Will Big Tech succeed where others have failed?
- Can we reduce documentation burden by 75% in 5 years?
  - https://www.dbmi.columbia.edu/25x5/



Certification of informatics professionals

- Certification is credential that recognizes and verifies a superior level of education, experience and expert knowledge
- Clinical Informatics Subspecialty (CIS) for physicians who are board-certified in one of the 24 American Board of Medical Specialties (ABMS) disciplines
  - Administered by American Board of Preventive Medicine (ABPM) and American Board of Pathology (ABP)
  - https://amia.org/careers-certifications/clinical-informatics-subspecialty
- AMIA Health Informatics Certification (AHIC) for clinicians who are nurses, pharmacists, dentists, nutritionists, public health and non-ABMS board certified physicians
  - Administered by AMIA Health Informatics Certification Commission
  - https://amia.org/careers-certifications/amia-health-informatics-certification-ahic

Discussion: where next?

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