One Florida
Clinical Research Consortium

Using Innovative Approaches, Addressing Real-world Problems

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OneFlorida+ Clinical Research Consortium: Using Innovative Approaches, Addressing Real-world Problems

**Background**
Using real-world data to improve health.

**Opportunities**
Partnerships, infrastructure and purpose.

**PCORI Research Priorities**
Translates to other funders

**Select Current Studies**
Opportunities to developing cohorts more deeply.

**Future Directions**
BACKGROUND
CRITICAL HEALTH ISSUES
AND REAL-WORLD DATA
“Data relating to patient health status and/or the delivery of health care routinely collected from a variety of sources.”
- US Food and Drug Administration

Examples:
- Electronic health record data
- Linked mother-baby data
- Tumor registry data
- Health care claims data
Leading Causes of Death in the Southern US

1. Heart Disease
2. Cancer
3. Stroke
4. Chronic lower respiratory disease
5. Unintentional Injury
6. Diabetes
7. Alzheimer’s Disease
8. Influenza/pneumonia
9. Kidney Disease
10. Septicemia

Other Health Issues:

- Alabama and Georgia rank in top 10 of US states in terms of **maternal morbidity and mortality**. Florida 32 out of the 50 states.
- Alabama, Florida and Georgia rank in the top 15 states for prevalence of **mental illness** among adults in 2020.

Source: CDC and [Ranking the States | Mental Health America](mhanational.org)
Persistent Poverty in the Southern US

Key takeaways:

• Clusters in Alabama, Georgia and North Florida.
• Important to consider social determinants of health more broadly as well.

Sources: The 10-20-30 Provision: Defining Persistent Poverty Counties (fas.org)

Note: Persistent poverty counties had poverty rates of at least 20 percent in each US Census 1980, 1990, 2000, and American Community Survey 5-year estimates, 2007-11.
OneFlorida+ Partners

Health Care Systems and Affiliated Practices

- University of Florida and UF Health
- Florida State University
- University of Miami and UHealth
- Orlando Health System
- AdventHealth
- Tallahassee Memorial HealthCare
- Tampa General Hospital
- Bond Community Health Center Inc.
- Nicklaus Children’s Hospital
- CommunityHealth IT
- University of South Florida and USF Health
- University of Alabama at Birmingham
- Emory University

Statewide Partners and Collaborators

- Capital Health Plan
- Florida Agency for Health Care Administration
- Florida Department of Health
Current Key Features:

- 17 M Floridians*
- 2.1M Georgians and 1.2M Alabamans
- Centralized Data Trust
- Clinical data (electronic health records)
- Health care claims
- Sites with linked tumor registry data
- All patients can be reidentified

Infrastructure Funding:

UFHCC; PCORI CDRN-1501-26692 and 2020-005; CTSI (NCATS)
UL1 TR001472 and UL1 TR000064; FL DOH JEK 4KB16

* Includes Medicaid payer mix
An Enduring Infrastructure & Capacity for:

- Identify Study Populations
- Compare Treatments, Drugs, Devices
- Conduct Clinical Trials in the Real World
- Translate Evidence Into Practice

Partnerships: People, Clinicians, Health Systems, Payers, Industry
OneFlorida+ Research

The Florida, Georgia and Alabama of Today is the United States of Tomorrow: Older and More Diverse
Be the vanguard for innovative pragmatic clinical trials *that we lead* because we look like the future.

**Infrastructure**
Acquire ongoing support for the Data Trust and pragmatic clinical trial infrastructure.

**Initiatives**
Lead and conduct studies, refine focus areas, develop pilots that specifically build on our expertise, allow future collaboration with other PCORnet networks and target specific funding opportunities.

**Better Evidence Through Novel Data Linkages**
Add populations, genomic, pathology, and other elements defined by the committee.

**Enhanced Collaborations**
Identify opportunities to enhance use of OneFlorida, particularly with diverse populations for learning health systems and learning health communities.
The Patient-Centered Outcomes Research Institute (PCORI) funds the OneFlorida Clinical Research Consortium.
PCORI RESEARCH PRIORITIES & OTHER FUNDERS
PCORI Adopted National Priorities

• PCORI’s congressional authorization requires identification of National Priorities and establishment of a Research Agenda outlining how it will address the National Priorities.

• The PCORI Board of Governors developed the first National Priorities for Research and Research Agenda in 2012 with input from PCORI’s Methodology Committee and informed by substantial public comment.
PCORI Proposed Research Agenda

**Proposed Research Agenda**

- Fund research that fills patient- and stakeholder-prioritized evidence gaps and is representative of diverse patient populations and settings.

- Fund research that aims to achieve health equity and eliminate health and healthcare disparities.

- Fund research that builds the evidence base for emerging interventions by leveraging the full range of data resources and partnerships.
PCORI Proposed Research Agenda

1. Fund research that examines the diverse burdens and clinical and economic impacts important to patients and other stakeholders.

2. Fund research that focuses on health promotion and illness prevention by addressing health drivers that occur where people live, work, learn, and play.

3. Fund research that integrates implementation science and that advances approaches for communicating evidence so the public can access, understand, and act on research findings.
PCORI 2022 and Beyond

Opportunities for Funding and Involvement in Patient-Centered Research

• PCORI BOG Approved Topics for Development
  • Healthy Aging
  • Maternal Morbidity and Mortality
  • Suicide Prevention
  • Visual Impairment
  • Hypertension Control
  • Advancing Health Equity
  • Telehealth for the Management of Chronic Disease
  • COVID-19
  • Cancer Immunotherapy
SELECT CURRENT ONEFLORIDA STUDIES:
ADDRESSING CRITICAL HEALTH ISSUES
OneFlorida & GatorTron: The World's Largest Artificial Intelligence for Text Data

ALL clinical notes from UF Health

- Over 2 million patients
- Over 290 million clinical notes
- Over 50 million encounters
- Over 80 billion medical words
OneFlorida & GatorTron:
The World’s Largest Artificial Intelligence for Text Data

Summary
• AI to identify symptoms, adverse events, social issues.
• Built in less than 7 days.
• Impossible to build w/o AI cluster from NVIDIA.
• 24% error-rate reduction relative to state-of-the-art models.
Text and Talk: A multi-level intervention to increase provider HPV vaccine recommendation effectiveness

Stephanie Staras, PhD, University of Florida

Among the United States, Florida has the 5th highest rate of HPV-related cancers, and the 45th highest rate for vaccine initiation

- Comparison of combination of two evidence-based interventions
  - Parent-targeted text messages
  - Clinician-targeted recommendation strategies
- Enrolling over 10,000 11 to 12-year-olds across 30 primary care sites
Cancer burden in vulnerable populations
Yi Guo, PhD; Jiang Bian, PhD (PIs)

- Potentially elevated cancer risk in the Transgender and gender nonconforming (TGNC) population, due to:
  - Long-term impact of gender affirmation hormone use
  - Higher rates of health risk behaviors (e.g. smoking)

- Gap in knowledge: high cancer risk => high cancer burden?
  - Anecdotal evidence in TGNCs due to small samples

- The first population-based cohort studies to examine cancer burden among TGNC people
  - (1) Develop a computable phenotype algorithm to identify a TGNC cohort in OneFlorida EHRs
  - (2) Conduct a population-based cohort analysis to estimate and compare cancer incidence and cancer risk factors between TGNC and non-TGNC individuals

Figure 1. Identifying TGNC individuals in OneFlorida.
Tracking BP Control Performance and Process Metrics in 25 US Health Systems

Rhonda Cooper-DeHoff, Pharm D, MS, University of Florida and Mark Pletcher MD, MPH UCSF

- BP control calculated averaged 62%.
- BP control was lower in Black patients (57%), and there was substantial variation by health system (range 44%-74%)
- A new class of antihypertensive medication (medication intensification) was prescribed in only 12% (range 0.6%-25%) of patient visits where BP was uncontrolled BP.
- When a medication intensification event occurred, subsequent SBP was 15 ± 20 mm Hg lower on average (range 5-18 mm Hg).

- Major opportunities exist for improving BP control and reducing disparities

Cooper-DeHoff RM et al. JAHA 2021 in press
Using NLP to Improve Healthcare

Yonghui Wu, PhD; Jiang Bian, PhD (PIs)

Natural Language Processing to Connect Social Determinants and Clinical Factors for Cancer Outcomes Research

- Value-based health care.
- Up to 80% of health care costs linked to social determinants.
- Extracting information from clinical notes. (Natural Language Processing)
- Identify high health care users and link to needed community services.

Index 2016 (1 - 100 scale)

High
Low
ACTIV-6: Drug Repurposing to Reduce COVID-19 Symptoms

Betsy Shenkman, PhD (Site PI) and Christina Li, MD (MD Site PI)  
Adrian Hernandez, MD, MHS, Susanna Naggie, MD, MHS (MPIs) – Duke University

• A platform trial to evaluate the effectiveness of repurposed medications to prevent worsening of COVID-19 infection
• 5-8 arms determined by existing ACTIV medication prioritization committee
  • Ivermectin first candidate. Others under discussion by the prioritization committee include metformin, fluvoxamine, colchicine, and montelukast
• To enroll 15,000 patients across estimated 80+ sites
The Benefits and Harms of Lung Cancer Screening in Florida

Jiang Bian, PhD; Yi Guo, PhD (PIs)

Lung Cancer

• 56/100,00 population in 2017 and declining
• Average costs of care can be $5K to $7K per month
• Lung cancer screening cost-effective but
  • High false positives
  • Invasive diagnostic procedures
  • Issues discovered through real world evidence
• Using OneFlorida Data
  • Identifying those at greatest risk for lung cancer to better target screening efforts

LUNG CANCER SCREENING CRITERIA
Our patients must be:

55-77 years old

CURRENTLY smoke or QUIT in the last 15 YEARS

Have at least a 30-PACK-YEAR smoking history

2 packs per day x 15 years = 30 pack-year history

Courtesty of Houston Methodist
Our understanding of risk factors for severe COVID-19 is incomplete, with critical knowledge gaps.

- One such knowledge gap relates to environmental exposures.
- Large racial/ethnic disparities in COVID-19 severity have been reported in the US.
  - Minority groups historically have higher exposures to harmful factors from the natural (e.g., air pollution), built (e.g., walkability), and social (e.g., neighborhood deprivation) environments.

Florida has 2nd Highest Prevalence of Alzheimer’s Disease. Projected to increase by 24% by 2025 to 720K Floridians.

- In the past 20 years, only two new pharmacological therapies have become available.
- Complementing traditional drug discovery with a broader range of approaches, such as drug repositioning, will maximize drug development efforts.
- Drugs such as insulin, metformin and others are all potential candidates.
Advancing Drug Repositioning for Alzheimer’s Disease using Real-World Data

Yonghui Wu, Jiang Bian, University of Florida; Hua Xu, University of Texas Health Science Center; Yong Chen, University of Pennsylvania (PIs)

- Can speed discovery and be cost effective
- Insulin, metformin and others are all potential candidates
- AI platform speeds analyses

402,021 patients with Mild Cognitive Impairment, AD/ADRD in OneFlorida Data Trust
NEXT STEPS
**Next Steps**

**Developed Research Committee**
Targeting Healthy Aging and Maternal Health – developed workgroups
Other areas are critical
Seeking workgroup members
Pilot funding

**PCORI PLACER and Other Awards**
Funding Opportunities | PCORI

**OneFlorida+ Front Door**

**Investigator Feedback**

**Enhance Collaborations**
Identify opportunities to enhance use of OneFlorida, particularly with diverse populations for learning health systems and learning health communities
QUESTIONS?

onefloridaconsortium.org
ctsi.ufl.edu
eshenkman@ufl.edu
SUPPLEMENTAL SLIDES OF DATA TRUST AND CURRENT ONEFLORIDA STUDIES: ADDRESSING CRITICAL HEALTH ISSUES
The OneFlorida Data Trust:
Putting it All Together
The OneFlorida Data Trust:
A Central Data Repository to Facilitate Research

DATA

- Electronic health record data
- PROs and other study data collection
- Linked mother-baby data
- Geocoded: census tract, environment
- Florida Medicaid and Medicare, Florida Cancer Registry
- Datavant death data index
- Selected unstructured data
- Merlin Data System / Florida Shots

Limited Data Set

Data Capture Strategies
ETL Processed and Tablet-Based Electronic Systems

OneFlorida Data Trust

ACCESS

OneFlorida Research Mart

1. OneFlorida Data Trust Query

Success

Submit Protocol to OneFlorida IRB and Executive Committee

2. Approval

Local Honest Brokers for Limited Data Sets IDs and/or Patient Contact Info

3. Data Provided

4. OneFlorida Data Trust

✔

Submit Protocol to OneFlorida IRB

✔

Success

Submit Protocol to OneFlorida IRB and Executive Committee

✔

Approval

Local Honest Brokers for Limited Data Sets IDs and/or Patient Contact Info

Data Provided

Florida shots
OneFlorida Data Trust: Current Data Picture, 2012 to Present

- Patients: 17.19 M
- Encounters: 720.2 M
- Diagnoses: 1.47 B
- Lab Data: 924 M
- Claims: 600.5 M
- Procedures: 1.81 B
- Dispensed Medications: 339 M
- Clinical Findings (T2DM): 1.411 M
PCORI Common Data Model v6.0

**Demographic**
- PATID

**Enrollment**
- PATID
- ENR_START_DATE
- ENR_BASIS

**Encounter**
- PATID
- ENCOUNTERID
- ADMIT_DATE
- ENC_TYPE

**Diagnosis**
- PATID
- DIAGNOSISID
- DX
- DX_TYPE
- DX_SOURCE

**Procedures**
- PATID
- PROCEDURESID
- PX
- PX_TYPE

**Vital**
- PATID
- VITALID
- MEASURE_DATE
- VITAL_SOURCE

**Dispensing**
- PATID
- DISPENSINGID
- DISPENSE_DATE
- NDC

**Lab_Result_CM**
- PATID
- LAB_RESULT_CM_ID
- RESULT_DATE

**Condition**
- PATID
- CONDITIONID
- CONDITION
- CONDITION_TYPE
- CONDITION_SOURCE

**PRO_CM**
- PATID
- PRO_CM_ID
- PRO_DATE

**Prescribing**
- PATID
- PRESCRIBING_ID

**PCORNET_Trial**
- PATID
- TRIALID
- PARTICIPANTID

**Death**
- PATID
- DEATH_SOURCE
- PARTICIPANTID

**Death_Cause**
- PATID
- DEATH_CAUSE
- DEATH_CAUSE_CODE
- DEATH_CAUSE_TYPE
- DEATH_CAUSE_SOURCE

**Proving**
- PROVIDERID

**MED_ADMIN**
- PATID
- MEDADMINID
- MEDADMIN_START_DATE

**OBS_CLIN**
- PATID
- OBSCLINID
- OBSCLIN_START_DATE

**OBS_GEN**
- PATID
- OBSGENID
- OBSGENID_START_DATE

**Hash_TOKEN**
- PATID

**LDS_ADDRESS_HISTORY**
- PATID
- ADDRESSID
- ADDRESS_USE
- ADDRESS_TYPE
- ADDRESS_PREFERRED

**IMMUNIZATION**
- PATID
- IMMUNIZATIONID
- VX_CODE
- VS_CODE_TYPE
- VX_STATUS

**HARVEST**
- NETWORKID
- DATAMARTID

**LAB_HISTORY**
- LABHISTORYID
- LAB_LOINC

**OneFlorida Clinical Research Consortium**

ONEFLORIDA: USING INNOVATIVE APPROACHES, ADDRESSING REAL-WORLD PROBLEMS
A Computable Phenotype for apparent Treatment Resistant Hypertension (aTRH)

Caitrin W. McDonough, PhD, MS, University of Florida

- Algorithms developed for aTRH and stable controlled hypertension (scHTN)
- scHTN defined as BP control at 80% of encounters over 3 years
- Algorithms confirmed and revised through iterative manual chart review process
- Final aTRHN algorithm PPV of 99.1% and final scHTN algorithm PPV of 96.5%
- Most common source of misclassification was related to documentation of historical medications

- Application of algorithms to OneFlorida Data Trust HTN population
  - 17% aTRH
  - 15% scHTN

McDonough CW et al. Pharmacoepidemiol Drug Saf. 2020
COVID-19: The PCORnet® Study of Post-Acute Sequelae of SARS-CoV-2 Infection

Betsy Shenkman, PhD (MPI)

- Part of the NIH PASC Consortium to rapidly advance scientific knowledge about recovery after acute SARS-CoV-2 infection and optimal treatments for PASC.

- To develop a single, unified, PCORnet Real-world Data (RWD) Repository that will support both the **Adult** and **Pediatric** PCORnet-PASC studies.
  - quantifying the incidence and prevalence of PASC,
  - phenotyping and subphenotyping,
  - determining risk and mitigating factors, and
  - understanding healthcare utilization patterns

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**Figure. Data Architecture**

OneFlorida: COVID-19
Computational Drug Repurposing

Jiang Bian, University of Florida/OneFlorida
Fei Wang, Weill Cornell Medicine/INSIGHT

R01: **Computational Drug Repurposing for AD/ADRD with Integrative Analysis of Real-World Data and Biomedical Knowledge**

- Combining machine learning (ML) and causal inference to estimate treatment effects from RWD
- Integrative learning from both biomedical knowledge base (BKB) and RWD to generate high-quality drug repurposing hypotheses

**AIM 1 - Cohort Development**
- Deliverables:
  - RWD-based AD/ADRD cohorts
  - Patient characteristics and AD/ADRD-related outcomes

**AIM 2 - Hypothesis Generation from BKB and RWD**
- Mutual information enhancement framework
- Deliverables:
  - High-quality drug repurposing hypotheses for AD/ADRD
  - Novel hypothesis refinement pipeline

**AIM 3 - Validation of Top-Ranked Drug Repurposing Signals**
- Diverse data sources and approaches:
  - Multi-omics network data
  - High-quality cohorts data from the National Alzheimer's Coordinating Center (NACC)
  - A prospective RWD-based virtual cohort from INSIGHT and OneFlorida following the trial emulation framework

**Study Design**

- Study Design
- Treatment/Control Group Construction
- Treatment Effect Estimation

**Feature Balancing**

**Hypothesis Ranking**

- NIH NIA
PANDA-MSD: Predictive Analytics via Networked Distributed Algorithms for Multi-System Diseases

Jiang Bian, PhD, University of Florida; Yong Chen, PhD, Peter Merkel, MD, University of Pennsylvania (PIs)

- A clear need to reduce dangerous and costly delays in diagnosis, particularly of rare multisystem diseases.
  - granulomatosis with polyangiitis (~74 per million);  
  - psoriatic arthritis (PsA) (~2,500 per million)

- Novel privacy-preserving distributed algorithms
- Methods to develop clinically-useful diagnostic aids that are both scalable to other rare and/or complex diseases and adaptable to any integrated learning health system.
- Novel tools readily accessible to any CTSA data hub or other data networks (such as PCORnet, OHDSI)

Sites/Partners:
- Univ. of Florida
- Univ. of Pennsylvania
- Vanderbilt University (Russel Rothman)
- Univ. of Alabama (Jeffrey Curtis)
- OneFlorida
- STAR
- ARPower
- VPPRN

Figure 1. Collaborations within the Research Team.
Assessing the Burden of Diabetes By Type in Children, Adolescents and Young Adults (DiCAYA)

Jiang Bian, PhD; Hui Shao, MD, PhD; Yi Guo, PhD; Elizabeth A Shenkman, PhD. (PIs)

**Using OneFlorida EHRs to Assess the Burden of Diabetes in Children and Adolescents in Florida**

1. A national task-force to monitor young diabetes across 8 sites.
   - Florida
   - Cornell
   - Geisinger
   - IUPUI
   - Kaiser
   - PEDSnet
   - Colorado
   - USC
2. CP development for young diabetes within OneFlorida CDRN.
   - “Market penetration Map (see figure)”
4. Real-time Surveillance on young diabetes

**Market Penetration Rates (MPR), measured by the percent of local residents covered by the EHR connected health systems in each county.**

**Market Penetration Rates (MPR) by county for OneFlorida for children and adolescents**