

# The Biomedical Informatics Infrastructure for Translational Research at MUSC

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Co-director, BMIC

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# Outline

- Biomedical Informatics for Translational Research
- EHR Data for Research
- Research Permissions
- Data Capture
- Epic Services
- Other Informatics Tools and Services
- Data Science Research and Education



# Learning Objectives

- What are the components of the biomedical informatics infrastructure for translational research?
- How to access and leverage the informatics resources and services at MUSC?
- Learn about some examples of data science and AI research projects.



# Outline

- **Biomedical Informatics for Translational Research**
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- Data Capture
- Epic Services
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# Translational Research Informatics Infrastructure

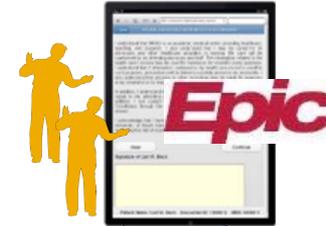
## Statewide IRB Reliance



## Patient Engagement & Recruitment



## Research Permissions



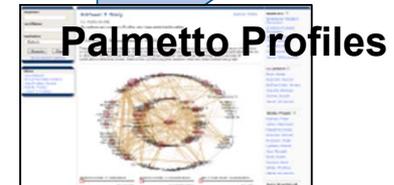
RDW (MUSC)  
HSSC CDW (Statewide)  
& Master Patient Index



CTSA Services, Budgeting,  
Epic Integration for Clinical Trials



Statewide Clinical Trial  
Feasibility & Cohort Analysis



Research Collaboration

# The Biomedical Informatics Center (BMIC)

## Themed around the Learning Health System

- › a Learning Health System *in which*
  - **Every patient** has the opportunity to benefit from research
  - **Every clinician** has their cohort of patients from which to learn
  - Every scientist has the human-derived **materials** needed for study
  - Every interdisciplinary team can **influence the health system** to learn from it

## Leadership



Dr. Leslie A. Lenert  
Director



Dr. Jihad Obeid  
Co-director



# BMIC Faculty: Academic Home in DPHS



**Leslie Lenert, MD, MS**  
Professor,  
CRIO  
Director, BMIC



**Jihad Obeid, MD**  
Associate  
Professor  
Co-director



**Lewis Frey, PhD**  
Associate  
Professor



**Alexander  
Alekseyenko, PhD**  
Associate Professor



**Brandon Welch, PhD**  
Assistant Professor



**Vivienne Zhu,  
MD, MS**  
Assistant Professor



**Stephane Meystre,  
MD, PhD**  
Associate Professor

Part time



**Christine Carr, MD**  
Professor

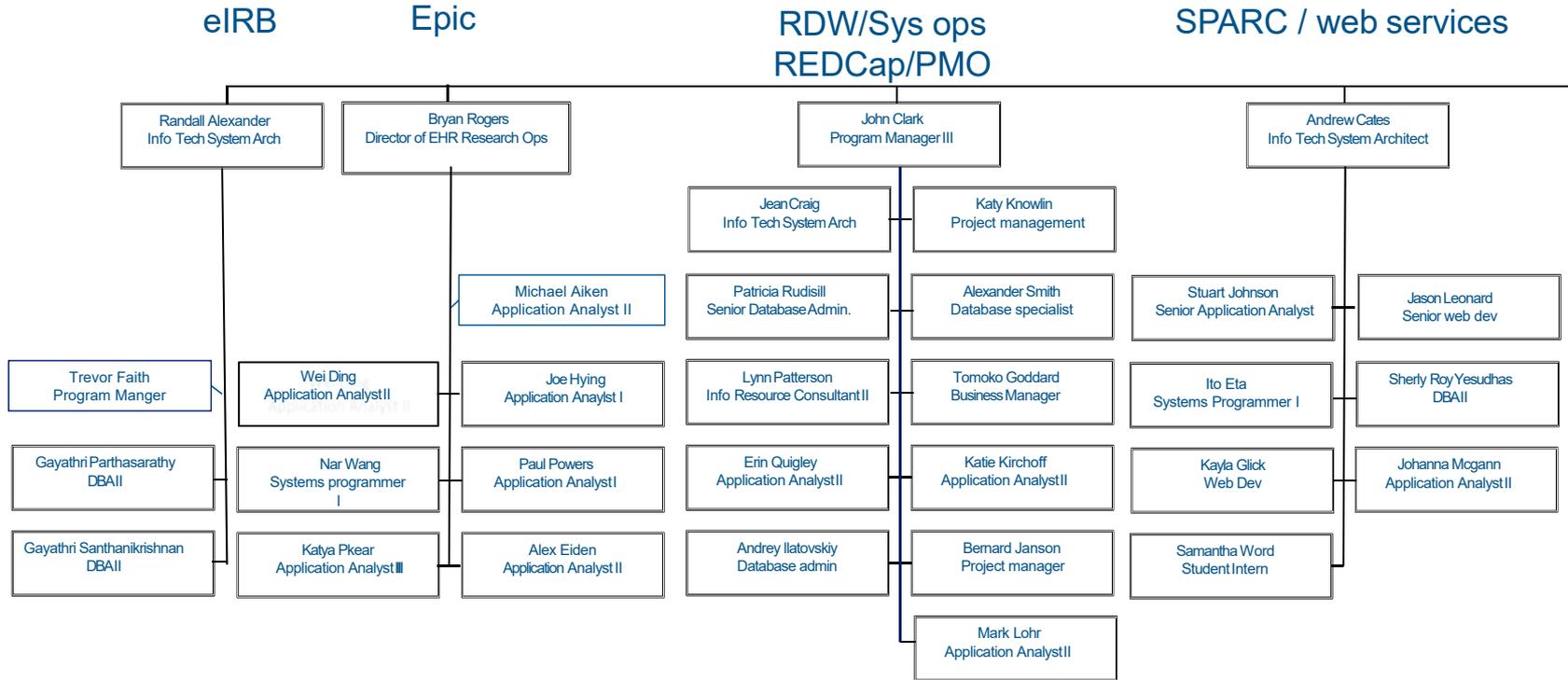


**Christopher Metts, MD**  
Assistant Professor

*THE ONLY BIOMEDICAL INFORMATICS PROGRAM IN SC*



# BMIC Operations Teams



# SPARC Request: <https://sparc.musc.edu/>



South Carolina  
Clinical & Translational  
Research Institute



SPARCRequest

SPARCDashboard

SPARCInfo

Login / Sign Up



## STEP 1: Add/Update Services

Browse Service Catalog

- Medical University of South Carolina
  - CEDAR: Comparative Effectiveness and Data Analytics Research Resource
  - Center for Biomedical Imaging
  - Center for Genomics Medicine
  - ClinCard by Greenphire
  - Cores & Facilities
  - Laboratory Services
  - National Center of Neuromodulation for Rehabilitation (NC NM4R)
  - Office of Clinical Research (OCR)
  - Office of Research Integrity
  - South Carolina Clinical and Translational Research Institute (SCTR)

Search by Service Name, CPT Code, or EAP ID

South Carolina Clinical and Translational Research Institute (SCTR)

The South Carolina Clinical and Translational Research Institute (SCTR) is the catalyst for changing the culture of biomedical research, facilitating sharing of resources and expertise, and streamlining research-related processes to bring about large-scale, change in the clinical and translational research efforts in South Carolina.

News

There is no recent news. Please check back later.

Calendar

- Dec 11 SPARC OS Technical Committee Monthly Call 3:00 PM - 4:00 PM Show Details
- Dec 12 SPARC OS \_Operations Review 3:00 PM - 4:00 PM Show Details
- Dec 19 SPARC OS \_Operations Review 3:00 PM - 4:00 PM Show Details

My Services

Open	Completed
You do not have any active requested Services	

Continue

Help/FAQs

Feedback

Contact Us

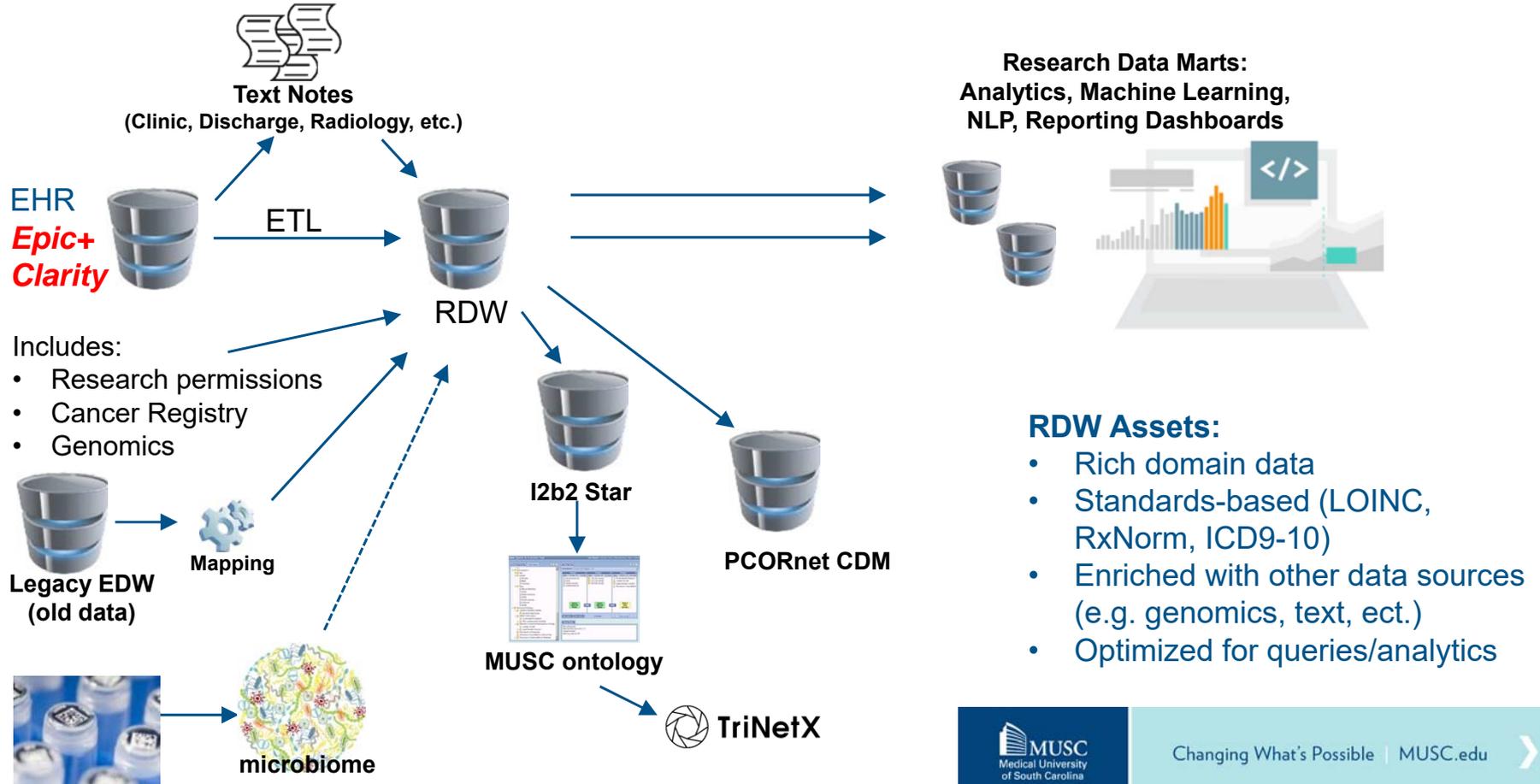


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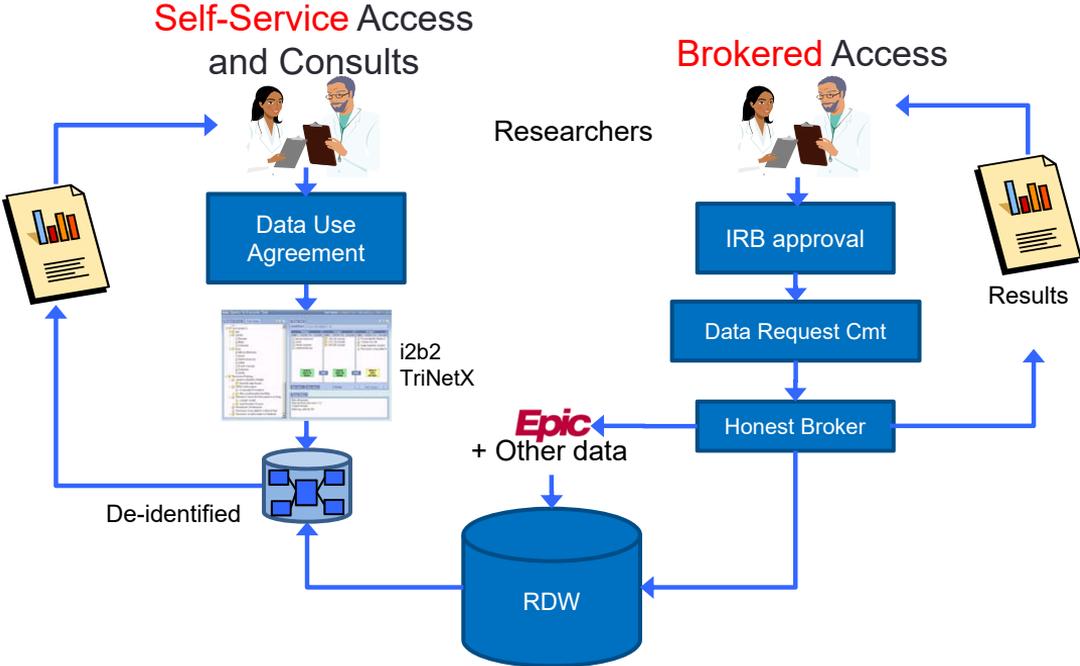


# MUSC Research Data Warehouse (RDW)



# Governance of EHR Data for Research (IRB Approved)

Including **data consults** and **honest broker** for identified data access



**i2b2 Query & Analysis Tool** Project: MUSC User: jio2 Find Patients | Analysis Tools | Help | Change Password | Logout

**Navigate Terms** Find

- Allergies
- Assessments
- Cancer Registry
- Clinical Results
- Clinical Trials
- Computable Phenotypes
- Demographics
- Diagnoses
- Immunizations
- Labs
- Medications
- Problem List
- Procedures
- Research Permissions
- Supplemental Data Available

**Query Tool**

Query Name: \_\_\_\_\_

Temporal Constraint: Treat all groups independently

Group 1	Group 2	Group 3
Dates Occurs > 0x Exclude	Dates Occurs > 0x Exclude	Dates Occurs > 0x Exclude
Treat Independently	Treat Independently	Treat Independently
drop a term on here		

Run Query Clear 0 Groups New Group

Show Query Status Graph Results Query Report

**Workplace**

- SHARED
- jio2@musc.edu

**Previous Queries** Find

- a. <= 5 Mile@08:08:28 [12-18-2018] [jio2@musc.edu]
- AMD\_v1 [9-6-2018] [jio2@musc.edu]
- All enc in 2 yrs@16:06:57 [7-9-2018] [jio2@musc.edu]
- All Encou@16:05:42 [7-9-2018] [jio2@musc.edu]



TriNetX

MUSC demographics

SCD (ischemic stroke)

Jihad Obeid - TriNetX Live  
Community | Help

- My Studies
- Trial Connect
- Query Builder
- Explore Cohort
- Demographics
- Diagnoses
- Procedures
- Medications
- Labs
- Genomics
- Analyze Criteria
- Rate of Arrival

☆
MUSC only ✎

1,700  
PATIENTS

1  
HCOS

Run

View History

**Demographics**

Range

Months (0-36)

Years (0-89)

Type of Graph

Grouped

Stacked

Sex

Female

Male

Total Patients	Minimum Age	Maximum Age	Mean Age	Standard Deviation
1,700	0	90	29	18

**Sex**

Female 56%

**Race**

Black or Afri... 93%

New Query
Hide

Filter By: Filter ▾      Sort By: Most Recent ▾

- ☆
Unnamed ✎

10  
Patients
 1  
HCOS
- ☆
IC ✎

90  
Patients
 1  
HCOS
- ☆
MUSC only ✎

1,700  
Patients
 1  
HCOS
 

Medical University of Sout... May 15, 2019, 3:50 pm  
By Jihad Obeid
- ☆
SCD+IC+ICH ✎

20  
Patients
 3  
HCOS
- ☆
SCD+IC (new) ✎

220  
Patients
 4  
HCOS
- ☆
SCD all ✎

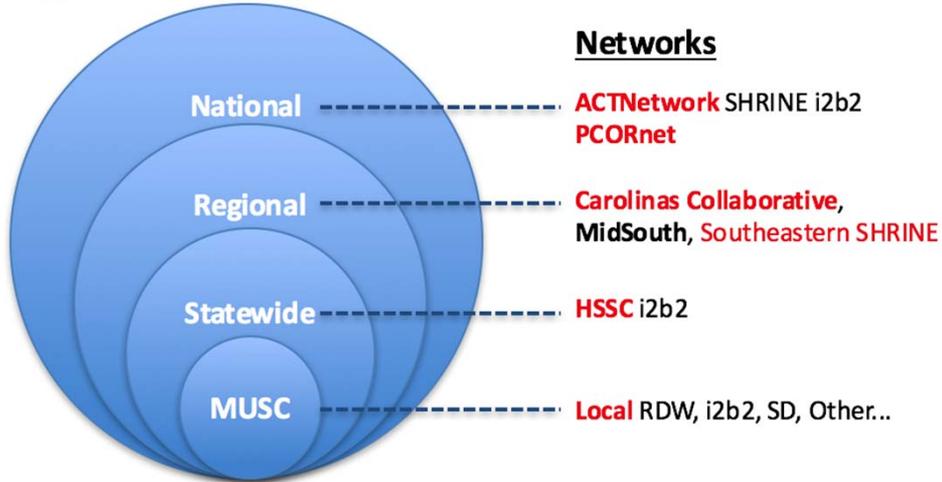
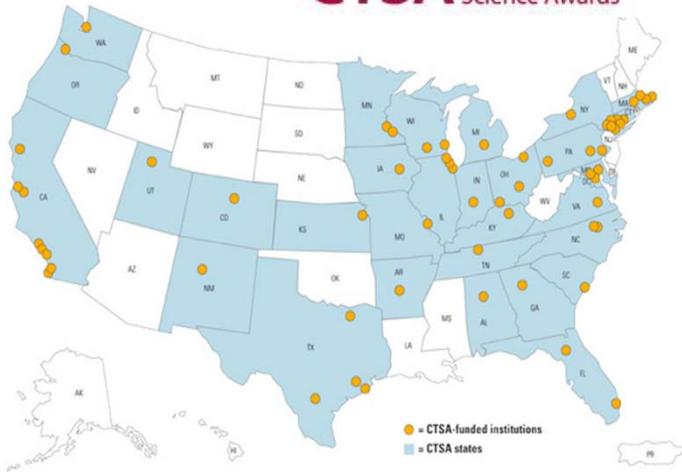
3,840  
Patients
 4  
HCOS

Medical University of South Carolina

# Collaborative Networks



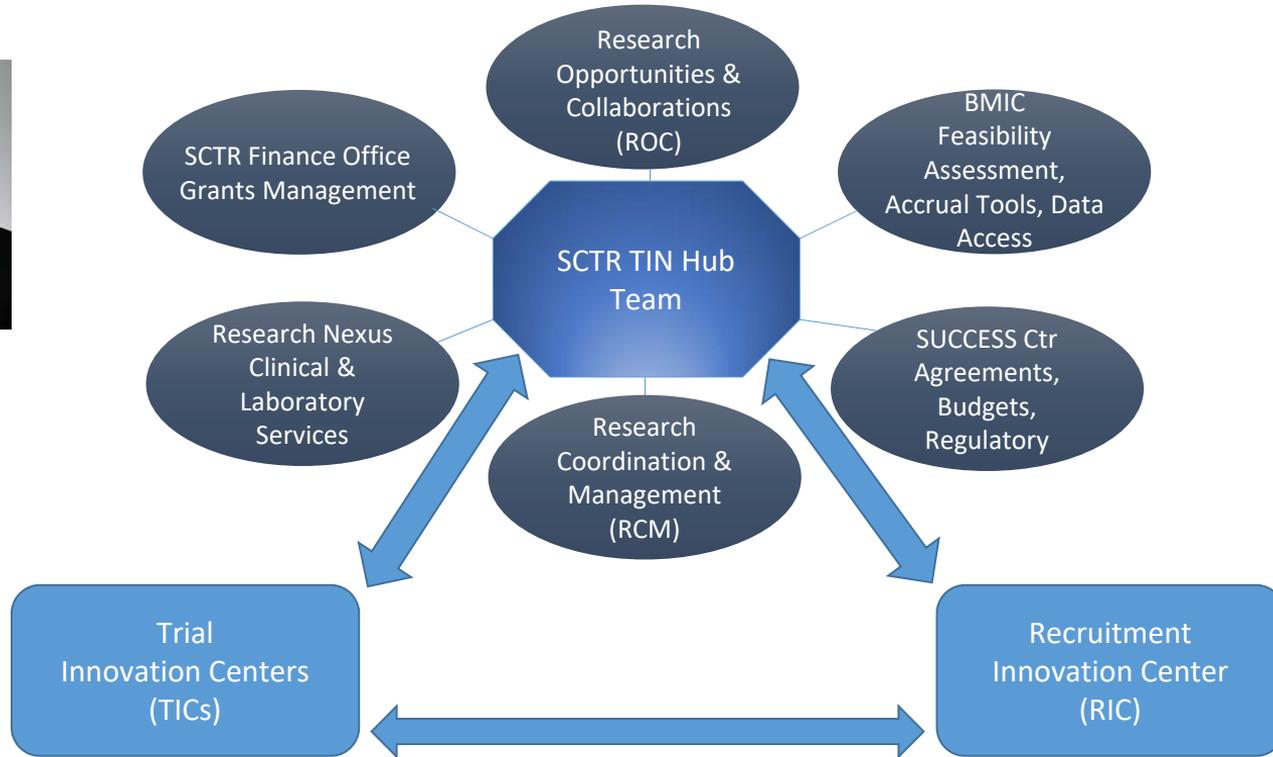
CTSA Clinical & Translational Science Awards



# Network Capacity (SCTR)



Dr. Marc Chimowitz  
Program Director



Signe Denmark, MS, CCRP  
Associate Director,  
Research Opportunities &  
Collaborations

- Aim 1: Optimize processes to operationalize TIN clinical trials
- Aim 2: Train and assist clinicians for multisite clinical trials
- Aim 3: Enhance novel recruitment strategies: NLP, telehealth, community...



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# MUSC Research Preferences

## Questionnaire in Epic MyChart & in clinic

### Retention / Disposal and Use of Blood, Body Fluids, or Tissue.

**Biobank**

I understand that any blood, body fluids or tissues normally removed from my body by MUSCHealth, including its hospital(s), physicians and staff, in the course of any diagnostic procedures, surgery, or medical treatment that would otherwise be disposed of may be retained, and used for research, including research on the genetic material (DNA) or other information contained in those tissues or specimens. I acknowledge that such research by MUSCHealth, may result in new inventions that may have commercial value and I understand that there are no plans to compensate me should this occur, regardless of the value of any such invention. I understand that any research using these leftover specimens or tissues will be done in a way that will not identify me. If I have questions, I should call (843) 792-8300 or visit <http://www.muschealth.org/clinical-trials/>.

I AGREE to have my leftover blood, body fluids or tissue used for future research studies.

I do not agree to have my leftover blood, body fluids or tissue used for future research studies.

I am not ready to make a decision at this time

### Preference for Contact by Research Studies.

**Contact**

I understand I may be contacted about future research studies at MUSC for which I may be eligible. If I have questions, I should call (843) 792-8300 or <http://www.muschealth.org/clinical-trials/>

I AGREE to be contacted about future research studies.

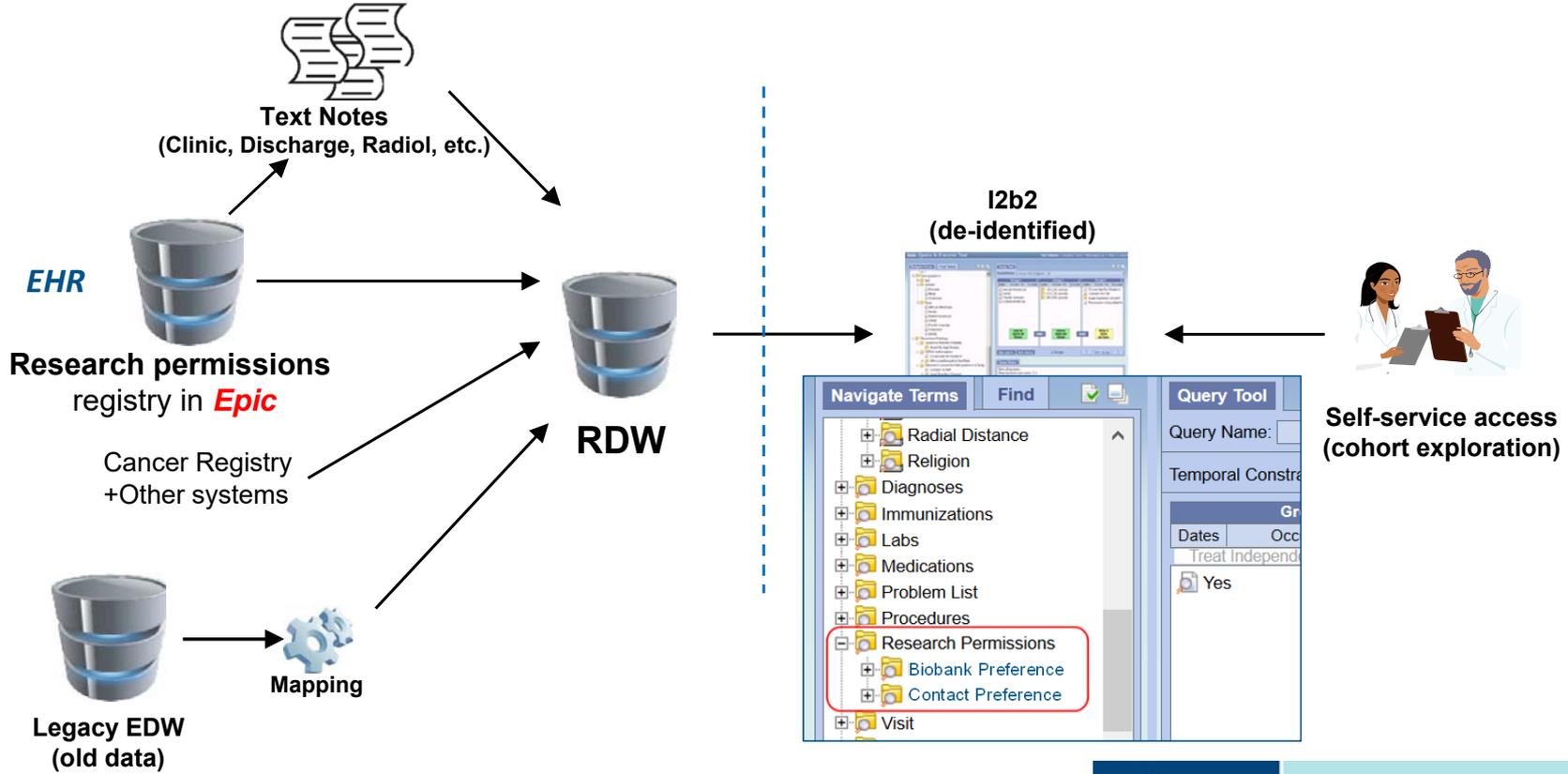
I do not agree to be contacted about future research studies.

I am not ready to make a decision at this time.

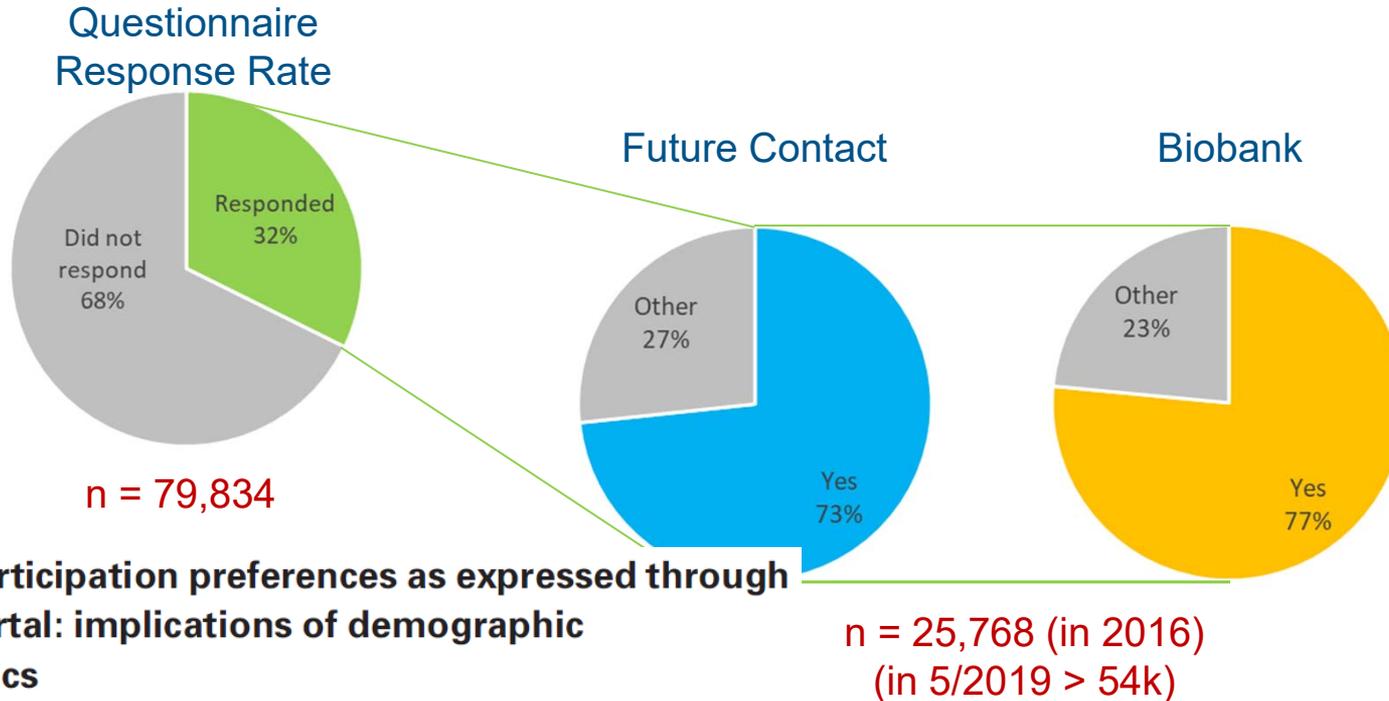
If at any time you would like to update your research preferences, you may modify them from the Questionnaires section...



# Research Permissions Registry Expressed in i2b2



# Response Breakdown



**Research participation preferences as expressed through a patient portal: implications of demographic characteristics**

Jihad S. Obeid,<sup>1</sup> Azza Shoaibi,<sup>1</sup> Jim C. Oates,<sup>2,3</sup> Melissa L. Habrat,<sup>1</sup> Chanita Hughes-Halbert,<sup>4</sup> and Leslie A. Lenert<sup>1</sup>

*JAMIA Open*, 1(2), 2018, 202–209  
doi: 10.1093/jamiaopen/ooy034



# Race Breakdown: across patient portal and research permissions



Attrition in minorities across the process

# Outline

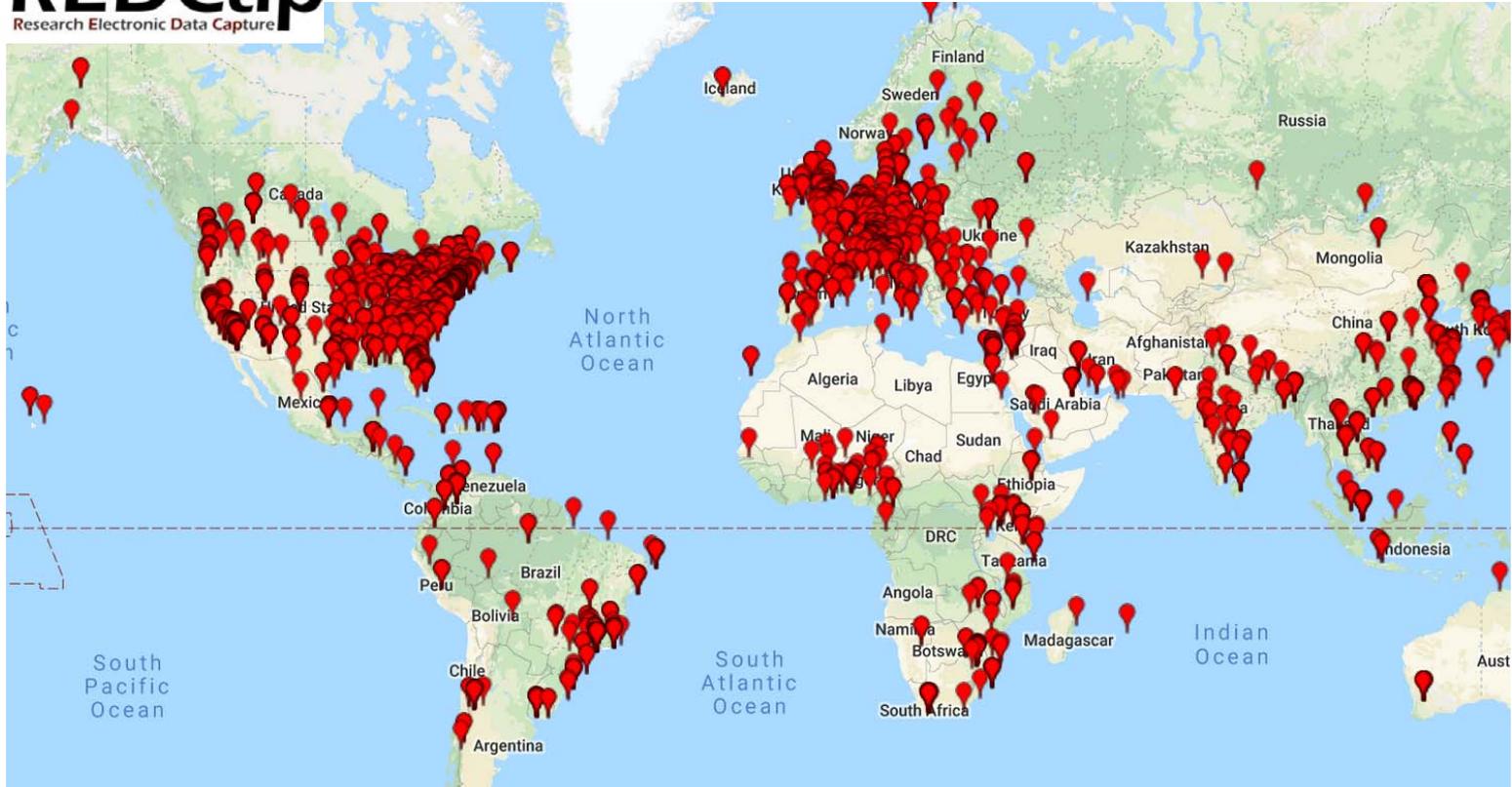
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- Electronic Data Capture for research studies:
  - Allows you to construct case report forms (CRF) online
  - Enter data via the web or mobile app
- Allows design of surveys
  - Collect data directly from participants
  - Can send links to specific individuals or via MyChart or online link
- Allows you to import/export data to statistical packages (SAS, R, SPSS) and CSV/Excel
- Easy to share data dictionary
- Secure web interface; Data integrity; Data center security and backup; HIPAA compliance





## Example Form

Editing existing Study ID 101

Event Name: **Event 1**

Study ID: 101  
(To rename this record, modify the value immediately below.)

Study ID: 101

**Demographics Characteristics**

Date subject signed consent:  Today Y-M-D  
YYYY-MM-DD

First Name:

Last Name:

**Patient Contact Information**

Street, City, State, ZIP:

Phone number:  Include Area Code

Second Phone number:  Include Area Code

E-Mail:

Gender:

Has the subject given birth before?  No  Yes

Ethnicity:  Hispanic or Latino  NOT Hispanic or Latino  Unknown / Not Reported

Race:  Amer. Indian/Alaska Native  Asian  Native Hawaiian or Other Pacific Islander  White  More than one race  unknown / Not Reported

Date of Birth:  Today Y-M-D

## Branching Logic

### Drag-N-Drop Logic Builder

Displaying field choices for the following data collection instrument:

Demographics

**Field choices from other fields**  
(drag a choice below to box on right)

study\_id = (define criteria)  
last\_name = (define criteria)  
first\_name = (define criteria)  
dob = (define criteria)  
sex = Female (0)  
sex = Male (1)  
address = (define criteria)  
phone\_number = (define criteria)  
problems = a (1)

→  
Drag  
and  
Drop  
→

Show the field ONLY if...

- ALL below are true  
 ANY below are true

[Clear logic](#)

Save

Cancel





## Supports Consent/Assent Forms + electronic signatures

### Alternative Procedures:

If you do not want to participate in this study, please inform your counselor and you will continue with typical counseling sessions.

### Confidentiality:

All of the information provided in this survey will remain completely anonymous and confidential. All information will be coded with a number so that names will not be present on any of your records. All of your information will be stored securely on password protected computers. Only study personnel will have access to your information unless we learn of clear and imminent danger to you or someone else, reasonable suspicion that a child or elder is currently being abused, or by court order.

### Person to Contact:

For more information or to obtain answers to any questions, please contact Dr. Mark Weist, professor at USC and lead for the study at (803)777-0449; [weist@mailbox.sc.edu](mailto:weist@mailbox.sc.edu) or Research Coordinator, **Name**, **phone number**, **email** at any time. Please also visit our website, **website** link, for more information.

### Institutional Review Board:

If you have questions about you or your child's rights in this study, please contact the IRB Manager, Office of Research Compliance, University of South Carolina, 1000 North Main Street, Room 414D, Columbia, SC 29208, phone: **phone number** or **email**.

### Consent:

By signing this form, I confirm that I have read and understand the information provided, I have given the opportunity to ask questions or request more information, I have signed voluntarily and that I have the opportunity to withdraw at any time.

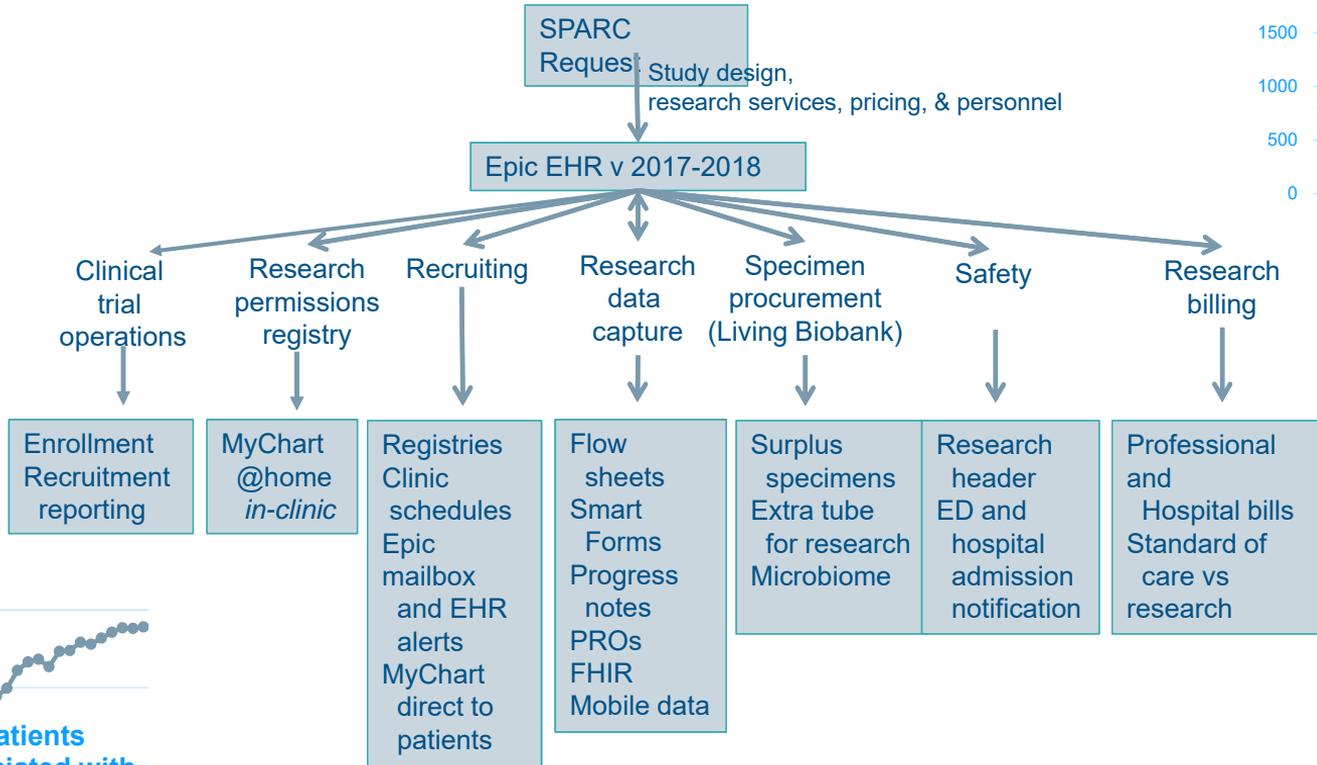
The screenshot shows a digital form interface. A white modal window titled "Add signature" is centered on the screen. Inside the modal, there is a section labeled "Participant Signature" with a dashed-line box for the signature. A yellow sticker with the text "SIGN HERE" is placed on the top left of the signature box. Below the signature box, there are two buttons: "Save signature" and "reset". The background of the form is partially visible, showing a table with columns for "Participant Signature", "Form Status", and "Complete?".

# Outline

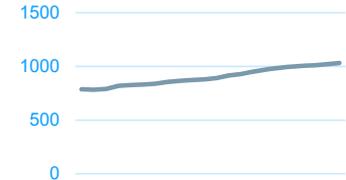
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# Epic Research Team



Number of Epic research users



Active Trials in Epic



# Living Biobank: Specimen/data request submission

### New Specimen Request

**Protocol Information**

Please provide your [Research Master ID](#) so that we can fill in information about your Protocol for you.

Research Master ID \*

Could not find a corresponding Protocol. Please fill in the information below to create a new Project

Title \*  Short Title \*

Brief Description

Funding Status \*  Funding Source \*  Timeline \*  to

Primary PI \*

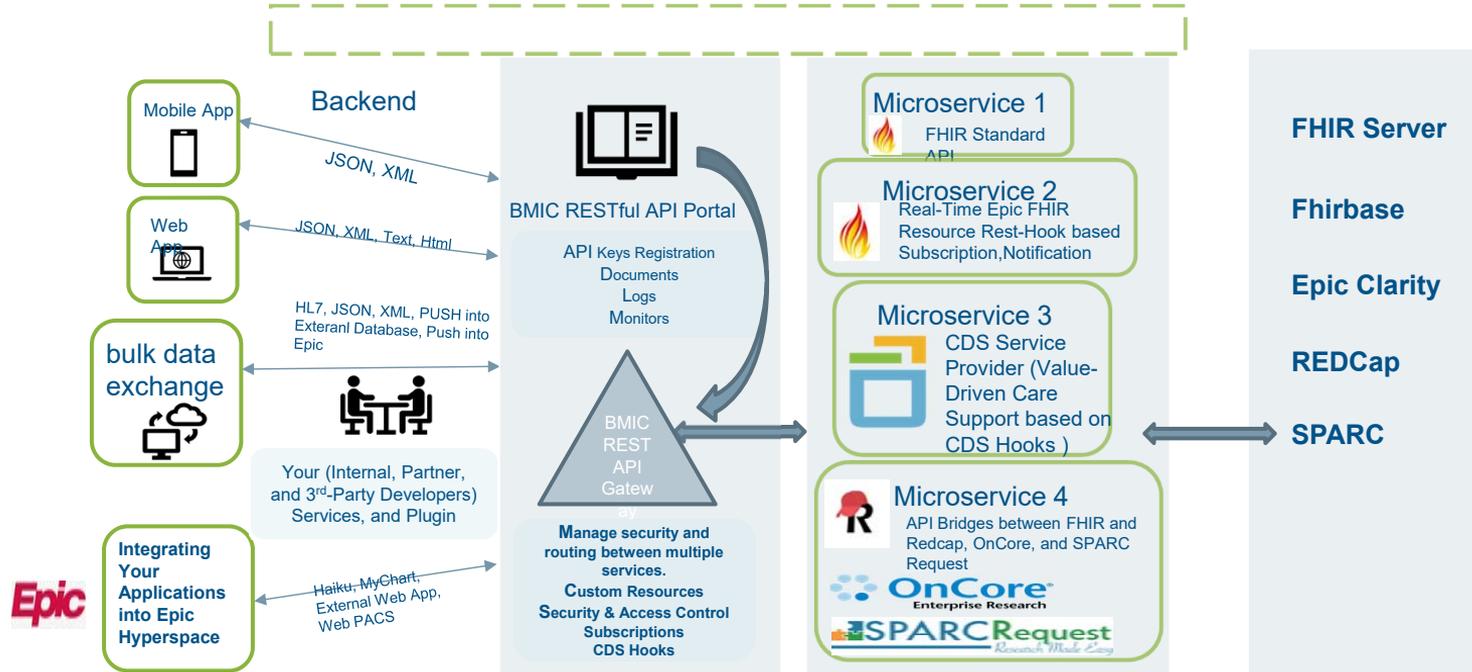
**Request Specimens**

Information about creating an i2b2 Query can be found at <http://academicdepartments.musc.edu/bmic/DataRequest.html>

Specimen Source *	i2b2 Query *	Quantity Requested *
<input type="text" value="Please Select"/> <ul style="list-style-type: none"><li>Please Select</li><li>Blood</li><li>Nasal Swab</li><li>Perianal Swab</li></ul>	<input type="text" value="Sparc12419-0004_14_Lenert_uncontrolled_diabetes_w_depression"/>	<input type="text" value="20"/>



# BMIC Gateway Streamlines Two-way Integration with Epic



# Patient Reported Outcomes (PRO): e.g HIV/Infectious Disease Clinic PRO

## Clinic Screening Questionnaire

Thank you for answering the following questions about your health today. Your doctor will use your responses to better understand how you are doing and how they might best address your health needs.

When was the last time you missed taking any of your HIV medications?

How many days have you missed your HIV medications since your last visit?

Since your last visit in our clinic, how often have you:

had little interest or pleasure in doing things?

felt down, depressed, or hopeless?

had trouble falling or staying asleep, or sleeping too much?

felt tired or had little energy?

had poor appetite or overeaten?

felt bad about yourself, or that you are a failure, or have let yourself or your family down?

had trouble concentrating on things, such as reading the newspaper or watching television?

moved or spoken so slowly that other people could have noticed. Or the opposite, been so fidgety or restless that you have been moving around a lot more than usual?

How often do you have a drink containing alcohol?

How many drinks containing alcohol do you have on a typical day when you are drinking?

How often do you have six or more drinks on one occasion?

- Combination of the PHQ2, a custom medication adherence PRO, and a validated alcohol screening assessment into one streamlined PRO
- Automated send out of assessments through MyChart prior to clinical visit
- In clinic collection of PRO for those that do not use MyChart or complete the PRO ahead of time.



# Patient Questionnaire: e.g. IPV Screening Tool

**This is a non-production environment. If you are a patient, contact the system administrator immediately. [X]**

## Healthy Relationships Screening

For an upcoming appointment with **James C. Oates, MD** on 10/16/2019

Because violence is common in many people's lives and can impact health, we would like to ask you a few questions about safety in your relationship. Your answers on this self-report measure will be confidential and no one will take action based upon your responses on this screening without further speaking with you. Your doctor may follow-up with you about the information you provide to ensure your safety.

\* Indicates a required field.

\* Have you been hit, kicked, punched, pushed, shoved, or otherwise hurt by someone at home in the past year?

Yes  No  Prefer not to answer

\* Do you feel safe in your current relationship?

Yes  No  Not Applicable  Prefer not to answer

\* Is there a partner from a previous relationship who is making you feel unsafe now?

Yes  No  Prefer not to answer

**CONTINUE** **FINISH LATER** **CANCEL**

Proceed to next page



# Provider Smart Form: e.g. IPV Screening Tool

IPV

Historical QNR Data

Historical Provider...

QNR Response

Documentation

## IPV Provider Assessment Smartform

### Suggested verbiage for physician

As your doctor, I am concerned about your safety in your relationship. I want you to know that you are not alone and help is available. I do have several questions that may assist me in best being able to help you.

### Provider Follow-up Safety Questions

Does your partner have access to a firearm?



Yes

No

Is your partner here at the clinic today?



Yes

No

I am concerned that you are in danger. For your safety do you want me to help you connect to police to make a report and keep you safe?



Yes

No

For your safety do you want me to help you connect to the local domestic violence shelter to hear about ways to stay safe either remaining in the relationship or how to leave is a safe way?



Yes

No

### Physical Exam

Was a physical exam performed?

Yes

No

Pt declined

### Strangulation Protocol

The pt answered that the strangulation took place within the past week. Examine inside of throat, neck, face, and scalp for physical signs of strangulation document in the physical exam section below.

Was there more than one strangulation attempts within the past week?

Yes

No

# Recruitment Reports

Reports NON-PRODUCTION - SUP

Research: Pro # [redacted] Chart Review - Cohort 1 [redacted] as of Wed [redacted] 3:54 PM

Filters Options | Research Studies | Chart | Encounter | Communication | Add to List | Send Multi-Patient Message | Send Recruitment Request

Refresh Selected Select All

Patient Name	Internal ID	MRN	Age	Patient	DOB	Sex	Race	Ethnicity	Language	ZIP Code	Current Medications
[redacted]	[redacted]	[redacted]	14	[redacted]	[redacted]/2004	Female	Other	Hispanic or Latino [2]	Spanish	[redacted]	ketotifen (ZADITOR) 0.025 % (0.035 %) ophthalmic solution loratadine (CLARITIN) 10 mg tablet
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]/2007	Male	Black or African American	Not Hispanic or Latino [1]	English	[redacted]	(E) a cream HFA; mcg/ (QVA) cetirizine fluticasone
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]/2004	Male	Other	Hispanic or Latino [2]	Spanish	[redacted]	

Snapshot

**Demographics**

[redacted] Female 15 y.o.

**Allergies**

No Known Allergies

**Current Outpatient Medications**

ketotifen (ZADITOR) 0.025 % (0.035 %) ophthalmic solution  
loratadine (CLARITIN) 10 mg tablet

**Problem List**

None

3256 results found Load All

# Research Coordinator Order Sets

The screenshot displays a medical software interface for a patient named Zzztest, Qira. The patient's information includes age (29 years), gender (Male), and various insurance and demographic details. The visit is dated 10/16/2019 and is for 'Orders Only' with James C. Oates, MD.

The interface features a left-hand navigation menu with options such as Snapshot, Chart Review, Review Flows..., Results Review, Medications, Immunizations, Enter/Edit Res..., Education, Communicatio..., Encounter, and Customize. The 'Encounter' section is currently active, showing options for Follow-up, Sign Visit, and Routing.

The main content area is titled 'SmartSets' and displays an order set for 'RHU Bursitis'. The order set includes the following sections:

- Documentation**
- Diagnoses**
  - Bursitis [727.3]
  - Enthesopathy of ankle and tarsus [726.70]
  - Enthesopathy of elbow [726.30]
  - Enthesopathy of hip region [726.5]
  - Wrist tendonitis [727.05]
- Labs / Imaging**
- Medications**
  - Depo-medrol
    - methylPREDNISolone acetate (DEPO-MEDROL) injection 40 mg/mL
- NSAIDs**

At the bottom of the interface, there are buttons for '+ ADD ORDER' and 'SIGN ENCOUNTER'.

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# State-wide IRB Cooperative Review: electronic IRB system (eIRB)

ID	Name	Date Modified	Owner	State	Current Approval Date	Review Type	PI	ExpDate	Campus	IRB
Pro00015991	Clinical Database for Rehabilitation Research after Neurological Injury	7/18/2014 9:35 PM	Haynes, Amy Eaddy	Approved	4/8/2014	Expedited	Kautz	4/7/2015	Medical University of South Carolina	IRB - Medical University of South Carolina
Pro00009273	HSSC-CDW for Research	7/15/2014 9:15 AM	Young, MPH, CP, Summer H	Approved	1/7/2014	Full IRB Review	Obeid	1/6/2015	Medical University of South Carolina	IRB - Medical University of South Carolina
Pro00026255	SEARCH for Diabetes in Youth MUSIC CDW Plus	7/10/2014 4:00 PM	Haynes, Amy Eaddy	Approved	6/25/2014	Expedited	Obeid	6/24/2015	Medical University of South Carolina	IRB - Medical University of South Carolina

Journal of Biomedical Informatics  
Volume 60, April 2016, Pages 58-65



## IRB reliance: An informatics approach

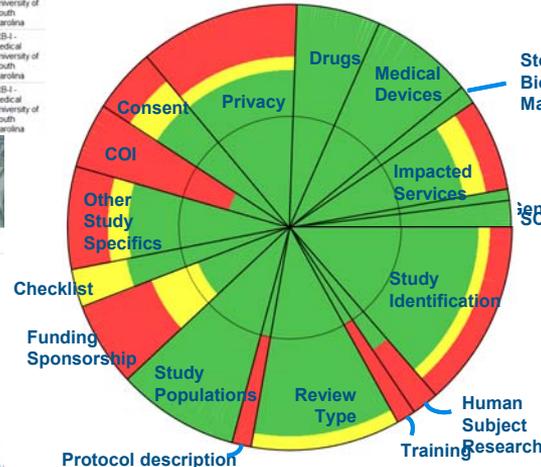
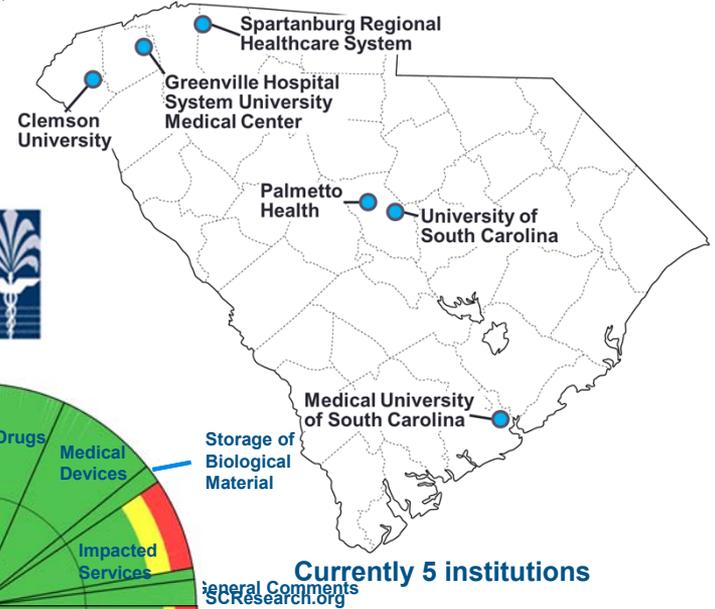
Jihad S. Obeid <sup>a, R, E</sup>, Randall W. Alexander <sup>a</sup>, Stephanie M. Gentilin <sup>a</sup>, Brigette White <sup>a</sup>, Christine B. Turley <sup>b</sup>, Kathleen T. Brady <sup>a</sup>, Leslie A. Lenert <sup>a</sup>

Show more

<https://doi.org/10.1016/j.jbi.2016.01.011>

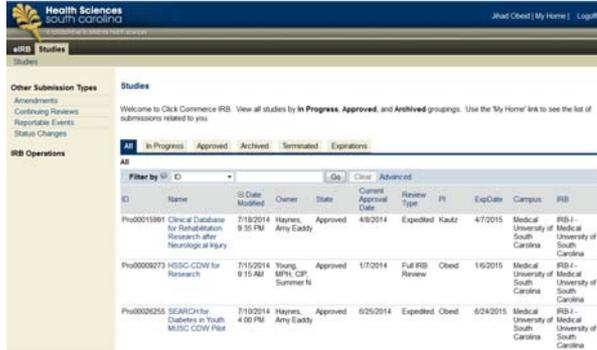
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- Pages customized for 2 institutions
- Pages in common to all institutions

# SResearch.org



Health Sciences south carolina

Studies

Other Submission Types

- Amendments
- Continuing Reviews
- Reportable Events
- Status Changes

IRB Operations

Studies

Welcome to Click Commerce IRB. View all studies by **In Progress**, **Approved**, and **Archived** groupings. Use the 'My Home' link to see the list of submissions related to you.

Filter by: All In Progress Approved Archived Terminated Expirations

ID	Name	Date Modified	Owner	State	Current Approval Date	Review Type	PI	ExpDate	Campus	IRB
Ph00010891	Clinical Database for Rehabilitation Research after Neurological Injury	7/18/2014 9:35 PM	Haynes, Amy Eaddy	Approved	4/8/2014	Expedited	Kautz	6/7/2015	Medical University of South Carolina	IRB-I
Ph00009273	H5SC CDW for Research	7/15/2014 9:15 AM	Young MPH, CP Summer Is	Approved	1/7/2014	Full IRB Review	Obied	1/6/2015	Medical University of South Carolina	IRB-I
Ph00020255	SEARCH for Diabetes in Youth MUSIC CDW Final	7/19/2014 4:00 PM	Haynes, Amy Eaddy	Approved	6/25/2014	Expedited	Obied	6/24/2015	Medical University of South Carolina	IRB-I



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MUSC Medical University of South Carolina | South Carolina Clinical & Translational Research Institute | CTSA Clinical & Translational Science Awards Program | HEALTH SCIENCES SOUTH CAROLINA

# Teleconsent: e-consent over telehealth platform (doxy.me)

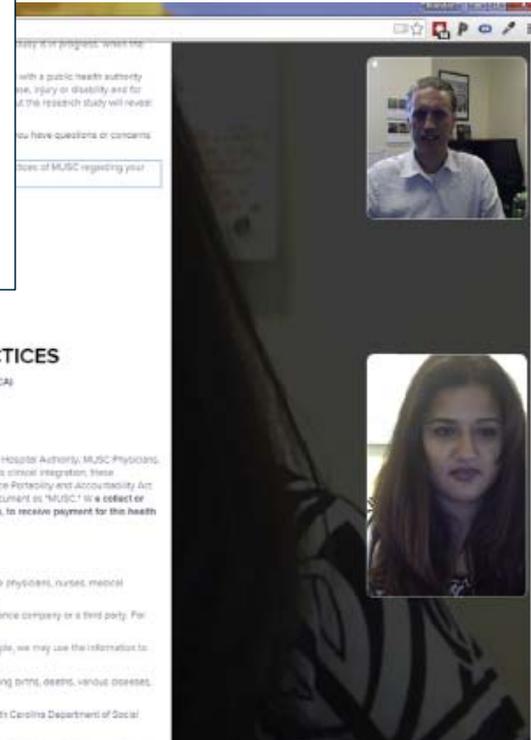
Contemporary Clinical Trials Communications

## Teleconsent: A novel approach to obtain informed consent for research

Brandon M. Welch <sup>a,\*</sup>, Elizabeth Marshall <sup>a</sup>, Suparna Qanungo <sup>b</sup>, Ayesha Aziz <sup>a</sup>, Marilyn Laken <sup>b</sup>, Leslie Lenert <sup>a</sup>, Jihad Obeid <sup>a</sup>

<sup>a</sup> Biomedical Informatics Center, Medical University of South Carolina, 135 Cannon St, Suite 405, Charleston, SC, 29425, United States

<sup>b</sup> College of Nursing, Medical University of South Carolina, 99 Jonathan Lucas St, Charleston, SC, 29425, United States



Grant number:  
R21TR002088

# Digital Health Solutions (DHS)

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## EHR & HIE Interoperability

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DHS has cutting edge solutions to advance the semantic interoperability and standards-based health information technology systems allowing for critical and successful healthcare reform within digital health landscape.



Sachin Patel



# Palmetto Profiles: Research Networking System



South Carolina  
Clinical & Translational  
Research Institute

Online CV  
Automatic  
publications  
updates

+

Find experts, collaborators,  
mentors, reviewers etc.

Clean data for network  
analysis

The screenshot displays the Palmetto Profiles web application. At the top, there's a navigation bar with 'HEALTH SCIENCES SOUTH CAROLINA' and 'Palmetto Profiles' branding. Below this, a search interface includes a 'Find people by keyword' section with a search box and a 'Find people by name/organization' section with fields for last name, first name, institution, department, and faculty type. A 'Most viewed (today)' list shows 'Myeloid Cells', 'machine learning', 'Paul', 'Women', and 'Knee'. The main content area features a network graph with nodes representing researchers and edges representing collaborations. A profile for 'Stephane Meystre' is highlighted, showing his title 'Endowed Chair, SmartState Chair of the Sciences, Trustee', a list of records, co-authors, similar people, and same department members. A sidebar on the left contains a 'Menu' with options like 'Find People' and 'Find Everything', a 'History' section, and 'Live Updates' showing publication and profile statistics.

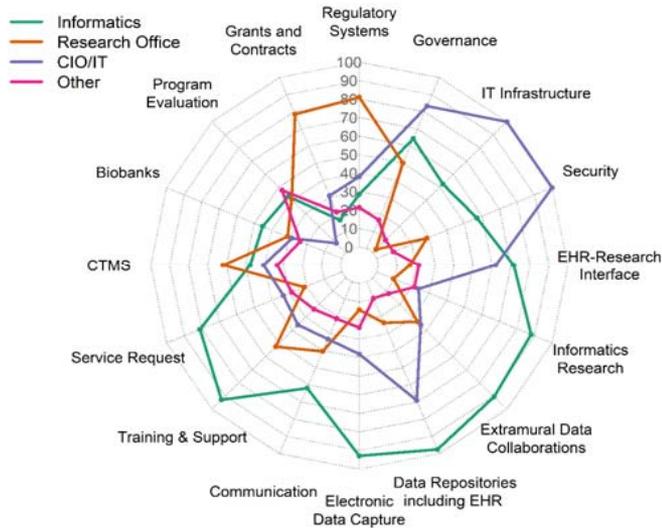


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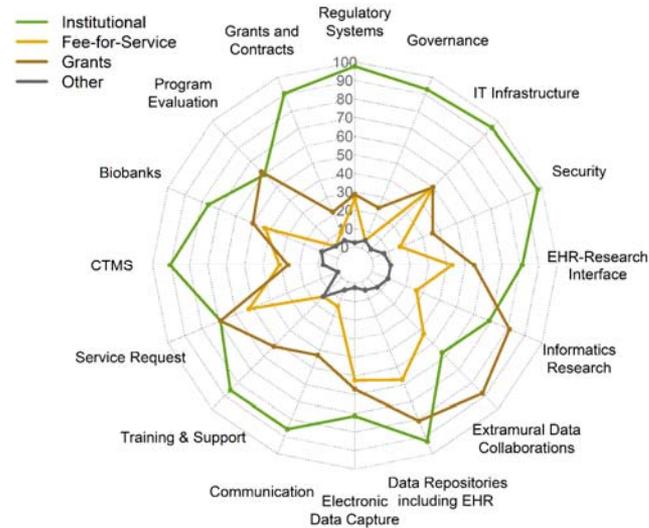




# Similar Infrastructure Across the Country: CTSA Survey



a. Locus of Control



b. Sustainability Model

Obeid JS, Tarczy-Hornoch P, Harris PA, Barnett WK, Anderson NR, Embi PJ, Hogan WR, Bell DS, McIntosh LD, Knosp B, Tachinardi U, Cimino JJ, Wehbe FH. Sustainability considerations for clinical and translational research informatics infrastructure. *J Clin Transl Sci.* 2018 Oct; 2(5):267-275. PMID: 30828467.



# Outline

- Biomedical Informatics for Translational Research
- EHR Data for Research
- Research Permissions
- Data Capture
- Epic Services
- Other Informatics Tools and Services
- **Data Science Research and Education**



# Informatics and Data Science Research

- › K07 CA211786 (Family History Data Capture)
- › 3UL1 TR001450-03S2 (Multisite e-IRB)
- › R21 TR002088 (Teleconsent for Remote Research)
- › R18 HS025654-01A (Pragmatic EHR-based trial of IPV screening)
- › R21 LM012945 (Intelligent Summarization of EHR records for IPV risk)
- › R21 TR002513 (Living Biobank: Microbiome specimens)
- › UL1 TR001450-04S1 (CTMS implementation)
- › K12 DA031794 (Zhu, Opioid abuse identification using NLP)
- › UL1 TR001450-04S2 (Cloud implementation SparcRequest)
- › U01 TR002628-01A1 (Opioid Overdose Network)
- › PCORI Improving Natural Language Processing Methods (NLP)
- › +Several Collaborative Grants



# EHR Phenotyping: Machine Learning & Text Classification

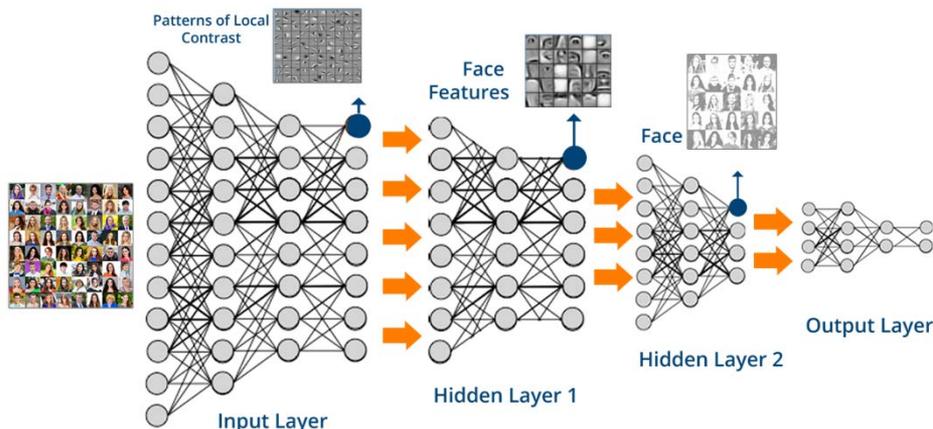
Examples outside healthcare industry:

- Sentiment analysis: e.g. book reviews
- Spam detection



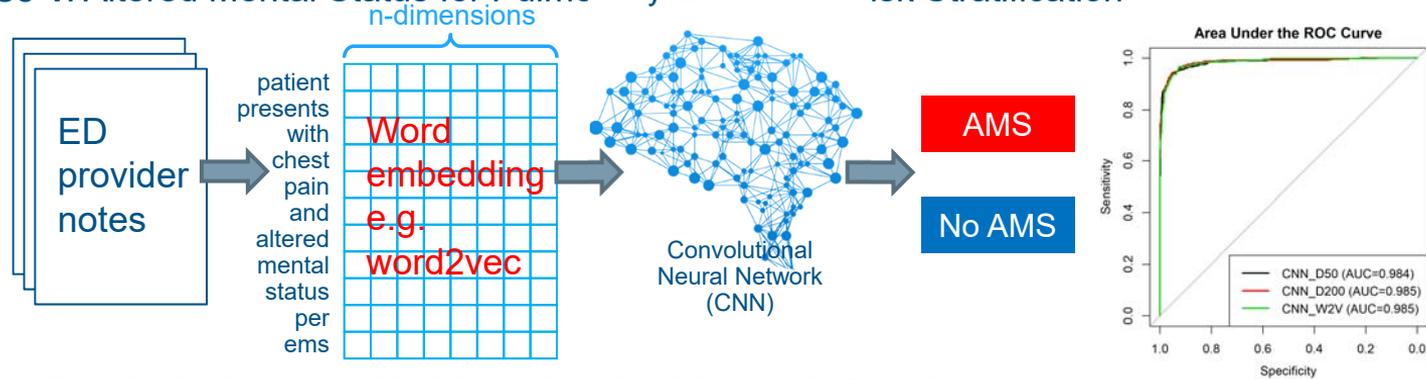
Machine learning:

- Traditional bag-of-words (BOW) models based on word frequencies
- More recently using deep learning classifiers

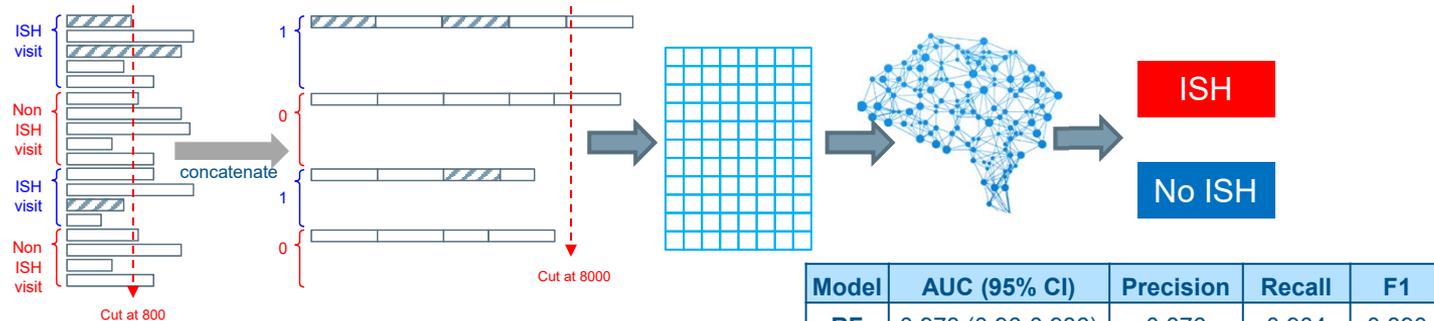


# EHR Phenotyping using Deep Learning Text Classifiers

## Use case 1: Altered Mental Status for Pulmonary Embolism Risk Stratification



## Use case 2: Suicide Attempts (ISH=intentional self harm) ICD codes



Can we predict Suicide Attempts before occurrence in EHR?

# MS in Clinical Research (MSCR)

## Overview

Training in clinical research for health care professionals

## Learning Objectives

1. Conduct a comprehensive and systematic review of the literature
2. Formulate a well-defined clinical or translational research question
3. Select an appropriate study design to address a clinical or translational research question
4. Compute, describe, and evaluate descriptive and inferential statistics appropriate to the chosen study design
5. Apply ethical codes and professional standards for the conduct of clinical and translational research

## Includes Informatics

MCR 746-01 Informatics and Data Management for Clinical Research

More at: <https://gradstudies.musc.edu/programs/masters/clinical-research>



# PhD Program in Biomedical Data Sciences and Informatics (BDSI)



Joint program between MUSC and Clemson:  
BMIC/DPHS at MUSC and  
Departments of Public Health Science and Computer Science at Clemson

More at: <https://www.cs.clemson.edu/bdsi/>

