Introducing CardX

A new community-driven domain of the CodeX™ HL7® FHIR® Accelerator

CardX Community Call
September 16, 2022

*** Call will start at 2:03pm ET ***

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# Agenda

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<th>Topic</th>
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| Introductions                              | **Melissa Christian**  
CardX Coordinator / University of Nebraska Center for Intelligent Health Care (CIHC) |
| Welcome to CodeX                           | **Dr. Su Chen**  
CodeX Clinical Director / MITRE                      |
| Introduction to CardX                      | **Dr. James Tcheng**  
CardX Champion / CIHC                                 |
| First CardX Use Case: Hypertension Management | **Dr. James Tcheng**  
CardX Champion / CIHC                                 |  
**Tom Windle**  
Informatician / CIHC                                 |
| How to Get Involved                        | **Rute Martins**  
CardX Domain Coordinator / MITRE                      |  
**Hilary Wall**  
CDC Million Hearts                                    |
| Q & A                                      | **Melissa Christian**  
Rute Martins                                           |
Welcome to CodeX
mCODE™

Minimal Common Oncology Data Elements

A growing, active community of oncology stakeholders prioritizing, building & executing use case pilots to demonstrate real world feasibility and value

mCODE STU2: http://hl7.org/fhir/us/mcode/

Collect patient data once.

Reuse for multiple use cases.
CodeX Use-Cases
Discovery -> Planning -> Execution

https://confluence.hl7.org/display/COD/CodeX+Use+Cases

**Oncology**
- mCODE++ Extraction
- EHR Endpoints for Cancer Clinical Trials
  (including, future extensions of the ICAREdata study)
- Integrated Trial Matching for Cancer Patients and Providers
- Cancer Registry Reporting
- Radiation Therapy Treatment Data for Cancer
- Prior Authorization in Oncology
- Risk Evaluation and Mitigation Strategies (REMS)
- Oncology Quality Measures

**Cardiovascular**
- CardX - Hypertension Management

**Genomics**
- GenomeX - Genomics Data Exchange
- GenomeX - Genomics Operations

--------- Stages --------
- Discovery
- Planning
- Execution
# CodeX Members
(September 2022)  
**CodeX Founders**

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CodeX™ Community of Practice
https://confluence.hl7.org/display/COD/mCODE+Community+of+Practice

A growing group of health systems and other key stakeholders, learning together in a monthly public forum focused on real-world applications of mCODE and new areas of interest around information technology applications across oncology, cardiovascular, and genomics.

Latest developments on mCODE, CodeX, and cancer data exchange
Ask questions and learn from the experience of other community participants
Develop and share best practices for clinical workflows, data modeling, and exchange

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https://confluence.hl7.org/display/COD/mCODE+Community+of+Practice
For more information on CodeX, please contact:

Dr. Su Chen
Clinical Director, CodeX
suchen@mitre.org

http://www.hl7.org/CodeX
Cardiovascular data eXchange
CardX is a new, community-driven domain of CodeX, working together to ...

- **Prioritize**
  - **Use cases** around interest and impact on patient care and research

- **Build**
  - New **FHIR IGs** needed for cardiovascular care
  - **Implementations** and updates to products

- **Execute**
  - **Pilots in the field** to demonstrate feasibility and value that enable early adoption and scale
Why CardX?

Cardiovascular medicine is rich in consensus, evidence-based guidelines and practice models proven to reduce cardiovascular morbidity and mortality.

DATA STANDARDS

ACCF/AHA 2011 Key Data Elements and Definitions of a Base Cardiovascular Vocabulary for Electronic Health Records

A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Clinical Data Standards

J Am Coll Cardiol. 2011; 58:202-22
Circulation. 2011; 124:103-23

Clinical Practice Guideline


A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines

J Am Coll Cardiol. 2018; 71:e127-e248
Circulation. 2018; 138:e484-e594
Evidence-Based Medicine

- **What is mature?**
  - Epidemiology, science – we understand the problems & have solutions
  - Pharmacology, devices – we have therapeutics that improve outcomes
  - Guidelines, policies – we have agreement about what needs to be done

- **What is incomplete (or missing)?**
  - Guidelines: written with informatics in mind (i.e., anticipating computation)
  - Device standards: that enables “plug and play” (e.g., home BP devices)
  - Data standards: clinical concepts expressed as (universal) data elements
  - Patient-facing IT: high usability systems that enable patients (e.g., medication reconciliation, guided BP management)
Why CardX?

FHIR Enabled Clinical Concepts and “Good Data”

Guidelines  Performance Measures  Registries

Clinicians  EHIS Vendors  Payers  Researchers

CardX will work with health systems, governmental organizations, medical societies, the healthcare industry, and standards organizations to promote data liquidity at the intersection of patients and clinicians and facilitate the adoption of cardiovascular guidelines, performance measures, and registries.
Why CardX?

CardX will facilitate use of CV clinical information as “good data” for assessing health and healthcare through standardized and interoperable FHIR APIs.
Use Cases
Potential CardX Use Cases

Foundation: core, interoperable cardiovascular lexicon

- Home-based management of hypertension
- Quality and performance measures assessment
- Registry submission
- Medical device assessment and surveillance
- Clinical decision support
- Research and discovery
- ...
CardX – Cardiovascular Data eXchange

A set of common data elements for cardiovascular care that is standardized, computable, clinically applicable and available in every electronic health record for patients with a cardiovascular diagnosis.

A standard health record for cardiology
Builds on the methods and technologies of mCODE

An expert validated set of data elements applicable to all cardiovascular conditions, and collected for:

- Standardized information exchange
- Use-case driven and targeted use

Cardiology data element domains: patient, disease, treatment, outcomes, device, lab/vital

mCODE STU2: http://hl7.org/fhir/us/mcode/
Hypertension Initiatives (partial list)

- JCCDS – ACC/AHA data standards in CV medicine – Hani Jneid, Bruce Bray
- CIMI AMA FHIR IG – blood pressure data – Corey Smith, Greg Wozniak
- OHSU FHIR IG – COACH app for home BP management – David Dorr
- Clinical Practice Guidelines on FHIR (CPG on FHIR) – Don Casey
- Public Health Informatics Institute (PHII) – Danielle Sill
- CDC Million Hearts – Hilary Wall, Janet Wright
- CMS – digital quality measures
- USCDI v4 – vital signs, demographics standards, proposal to add average BP
- HL7 Mobile Health workgroup – consumer mobile health functional framework
- AHA – National Hypertension Control Initiative
Hypertension Use Case

**Problem**
- Hypertension affects 115 million adults in America
- Lack of adherence to clinical guidelines to diagnose, treat, and manage hypertension
- Home BP monitoring is the standard for hypertension management, however there are no data exchange standards

**Solution**
- Integrated standard that enables interoperable, scalable, and accessible HTN management both at home and clinic

**Desired Impact**
- Provide patients, physicians, APPs, nurses, medical assistants, pharmacists, and dieticians with the tools needed to adhere to hypertension guidelines
- Increase data liquidity between blood pressure measurements captured at home with those captured in the clinic
Clinician Encounter (Outpatient) (e.g., cardiology, internal medicine, family medicine)

EHR
- Demographics
- Vitals
- Diagnoses
- Prescriptions
- Labs
- Social history
- Care plan

ASCVD Risk Calculator
American College of Cardiology

Clinical Decision Support, Guidelines
- HTN management
- Performance measures
- Clinical documentation

Home Monitoring (asynchronous, semi-autonomous)

PHR
BP / Health Management Portfolio

FHIR Personal Medical Device

KEY
Purple: not in scope
Orange: our responsibility to define
Dark blue: collaboration with stakeholders at data exchange & implementation levels
Light blue: high level data content

FHIR BP1 (EHR to PHR: both push to and call from PHR)
- Demographics: patient ID, DOB, MRN, sex, race, ethnicity
- Vitals: SBP, DBP, HR, height, anatomic location, measurement location
- Diagnoses: HTN, DM, CKD, kidney transplant, pregnancy, comorbidities ...
- Assessment: EtOH, diet, nicotine, activity, stress
- Labs: cholesterol, HDL
- Meds: ASA, statin, HTN rx, HTN aggravating rx, RxClass (as taken)
- Care plan: HTN target, care plan components, education

FHIR BP2 (episodic PHR to EHR: BP data, clinician messaging)
- Demographics: patient ID, DOB, MRN
- Vitals: SBP, DBP, average BP, HR, anatomic location, measurement location, weight
- Meds: ASA, statin, HTN rx, HTN aggravating rx, RxClass (as taken)
- Social: diet, tobacco, EtOH, exercise, behavioral
- Patient-reported outcome measures (PROM)

FHIR Personal Medical Device
- Patient ID
- Device ID
- Vitals: SBP, DBP, HR, anatomic location
- Measurement location (home)
- Date and timestamp
Technical Approach

- Map and disambiguate Guidelines and Performance Measures (ACC/AHA, AAFP, NQF, etc.) into core concepts and corresponding data elements
- Identify sources of data in context of processes and workflows
- Specify, build FHIR profiles and implementation guides
  - From device or device gateway, self-monitored BP data will be exchanged with a Patient Data Manager (PHR)
  - Separate FHIR-based exchanges will connect the Patient Data Manager / PHR with the EHR
Use Case Execution: Multi-Phased Approach (Notional)

Phase 0: Foundations
- Convene community
- Map guidelines to discrete clinical concepts
- Enlist subject matter experts
  - Candidate list of data elements and value sets, mapping of data elements, data uses defined with stakeholders

Phase 1: Enable Data Exchange
- Express concepts through FHIR Implementation Guide (IG)
- Pilot data exchange with implementers using synthetic data
  - Draft, test, refine IG
  - Full IG data set exchanged
  - Technical requirements documented in IG

Phase 2: Proof of Use
- Real world demonstrations with multiple implementers
  - Implement across additional health systems and devices
  - ↑ # of health systems
  - ↑ # of device vendors
  - Ensure process can be scaled
  - Gauge user experience and make adjustments

Scale to Widespread Adoption
How to Get Involved
Call to Action

- Actively participate in the CardX community
  - Answer a short survey
    - Share your perspectives on CardX and CardX use cases (survey to be sent by email)
  - Join CardX and the Hypertension Management Use Case team
    - Help develop implementable FHIR-based specifications
    - Contribute your real-world expertise by prototyping solutions
    - Consider opportunities to pilot and drive real-world adoption
  - Spread the word to friends and colleagues – encourage them to participate!

Contact Melissa Christian melchristian@unmc.edu and Rute Martins (rute@mitre.org) to learn more
### Stakeholder Opportunities and Contributions

Linking Clinicians, Patients, Health Systems, Vendors, and Government

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<th>Contribution</th>
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| - Lower barriers to evidence-based practice  
- Reduce burden of data collection  
- Facilitate actionable data to inform treatment | - Enable data liquidity through FHIR  
- Support development of next generation care models for patients with HTN  
- Focus on the user experience |
| - Establish clinical priorities  
- Define optimal workflows  
- Validate clinical concepts and data specifications | - Accomplish proof of value through real-world implementation |
| - Reduce death and disability due to HTN  
- Decrease healthcare costs  
- Increase scalability, efficiency, and effectiveness of HTN management | - Demonstrate proof of use of FHIR-based interoperability  
- Validate value of FHIR Accelerator model in improving HTN management |
## Million Hearts® 2027 Priorities

### Building Healthy Communities
- Decrease Tobacco Use
- Decrease Physical Inactivity
- Decrease Particle Pollution Exposure

### Optimizing Care
- Improve Appropriate Aspirin or Anticoagulant Use
- Improve Blood Pressure Control
- Improve Cholesterol Management
- Improve Smoking Cessation
- Increase Use of Cardiac Rehabilitation

### Focusing On Health Equity
- Pregnant and Postpartum Women with Hypertension
- People from Racial/Ethnic Minority Groups
- People with Behavioral Health Issues Who Use Tobacco
- People with Lower Incomes
- People Who Live in Rural Areas or Other ‘Access Deserts’
Optimal SMBP

Patients receive guidance on:
- Selecting a device
- Proper cuff sizing
- Preparation and positioning
- Clinical protocol with frequency and duration
- Method for returning patient-generated values

Remote Data Exchange

- Self-measured blood pressure readings
- Adjustments to medication type and dose to achieve goal blood pressure
- Suggestions to achieve lifestyle changes
- Insights into variables affecting control of blood pressure
- Identification of medication side effects and adherence barriers
- Advice about community resources to assist in controlling blood pressure

- Lifestyle habits (e.g., smoking, diet, exercise)

- Actions to sustain or improve adherence

- Clinical decision supports
- Clinical quality measures

Wall HK, Am J Hypertens. 2022 Mar 8;35(3):244-255.
Current SMBP HIT Landscape

- **Home Blood Pressure Monitor**
  - Wireless home BP monitor

- **BP Mobile App**
  - Consumer-facing apps associated with a BP device manufacturer

- **BP Clinical Portal**
  - Portals available for care teams to log in and review patient BP data

- **Other Personal Health Devices**
  - e.g., Activity trackers, weight scales, etc.

- **Other Mobile Health Apps**
  - Consumer-facing apps that capture and store PGHD

- **Consumer Mobile Health Data Aggregator**
  - Mobile health data aggregators: Apple Health, Google Fit

- **Custom Applications**
  - Developed by health care systems to translate/consume data

- **Data Integration “Hub” Service**
  - Service provider that accesses and integrates data from various sources, e.g., Redox, Validic, Human API

- **Patient Portal**
  - Portals for patients, tethered to EHR systems

- **Electronic Health Record**
  - Used by healthcare providers to support clinical practice/practice management

- **SMART on FHIR Apps**
  - e.g., Mobilizing a Million Hearts on FHIR, AMA IHMI App

Slide from the Public Health Informatics Institute
High-Level Health IT Challenges

- Data ownership, privacy, and security concerns as data flow from patients to non-HIPAA covered entities to HIPAA-covered clinical entities
- How best to incorporate data into clinical workflow
- Technical standards and specifications to enhance and simplify SMBP data exchange regarding what data elements are being exchanged, in what format, and how

https://phii.org/resources/self-measured-blood-pressure-monitoring/
How Do We Jump Start SMBP in the U.S.?

Explores:

• Simplified, Standards-Based, and Interoperable Health IT to Support Remote Exchange of Patient-Generated BP Readings

• Ready Access to High-Speed Broadband

• Accessible Technical Assistance to Overcome the Digital Divide

• Ample Supply of Validated Blood Pressure Devices and Appropriately Sized Cuffs

• Improved Coverage and Reimbursement

• Creative Solutions to Overcome Barriers of Trust, Time, and Distance

SMBP Influencers

Federal Agencies

CDC
HRSA

Initiatives

TARGET:BP

Organizations

Million Hearts
American Heart Association
CardX

MedMorph

Federal Hypertension Control Leadership Council

NATIONAL FORUM
FOR HEART DISEASE & STROKE PREVENTION

PREECLAMPSIA FOUNDATION

The Office of the National Coordinator for Health Information Technology

CENTER FOR MEDICARE & MEDICAID SERVICES

National Hypertension Control Initiative

The Office of the National Coordinator for Health Information Technology

National Heart, Lung, and Blood Institute

NIH
Q&A

CardX™
Q & A

CardX

• What are your challenges collecting, sharing, and utilizing cardiovascular data?
• What are the most important use cases CardX should take on?
• How do you see your organization participating in CardX?

Hypertension Management Use Case

• What exchange scenarios should we tackle first?
• What initiatives should we pay attention to?
• Where do you see the best opportunities for collaboration – and demonstration – of new FHIR-based capabilities?
Learn More

- More on CardX: https://confluence.hl7.org/display/COD/Cardiovascular
- More on Hypertension Management Use Case: https://confluence.hl7.org/display/COD/CardX++Hypertension+Management

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