Reactor Panel:
EMR Integration of Genomic Results and Automated Decision Support
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eMERGE & Beyond: The Future of Electronic Medical Records (EMR) and Genomics
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EMR Integration of Genomic Results and Automated Decision Support

• Questions:
  • What new or enhanced data standards are needed to enable electronic medical record (EMR) integration and automated decision support?

  • How can eMERGE make a knowledge representation that can support multiple levels of health literacy through tools (e.g., SMART apps) so that the same knowledge contained in the system will be available and useable by a genomic medicine specialist, primary care provider, patients, and their families?

  • What tools can eMERGE develop to ensure that patients and providers are kept up-to-date as the interpretation of genomic findings rapidly evolves?
Inputs to Framework for Discussion/Reactions

IOM Report Building Safer Systems for Better Care

Recent Review of CDS

Six dimensions of CDS: data, knowledge, inference, architecture and technology, implementation and integration, and users
Comments/Reactions

- **data,**
  - Requisite data standards
  - Patient preferences data
  - Genomic test result data
  - Clinical outcomes data

- **knowledge,**
  - Representation of complex hierarchical knowledge objects (rules, value sets, terminologies, ontologies)
  - Knowledge management (metadata, provenance)
  - Feedback loops – learning
  - Health literacy considerations (reports; providers and patients)

- **inference,**
  - Certainty management, confidence limits
  - Decision-theoretic concerns re patient preferences

- **architecture and technology,**
  - Externalized CDS services (e.g. FHIR plan definitions, SMArt apps)
  - Computable knowledge object I/O
  - Messaging std(s) (FHIR profiles; 2.X syntax)

- **implementation and integration,**
  - Workflow domain ontologies, setting specific factors
  - Provider facing v. Patient-facing CDS

- **users,**
  - Human-computer interaction(s) – static v. dynamic
  - Patient and provider preference models?
Summary assessment

• Data – move toward standards where feasible / possible
  • FHIR, CIMI, IHMI... OMOP
  • Work to develop standard transforms, semantic mapping

• Knowledge – embrace standards that are emerging
  • CQL
  • Work towards standardizing all the component parts of the K stack – recognize the hierarchical nature of the knowledge stack (and various relevant knowledge sources)
    • Controlled terminologies, ontologies, value sets
  • Recognize the potential of networked knowledge
    • Both in Authoring CDS artifacts
    • Executing CDS artifacts

• Recognize the need for implementation at scale – across multiple instances of an EHR and multiple EHRs – a ‘system of insight’
  • Patients have multiple sites of care across time and space
  • Implement knowledge assets at scale to promote reusability

• Work toward standardized CDS PGx presentation layer / applications / web services
• Recognize 90% of healthcare systems will NOT build it... will want to buy it
Research questions for CDS PGx

- Method of capturing and representing patient preferences and utilities
- Transitive semantic closure on data mapping
  - -> more automatic semantic mapping
- Contextual factors / setting specific factors influence on PGx CDS
- Evaluation – impact on patient and provider KAP (knowledge, attitudes, and practice)
Next steps

• Consider knowledge engineering / knowledge management infrastructure at scale
  • Building upon success with PheKB, CDS_KB, etc.
  • Promote open sourcing core knowledge assets

• Conduct more CDS PGx pilots / demonstrations
  • With build in evaluation component
  • SMArt on FHIR, Web services, web apps
  • At scale across multiple EMRs