Using Standards-Based Clinical Decision Support Algorithms to Identify and Manage Patients who Meet Evidence-Based Criteria for Genetic Evaluation of Familial Cancer

NCI ITCR Annual Meeting, 5/29/2019, Deer Valley

Kensaku Kawamoto, MD, PhD, MHS
Associate Chief Medical Information Officer
Associate Professor of Biomedical Informatics

Guilherme Del Fiol, MD, PhD
Associate Professor of Biomedical Informatics
Disclosures

• In the past year, I have served as a consultant, sponsored researcher, or invited speaker with honorarium for the U.S. Office of the National Coordinator for Health IT (ONC)*, Hitachi, McKesson InterQual, Premier, Klesis Healthcare, University of Washington, and UC San Francisco

• None of these activities are directly related to this project

*via SRS, Inc. and ESAC, Inc.
Project Investigators

Biomedical Informatics
- Guilherme Del Fiol
- Ken Kawamoto

Primary Care
- Mike Flynn
- Rachel Hess

Huntsman Cancer Institute
- Wendy Kohlmann
- Kim Kaphingst

Intermountain Healthcare
- Charlene Weir
- Wendy Chapman
- Scott Narus
- Josh Schiffman
Motivation

• Many at elevated risk for familial cancer
  – Breast / colorectal cancer: ~13% of individuals

• Most unaware of their risk
  – Cannot benefit from risk reduction options

• Project goal: identify and manage risk via scalable clinical decision support (CDS) platform
  – Analyze risk factors in electronic health records (EHRs), particularly for family health history (FHH)
  – Apply algorithms based on National Comprehensive Cancer Network (NCCN) guidelines for risk evaluation
  – Integrate with busy primary care workflows
Family History Documentation

Workflow Analysis

- 10 University of Utah outpatient sites
- Interviewees: 107 MAs, 42 clinicians, 10 RNs
- 7 workflow patterns
  - From provider-specific to clinic-wide standard procedures
  - Ask about cancer, but information is incomplete
  - Physicians often do not review MAs’ documentation
CDS Platform - Workflow

Population-based algorithm (NCCN) → Meets NCCN criteria?

- Yes
  - Genetic counseling outreach
    - Message to PCP
  - Genetic counseling appointment
    - Note to PCP

- No
  - Natural language processing (NLP)
  - Exit

Breast cancer 2nd degree relative onset 35 years old
Sample Criteria - Breast Cancer
(adapted from NCCN guidelines)

- **Breast** cancer in 1st or 2nd degree relative at ≤ 45 yrs old
- **Ovarian** cancer in 1st or 2nd degree relative
- **Breast, prostate, and/or pancreatic** cancer in 3 or more 1st or 2nd degree relatives
- **Breast** cancer in **male** relative
- ...
CDS Platform - Architecture

OpenCDS
- Familial cancer detection algorithm
- HL7 CDS Hooks API

Population Analyzer
- Retrieve patients
- Extract facts
- Evaluate
- Export

Epic® EHR
- Data Warehouse

Population Registry

Genetic counselor

Patient
Population analysis

N=445,967
- 24 to 60 years old
- UHealth or NYU patient

Population-based computer algorithm

Meet NCCN criteria?

Yes

n=26,414 (5.9%)

Genetic counseling outreach
Patients from 5 UHealth PCPs

Population-based computer algorithm

Meets NCCN criteria?

Yes (n=40)

Appt scheduled (n=15; 38%)

Appt declined (n=11; 28%)

Unreachable (n=14; 35%)

No testing needed (n=3; 27%)

Tested negative (n=7; 64%)

Tested positive (n=1; 9%)
Dissemination

• CDS platform compliant with EHR standards
  – HL7 FHIR and CDS Hooks
• Based on open source software
  – OpenCDS – [www.opencds.org](http://www.opencds.org)
  – OpenInfobutton – [www.openinfobutton.org](http://www.openinfobutton.org)
• Interoperability assessment
  – Intermountain Healthcare (Cerner EHR)
• NCI U01-funded randomized trial
  – Utah and NYU
Meets NCCN criteria?

Population-based computer algorithm

EHR structured data and NLP

Yes

Meets NCCN criteria?

Genetic counseling outreach Vs. Chatbot assisted testing
Questions?

Kensaku Kawamoto, MD, PhD, MHS
Associate Chief Medical Information Officer
Associate Professor of Biomedical Informatics
University of Utah
kensaku.kawamoto@utah.edu

Guilherme Del Fiol, MD, PhD
Associate Professor of Biomedical Informatics
University of Utah
guilherme.delfiol@utah.edu