Cardiovascular Surveillance in the Cardiovascular Research Network (CVRN) of the HMO Research Network (HMORN)

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Charge from the sponsors to the IOM Committee

Provide recommendations on how to develop a framework for building a nationwide cardiovascular surveillance system

• Focus on cardiovascular diseases (CVDs), CVD risk factors, and COPD

• Capable of data collection on
  • Incidence
  • Prevalence
  • Functional health outcomes
  • Measured risk factors
  • Key elements of clinical care delivery
  • Health disparities in these measures
    • Racial/ethnic
    • Socioeconomic
    • Geographic region
A New CVD Surveillance Program: Development of a Cardiovascular Surveillance System in the CVRN

funded by grant number RC2LH10666-01 from the National Heart Lung and Blood Institute

- HMO Research Network (HMORN) is an organization of health care delivery systems whose mission is to use its collective scientific capabilities to integrate research and practice for the improvement of health care among diverse populations.

- The Cardiovascular Research Network (CVRN) was funded by the NHLBI in 2007 to utilize the resources of the HMORN members to answer critical questions about CVD epidemiology, prevention, management, and outcomes.
CVRN Program Objectives

- Promote research on clinical practice and quality of care
- **Provide more robust CVD health care surveillance data**
- Enable assessment of new diagnostic and therapeutic technologies, and clinical guidelines
- Promote research on determinants of disease for uncommon disease phenotypes
- Create opportunities for interested non-network researchers to use study datasets generated through network
The CVRN

- CVRN awarded in September 2007 (Alan Go, PI)
- 15 CVRN Health Plans geographically distributed throughout the US
- Variation in practice settings and styles
- Large number of staff, clinics, and hospitals
- Established Research Centers at each site
CVRN Mission

To provide a unique resource that leverages the Network’s
- Cardiovascular expertise
- Diverse community-based study populations
- Rich electronic data systems and EMRs

to answer critical questions about CVD epidemiology, prevention, management, and outcomes.
Cardiovascular Research Network Centers

- Group Health Cooperative
  Seattle, WA
- Kaiser Permanente Colorado
  Denver, CO
- Kaiser Permanente Northwest
  Portland, OR
- Kaiser Permanente Northern CA
  Oakland, CA
- Kaiser Permanente Southern CA
  Pasadena, CA
- Kaiser Permanente Hawaii
  Honolulu, HI
- Henry Ford Health System
  Detroit, MI
- Harvard Pilgrim Health Care
  and Harvard Medical School
  Boston, MA
- Fallon Community Health Plan
  Worcester, MA
- Geisinger Health System
  Danville, PA
- Kaiser Permanente Southeast
  Atlanta, GA
- Lovelace Sandia Health Systems
  Albuquerque, NM
- Scott & White
  Temple, TX
- HealthPartners
  Minneapolis, MN
- Marshfield Clinic
  Marshfield, WI
CVRN Strengths & Characteristics: Patient Demographics

- Collectively provide community-based healthcare to ~10.9 million persons
- Patient populations per CVRN site: 140,000 - 3,300,000
- Broad age, gender, and racial/ethnic diversity across sites:
  - ≥ 65 yrs: 3 - 20%
  - Female: 51 - 56%
  - Black/ African American: <1 - 42%
  - Hispanic: <1 - 41%
  - Asian American: <1 - 63%
  - Native American: <1 - 2%
  - Other: <1 - 17%
Patient Retention in CVRN Sites

- 1-year: 77 – 95% (14 health plans)
- 3-years: 54 – 92% (13 health plans)
- 5-years*: 41 – 92% (13 health plans)
- Higher retention levels in older adults
- Higher retention among those with chronic disease.

*2002
CVRN Strengths: Automated/Electronic Data Systems

- CVRN has extraordinary clinical and administrative data resources to support research.
- 14 of 15 CVRN sites have electronic medical records (EMR) implemented.
The Virtual Data Warehouse (VDW) of the HMORN/CVRN

- Essentially a systematic mapping algorithm to ensure Network sites all use consistent variable names
- Programs use common data dictionary with local VDW database set up identically at each CVRN site.
- Allows a SAS program written at one Network site to be run at other sites with little modification
- Increase efficiency for doing multi-site studies
Example of VDW Linkages
Development of a Cardiovascular Surveillance System in the CVRN

funded by grant number RC2LH10666-01 from the National Heart Lung and Blood Institute

- 2-year study funded by an ARRA GO grant from the NHLBI and awarded on September 30, 2009 (Steve Sidney, PI).
- Involves all 15 sites of the CVRN.
Major Goals

- Establish a surveillance system for coronary heart disease (CHD), stroke, and heart failure (HF) in the CVRN including therapeutic interventions, post-event outcomes, and important risk factors and confounders.

- Determine most recent 10-year trends in rates of acute MI (AMI) and stroke and their relationship to trends in risk factors, comorbidities, therapeutic interventions, medications and diagnostic modalities.

- Establish an aggregate database incorporating CHD, stroke, and HF data from all 15 CVRN sites that can be used by CVRN investigators and other qualified research scientists to conduct studies related to comparative effectiveness and health disparities.
Organizational structure

CVRN CVD Surveillance Study
Executive Committee
Steve Sidney (PI)
Jean Olson (NHLBI Project Officer)
Alan Go (Director, CVRN)
David Magid (Co-Director, CVRN)
Jerry Gurwitz (Co-Director, CVRN)
Barbara Wells (NHLBI Project Officer (CVRN))

Consultants:
Wayne Rosamond
Mark Hatky

Steering Committee
(Site PI’s and NHLBI)

CVRN Proposal and Publications Committee

Research Projects

Committees:
Surveillance Design
Comparative Effectiveness
Disparities
Key researchers in the CVRN CVD Surveillance Study

Kaiser Permanente Northern California
Stephen Sidney, MD, Principal Investigator
Alan Go, MD, Co-Investigator
Carlos Iribarren, MD, Co-Investigator
Joseph Selby, MD, Co-Investigator
Joseph Terdiman, MD, Co-Investigator
Charles Quesenberry, PhD, Biostatistician
Mike Sorel, MPH, Sr. Data Consultant
Michael Emery, Data Analyst

Kaiser Permanente Southeast
Suma Vuppuri, PhD, Principal Investigator
Tracy Thomas, Programmer/Data Analyst

Group Health Cooperative
Denise Boudreau, PhD, Principal Investigator
Katherine Newton, Co-Investigator
Gene Hart, Data Manager
Dustin Key, Programmer

Henry Ford Health Care
Andrea Cassidy-Bushrow, PhD, Principal Investigator
David Lanfear, Co-Investigator
Steve Anteau, Programmer
Richard Krajenta, Programmer

Kaiser Permanente Hawaii
Rachel Novotny, PhD, Principal Investigator
Vinutha Vijayadeva, Project Mgr/Data Analyst - UH
Aleli Vinoya, Programmer (Mgr Research IT) – KPHI

Kaiser Permanente Northwest
David Smith, RPh, PhD, Principal Investigator
Amanda Petrik, Programmer/Data Analyst

Kaiser Permanente Colorado
David Magid, MD, Principal Investigator
Pamela Peterson, MD, Affiliate Investigator
Karen Glenn, Programmer/Data Analyst

Geisinger Health System
Nirav Shah, MD, Principal Investigator
Craig Wood, Programmer/Data Analyst

Scott & White Healthcare
Catherine McNeal, MD, Principal Investigator
Debbie Godwin, Project Manager/Data Analyst
Dean Kjar, Programmer/Data Analyst

Marshfield Clinic
Bob Greenlee, PhD, Principal Investigator
Steve Waring, PhD, Co-Investigator
Aaron Miller, Programmer/Data Analyst
Nick Berger, Programmer/Manager

Harvard Pilgrim Healthcare
Tracy Lieu MD, Principal Investigator
Steven Lampert, MD, Co-Investigator
Darren Toh, PhD, Co-Investigator
Inna Dashevsky, Programmer/Data Analyst

Health Partners
Kenneth Adams, PhD, Principal Investigator
Mary Becker, Data Analyst
Alex Kravchik, Programmer

Lovelace Clinic Foundation
Bob White, MD, Principal Investigator
Michael Shainline, Project Manager/Programmer

Kaiser Permanente Southern California
Kristi Reynolds, PhD, Principal Investigator
Michael Shainline, Project Manager/Programmer

Meyers Primary Care/Fallon Clinic/UMass
Jerry Gurwitz, MD, Principal Investigator
Rob Goldberg, PhD, Co-Investigator
Jane Saczynski, PhD, Co-Investigator
Jackie Fuller, Programmer/Data Analyst
Team-building and communications

- Site visits conducted by study PI and project manager to each of the study sites during first 5 months of funding.
- Face-to-face meeting of all site PIs and staff at beginning of month 6 of funding.
- Weekly conference calls of programmers.
- Monthly conferences call of Steering Committee with all study staff invited.
- Quarterly calls of study PI and project manager with each site.
- Regular email communications.
- Website for facilitating study communications, document transfer, etc. is nearly complete.
- One-day conference to disseminate descriptive and analytic information about the study database will be conducted near end of the 2-year funding period.
Data Plan for CVRN Surveillance
Study Analytic Dataset

- Medical claims (inpatient and outpatient diagnoses and procedures)
- Pharmacy
- Membership/enrollment
- Demographics
- EMR (e.g., vital signs, access clinical notes)
- Laboratory test results
- Appointments scheduled
- Census
- Mortality
Endpoint validation

- Case validation will be conducted at each site for the MI, stroke, and heart failure cases using forms and methods derived from ARIC study.

- A small sample of cases at each site will be abstracted from the early and late parts of the 10-year period of interest in examining recent trends.

- Cases will be centrally adjudicated at Kaiser Permanente Northern California (Oakland).
What can CVRN CVD Surveillance Contribute?

IOM charge - Provide recommendations on how to develop a framework for building a nationwide cardiovascular surveillance system

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  - Incidence
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The CVRN Surveillance Study has the capability to address all of these measures except (currently) for functional health outcomes.

Incidence of ST-Elevation and Non-ST-Elevation Myocardial Infarction

Yeh et al, presented at 2009 AHA Council on Epidemiology and Prevention meeting

This analysis is currently being replicated over all 15 CVRN sites
Examples of CVRN activities/capabilities

- Currently also producing 10-year trend data on hospitalization for stroke and heart failure. Will later incorporate outpatient heart failure.

- The incorporation of therapeutic data (drugs and procedures) and lab data and the ability to use this framework to address comparative effectiveness and disparities questions means that we can address factors contributing to CVD trends.

- Currently exploring the capability of natural language processing in enhancing data capture from the EMR.

- The system is scaleable. Discussions are taking place to add other diagnoses including COPD, diabetes, and asthma.
Strengths of CVRN CVD Surveillance

- Large diverse community-based populations based in health care delivery systems with reasonably durable membership.
- Rich administrative and electronic medical record data that can be used to address all aims set in the charge to the IOM.
- Motivated and collegial research collaborators at each of the sites with diverse interests within CVD (e.g., women and CVD, and pediatrics work groups are being formed).
- Capability for rapid reporting of current data.
Weaknesses of CVRN CVD Surveillance

- By definition, study population is limited to individuals who receive medical care from the participating health care delivery systems (however, the populations have Medicaid and Medicare components).
- Variability in completeness and quality of data among sites.
- Absence of systematic physical activity and dietary intake data.
- Challenges in the extent to which individual sites will share individual level data in unified data base vs. federated model in which analyses on individual level data are run at sites and shared as aggregate data.
Conclusion

The CVRN Surveillance Study is an effort to significantly increase the capacity for CVD surveillance in this country in a network of health care delivery systems that provides care for about 11 million people and is diverse in the domains of geography, race/ethnicity, and socioeconomic status.