Improving the health of populations
Stanford Center for Population Health Sciences

Solano County
Population and Public Health Hub

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Finding the Missing Link for Big Biomedical Data

【图】
- **Types of Data**
  - **Structured Data**
    - Electronic pill dispensers
    - Medication prescribed
    - Medication instructions
    - Medication taken
    - Diaries
    - Herbal remedies
    - Alternative therapies
  - **Unstructured Data**
    - Medication filled
    - Dose
    - Route
    - Allergies
    - Out-of-pocket expenses
    - Employee sick days
    - Death records
    - Chief complaint
    - Differential diagnosis
  - **Personal Health Records**
    - Encounter types and times
    - SNOMED
    - ICD-9
    - CPT
    - LOINC
    - Pathology, histology
    - Radiology
    - Lab values, vital signs
    - Lab values, vital signs
    - Tobacco/alcohol use
    - Diagnostics (ordered)
    - Diagnostics (results)
    - Genetics
    - Social history
    - Family history
    - Symptoms
    - Lifestyle
    - Socioeconomic
    - Social network
    - Environment

- **Probabilistic Linkage to Validate Existing Data or Fill in Missing Data**

【表格】
- **Examples of Biomedical Data**
  - Pharmacy data
  - Health care center (electronic health record) data
  - Claims data
  - Registry or clinical trial data
  - Data outside of health care system

- **Ability to Link Data to an Individual**
  - Easier to link to individuals
  - Harder to link to individuals
  - Only aggregate data exists

- **Data Quantity**
  - More
  - Less
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Population 425,000
Critical Data for Actionable Population Health

- Reportable conditions under Title 17 (n~80)
- Syndrome surveillance data
- Reportable data under Meaningful Use (CMS)
- Vital Statistics
- Community Health Indicator data
- Needs assessment data
Solano County Approach

• Local public health is the “Public Health Authority” in California
  – Can decide which data are needed to serve public health needs

• With health information exchange, can shift resources from data collection -> data analysis -> actionable population health
  – Transition from faxes and manual entry to electronic

• Information flow is bidirectional
  – Into hub, undergoes QA and standardization (proprietary)
  – Used by Solano county health officer for PH purposes
  – Back out of hub to data providers for coordination, EHR update

• Can be cost justified for many providers, health care systems
San Diego Health Connect - Early Successes

- San Diego county - 3.1 M population, > 90% in HIE
- Emergency medicine (primary application)
  - Improved safety (pre-hospital EMS ID medications, preexisting conditions, allergies).
  - Reduced high utilizer ER use, readmissions
  - EMS-administered EKGs for MI patients reduced unnecessary cardiac cath – 33% FPs to nearly 0%
Population Health Data Ecosystem

**General Healthcare**
- Electronic Health Records (EHR)
- Patient reported information – PHR
- Genetic data

**Telemedicine**
- Video Diagnostic Consultation
- Teleimaging
- Remote doctor/specialist services
- Remote monitors

**mHealth**
- Wellness Apps
- Fitness Apps
- Wearables
- Biological sensors

**Other Determinants**

**Social determinants**
- Education
- SES
- Race/ethnicity

**Environmental determinants**
- Air Quality
- Toxic exposures

**Geographic determinants**
- Location
- Weather
- Built environment
...disease prevalence, risk factors, data from remote sensing devices, etc.