Current Challenges in Health Care Enterprises

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Presentation Agenda

- Background
  About Kaiser Permanente
  About Clinical Terminology, Its Challenges, and How It Is Used

- Challenges Using, Managing, And Analyzing Health Care Data

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About Kaiser Permanente

Kaiser Permanente

An Integrated Delivery System

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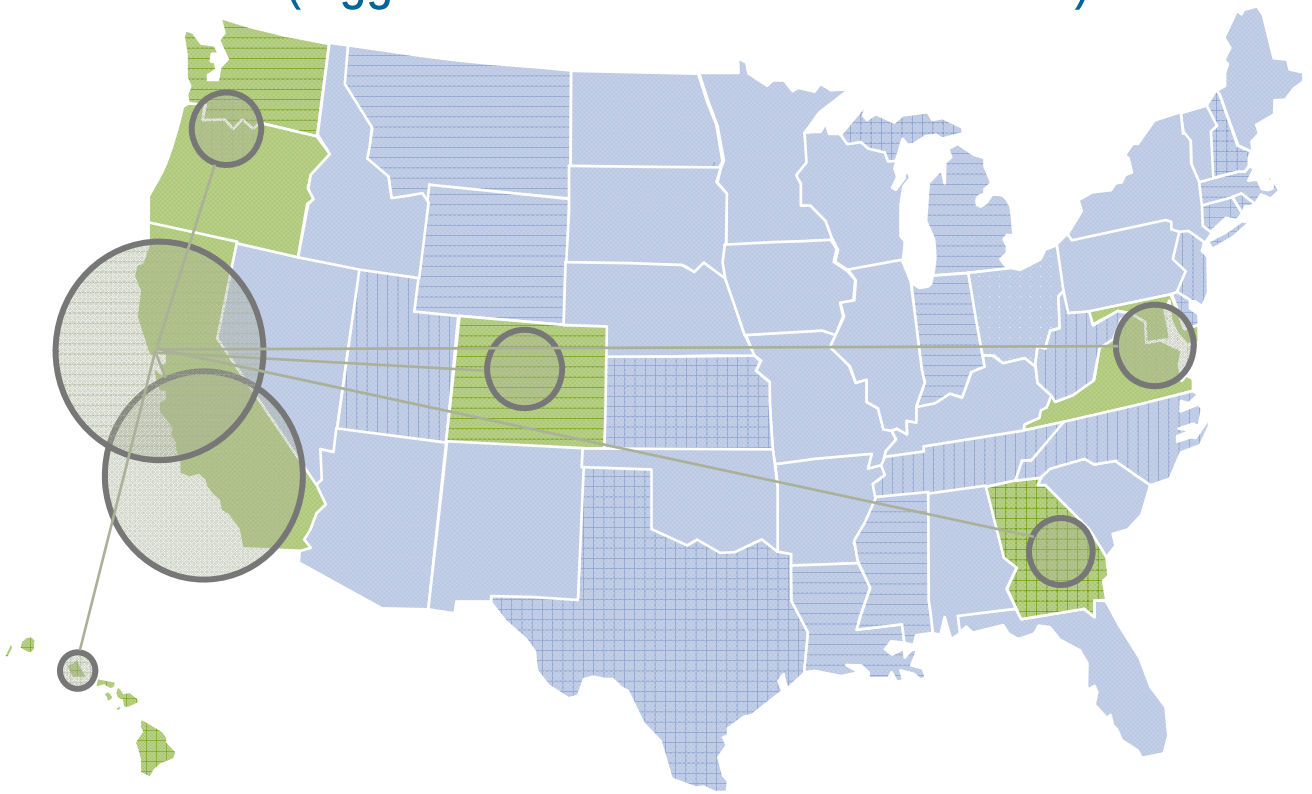
- primary care
- specialty care
- home care
- hospital
- lab
- pharmacy
- imaging
- optical
- dental
- insurance
- research

Largest integrated delivery system in US

(bigger than 42 states & 130 countries)



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Kaiser Permanente By The Numbers (2015)

433,413 hospital admissions;
6,291 neurosurgeries;
1 million mammograms

10.2
million members

38
hospitals

650+ outpatient surgery centers, medical office buildings, and other outpatient facilities

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70 years of providing care

$60B in revenue

$62B in assets

225,000 inpatient surgeries

98,000 births

40.2M doctor office visits

188M
visits to KP.org My Health Manager

22M
secure messages sent to providers

150M
lab orders per year

78M
prescription orders per year

4.8M
appointments booked online

23.2 million real time exchanges of standardized record sets between health care entities for treatment purposes

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One-stop shopping for most services

- Ambulatory/outpatient care
- Audiology and optometry/ophthalmology
- Behavioral/mental health
- Diagnostic imaging, laboratory, and pharmacy
- Emergency care and hospitalization*
- Health education and preventive care
- Home health care
- Labor and delivery (childbirth)
- Occupational health (workers' compensation)
- Physical therapy
- Primary care working closely with specialty care, surgeons, hospitalists*

** Note: In Colorado, Georgia, and the Mid-Atlantic States, we contract with community hospitals for beds and some specialty care.*

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Innovative ideas from the beginning

- Prepayment
- Group practice
- Prevention/total health
- Population-based approach
- Clinical information technology

Photo:

Sidney Garfield, MD (left): a surgeon, visionary, and trailblazer

Henry J. Kaiser (right): an entrepreneur who revolutionized shipbuilding and started global enterprises, including cement, steel, aluminum, and automobiles

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KP has the most # 1 ranked effectiveness-of-care measures in the U.S., including:

- Breast cancer screening
- Cervical cancer screening
- Controlling high blood pressure
- Persistence of beta blocker treatment after heart attack
- Comprehensive diabetes care
- Counseling for nutrition in children
- Counseling for physical activity in children

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About Clinical Terminology, Its Challenges, and Some Ways It Is Used

Scenarios for the use of terminology

- Use case for ***classification*** based on ICD:
  - ***I have a record.*** Everything in the record needs to be assigned ***the right code*** in a classification system.
  - Not everything is in the classification system, therefore “Not Otherwise Specified” (NOS) and “Not Elsewhere Classified” (NEC) codes are necessary and meaningful.
  - Supports consistent administrative reporting and financial transactions.

- Use case for ***clinical terminology*** based on SNOMED CT:
  - ***I have a patient.*** I can document everything that is relevant, and my EHR system will attach codes to much of it ***(but not all)***.
  - NOS and NEC are meaningless.
  - Supports semantic interoperability, decision support, care of individual patients, and population health management.

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Key U.S. legal/regulatory requirements

- Law and regulation require the use of ***over 50 different standard terminologies and classification systems*** in health care enterprises
- ***Meaningful Use*** regulations require certified EHR technology to use ***SNOMED CT*** for clinical documentation of problems, and ***LOINC*** for laboratory procedures, for ***care coordination, referrals, transitions of care, and patient access*** to health summaries.
  - Use of SNOMED CT and LOINC for ***interoperability*** is required for certification of EHRs and hospital or physician compliance may be audited under Meaningful Use.
- ***HIPAA*** law requires the use of classification systems to document health care interventions for ***administrative purposes*** such as insurance ***billing***, mortality records, or ***reporting***.
  - Current Procedure Terminology (CPT) is used to classify outpatient procedures and inpatient services. ***CPT-4*** is owned by the American Medical Association
  - International Classification of Diseases (specific schemes published by the US government) is used to classify inpatient and outpatient diagnoses and inpatient procedures: ***ICD-10-CM*** (Clinical Modification) for diagnoses; ***ICD-10-PCS*** (Procedure Coding System)

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Terminology implementation

- Implementing an ***enterprise terminology*** management solution is an important part of the implementation of health information technology with ***electronic health records***. It is not an independent activity.

- Kaiser Permanente uses Convergent Medical Terminology ***(CMT)*** in KP HealthConnect®
  - Based on ***SNOMED CT*** and Laboratory ***LOINC***.
  - CMT includes concepts ***not yet in SNOMED CT*** therefore not in cross-maps to ICD.

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What is Convergent Medical Terminology (CMT)?

CMT is Kaiser Permanente's enterprise terminology system – how data is captured in KP HealthConnect® – which includes several components:

- End user terminology
- Standard terminology
- Administrative codes
- Patient/population query and decision support
- Terminology request process

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CMT end user terminology component (1)

- CMT contains the terminology used by clinicians in KP HealthConnect® and by patients in kp.org and mobile apps
- End user terms are mapped to the standard terminologies and have data attributes needed by the application software
- End users use and see the terms that are familiar to them, and the application uses the codes and attributes it needs
- Patient-preferred display terms usually are the same as medical terminology but may be synonyms — such as “miscarriage” instead of “spontaneous abortion”

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CMT end user terminology component (2)

- Protects clinician end users from changes in standard terminology or coding schemes
- Example: Almost all diagnosis terms displayed to clinicians did not have to be changed or deleted for the transition from ICD9 to ICD10
- Neither ICD nor SNOMED has an inherent focus on end user usability
- CMT is a product of over two decades of actual user experience, and it continues to improve every month

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CMT standard terminology component

- CMT maps and integrates national and international terminology standards, such as SNOMED CT, ICD-10, and LOINC
- CMT can be mapped to other terminology as needed, such as local (non-standard) terminologies used in clinical technology, or terms developed and used for patient safety or quality measurement
- CMT supports requirements for standard terminology in Meaningful Use and Health Information Exchange programs

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CMT administrative code component

- CMT supports Revenue Cycle, Charge Capture, and Risk Adjustment

- Administrative and financial coding is a by-product of the process for capturing patient care information — not a separate step
  - Diagnosis terms are mapped to ICD — clinicians pick a problem list and the same term is used for encounter diagnosis coding
  - Procedure terms are mapped to CPT4 or HCPCS codes
  - When a laboratory test order is resulted/completed, CPT4 administrative codes mapped to it are sent to the financial systems

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CMT query and decision support component (1)

- CMT is built on SNOMED CT, the global language of health care.
- CMT leverages the internal structure of SNOMED CT, including poly-hierarchy and description logic (formal definitional attributes).
- CMT provides the ability to query different ways to identify subsets in terminology:
  - SNOMED CT logic improves precision and efficiency of queries
  - Supports decision support modules in KP HealthConnect®
  - Identifies patient cohorts for Population Care
  - Identifies KP HealthConnect® terminology to fulfill reporting or analytical criteria and specifications

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CMT query and decision support component (2)

- Ability to easily identify patient cohorts for certain conditions for Population Care
- Ability to identify subsets for use as input criteria for KP HealthConnect® decision support modules, such as Best Practice Alerts, Reminders, etc.
- Ability easily to do precise queries, such as “find all conditions where causative organism is Aspergillus”
- Ability easily to do large aggregate queries, such as “find all patients with cardiovascular system disorders”

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CMT request tracking component

- What happens when a desired clinical concept is not already present in KP HealthConnect®, such as a new medical diagnosis or a new regulatory requirement?

- Terminology request submission and release process:
  - Kaiser Permanente regions and business partners submit CMT requests for inclusion of concepts in KP HealthConnect®
  - Integration into published standards including SNOMED CT and LOINC, release schedule, quality assurance, and operational processes ensure availability of the requested terminology in HealthConnect®

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Clinical terminology needs are dynamic

- According to the latest SIRS report from IHTSDO: since 2011 (last 5 years), Kaiser Permanente submitted 28,589 new concepts to NLM (US NRC) and IHTSDO

- New concept requests were in many recent KP submissions to IHTSDO and NLM:
  - Top 2500 Problem List;
  - Cardiology;
  - Mental Health;
  - Neurology;
  - Musculoskeletal;
  - Ophthalmology;
  - Hem/Onc;
  - Endocrine;
  - ENT/GI/ID;
  - Skin/Respiratory;
  - OB/Gyn;
  - Ortho Extremities;
  - Hx of and FHx of;
  - Ortho Non-Extremities;
  - Injuries;
  - Orthopedics;
  - Pediatrics;
  - Emergency Dept;
  - Common Lab Procedures;
  - Specimen Source;
  - Specimen Type;
  - Skin/Respiratory;
  - ENT/GI/ID;
  - Vaccinations;
  - Endo/Uro/Neph;
  - Radiology

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Why “enterprise terminology”?

Internal:

- No one terminology meets all needs — standards meet specific needs
  - We must use many different terminologies, and we integrate or “converge” them in a central model in order to leverage the efficiencies of each terminology, and to provide interoperability
- None of the standard terminologies are ever “complete”; therefore, there is a need for new concepts or enterprise-specific concepts
  - Standard reference terminologies are updated slowly, e.g. 2x/year
- Having a central terminology management system eliminates duplication of effort and provides a common definition of data via common concepts/terms across the enterprise

External

- Standard terminology using SNOMED CT and LOINC the key to semantic interoperability in the U.S.
- Enables receivers of external data to understand the intended meaning precisely

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Kaiser Permanente HealthConnect

Kaiser Permanente typically spends about 6% of our total revenue on information technology. KP HealthConnect (our integrated system for care delivery) is:

- More than just an electronic medical record
- A Program-wide system that integrates the clinical record with appointments, ancillary and specialty services, registration, and billing
- A complete health care business and management system that enhances the quality of patient care
- A personal health record for nearly 5 million Kaiser Permanente members (70% of members over 13 with Internet access)

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File Edit View Favorites Tools Help

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Northwest

preferences | getting started | updates | user guide | glossary | support center | logout

The Patient Support Tool

Choose a provider | Service | Search / panel view | disease | risk factor | visit info | panel vitals

Complete Panel View

PCP(s): XXXXXXXXXXXXXXXXX

Total Patients : 1972 - displaying results 1- 200 of 1972

1 2 3 4 5 6 7 8 9 10 All

Report	Handout	HRN	NAME	Age	Sex	Dx	Prev	Gap	DM	ASCVD	CHF	HTN	CKD	Asth	Remarks	Last Seen	F/U Rev'd	PCP
		99999999	XXXXXXXXXX	57	M			23	Y								4/22/14	XXXXXXXX
		99999999	XXXXXXXXXX	55	M			22	Y			Y				03/15	3/30/15	XXXXXXXX
		99999999	XXXXXXXXXX	57	M			21	Y						MEMBER		10/30/15	XXXXXXXX
		99999999	XXXXXXXXXX	52	M			18	Y	Y								XXXXXXXX
		99999999	XXXXXXXXXX	60	F			18	Y			Y				02/16	2/11/16	XXXXXXXX
		99999999	XXXXXXXXXX	74	M	R		18	Y	Y		Y				09/15	11/14/14	XXXXXXXX
		99999999	XXXXXXXXXX	66	M	R		17	Y			Y				04/15	5/2/15	XXXXXXXX
		99999999	XXXXXXXXXX	54	M			17	Y			Y				05/15	6/15/15	XXXXXXXX
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		99999999	XXXXXXXXXX	68	F	R		15	Y						MEMBER	08/15	7/31/15	XXXXXXXX
		99999999	XXXXXXXXXX	54	M			14	Y			Y	Y			07/15	2/25/16	XXXXXXXX
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		99999999	XXXXXXXXXX	66	M			14	Y			Y				02/16		XXXXXXXX
		99999999	XXXXXXXXXX	68	F	R		14	Y			Y				05/15	10/7/15	XXXXXXXX

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Care gaps identified by the Panel Support Tool (PST)

Currently, there are more than 130 **care gaps** addressed in the PST.

Therapy

Asthma	☐ Consider start/increase of inhaled steroids
Heart Protection	☐ Heart Protection (Statins, ACE-I, Aspirin) for High Risk Populations
Statins	☐ CVD & DM populations ☐ Based on 10yr CAD risk score
ACE/ARB	☐ HOPE trial ☐ DM Nephropathy ☐ Heart Failure
Aspirin	☐ Daily Aspirin for High Risk Populations ☐ Based on 10yr CAD risk score
Betablockers for	☐ Post-MI ☐ Heart Failure
Glycemic control	☐ Insulin consideration when A1c >9 and on Orals > 1yr ☐ Metformin consideration when BMI > 27 and A1c > 8
BP control	☐ Suspected HTN ☐ Diagnosed HTN - uncontrolled ☐ Dx HTN and no BP taken in 12 months ☐ Dx HTN, uncontrolled and on <3 BP meds
Osteoporosis	☐ Women 65+ with T-score <= -2.5 ☐ Post-fracture -osteoporosis per HEDIS

Women's Health

Prevention	☐ Mammo counseling ☐ Mammo due soon / overdue ☐ Mammo overdue ☐ Osteoporosis screening due ☐ Pap smear overdue ☐ Pap smear due soon ☐ Pap/biopsy recommendation (prior abnormal)

Chronic Condition - Monitoring

DM	☐ HbA1c screening due ☐ Renal screening due ☐ Eye screen due ☐ Foot screen due
High Risk Populations	☐ Lipid Panel for high risk populations due
Monitoring Meds (HEDIS)	☐ Annual Labs Due
CKD	☐ Lab(s) due - Renal Function Panel or MicroAlbumin Screen, Urine
OTP	☐ OTP Brief Pain Inventory due ☐ OTP Order due ☐ OTP Office Visit due ☐ 2 or more early refills in 6 mos ☐ On > 4 gm/d acetaminophen ☐ UDS due

Primary Prevention

High Risk Populations	☐ Pneumovax due
General Population	☐ Colorectal screening due ☐ Colorectal screening due soon ☐ Colonoscopy due ASAP (previous positive FIT) ☐ Lipid Panel due ☐ Flu shot due (during flu season) ☐ Tetanus shot due ☐ Physical Exam due ☐ Glaucoma screening due ☐ HIV screening due ☐ Shingles vaccine due

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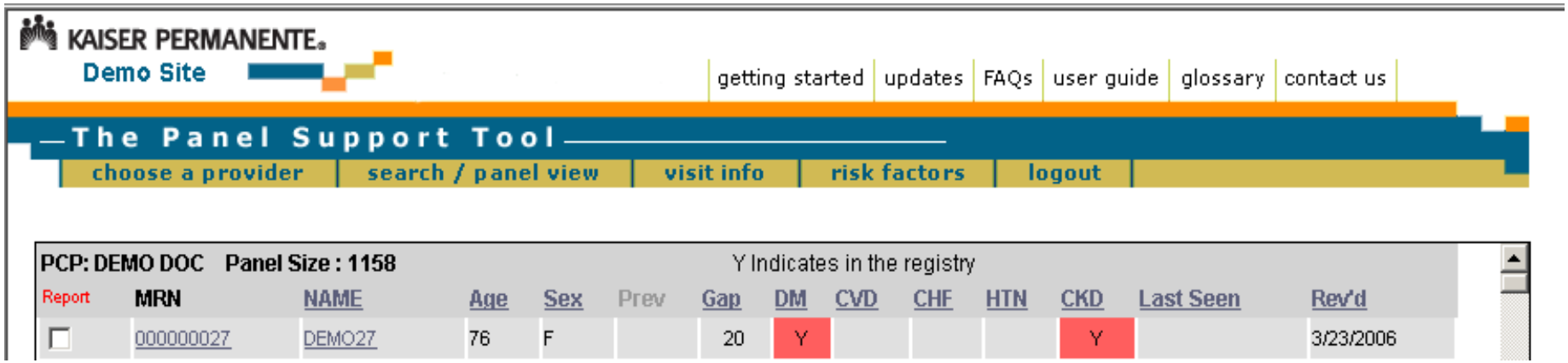
Taking accountability for patient populations



Clinical Outcomes in Southern California

Metric	Improvement	Lives Saved Per Decade[1]
Blood Pressure Control	38.9%	5,341 Lives
Colorectal cancer screening	30.2%	4,788 Lives
Cholesterol Control	21.8%	1,751 Lives
Blood sugar control	11.5%	1.088 Lives
Smoking Cessation	17.0%	955 Lives
Breast Cancer Screening	11.4%	570 Lives
Cervical Cancer Screening	5.9%	59 Lives

Over 14,000 Lives Saved[1]

1/ Based on NCQA Quality Dividend Calculator

Kaiser Permanente member Mary Gonzales talks about her experience with KP, and how a receptionist using KP HealthConnect prompted and scheduled her for a mammogram.

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Challenges Using, Analyzing, And Managing Health Care Data

General Challenges With Health Care Data

- Complexity
  - e.g., SNOMED CT concept model in combination with LOINC and medications models have ~10^4 or 10^5 times more concept members than IBM's Finance, Insurance, and Real Estate data model
- Heterogeneity
  - Different solutions over time, by geography, and different clinician documentation practices together result in variation in design, structure, or schema
- Fundamentals
  - Lack of consistent individual identities
  - General data governance practices, compounded by institutional fragmentation
  - Adequacy of original health care documentation varies wildly

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Current Challenges With Health Care Analysis

- Attribution
  - It is difficult to attribute care outcomes to a single practitioner and there is a need for validated attribution algorithms
  - Care is increasingly provided by “teams” where there is a need to produce quality process and outcome analyses by team, but technical measurement specifications do not address the performance of clinical teams
- Risk Adjustment
  - Individuals have different risk profiles and risk adjustment can assure a "fair" comparison, however, real differences in outcomes that might not be justified may be camouflaged. There is a need to strike a balance between measuring and reporting actual, crude outcomes (for quality improvement) and measuring and reporting risk-adjusted outcomes. Increased transparency in the simulation of coefficients for risk adjustment may be a benefit of using semantic technologies.
- Clinical Intelligence and Decision Support
  - Current systems have relatively poor precision resulting in workflow problems and alert fatigue. Much modeling will be needed to make systems “more intelligent.”

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New Challenges With Health Care Analysis

- Guided Data Exploration and Predictive Modeling
  - Check whether data meets constraints, e.g. derive missing data
  - Trigger review of encounters
  - Define composition of disease or diagnosis by dynamic value sets to make suggestions
  - Trace documented diagnosis back through clinical guidelines (“best practices”) and evidence based protocols to highlight variance to clinicians

- Non-traditional Data Which May Be Relevant To Health
  - Financial records
  - Geolocation
  - Behavioral data
  - Social data

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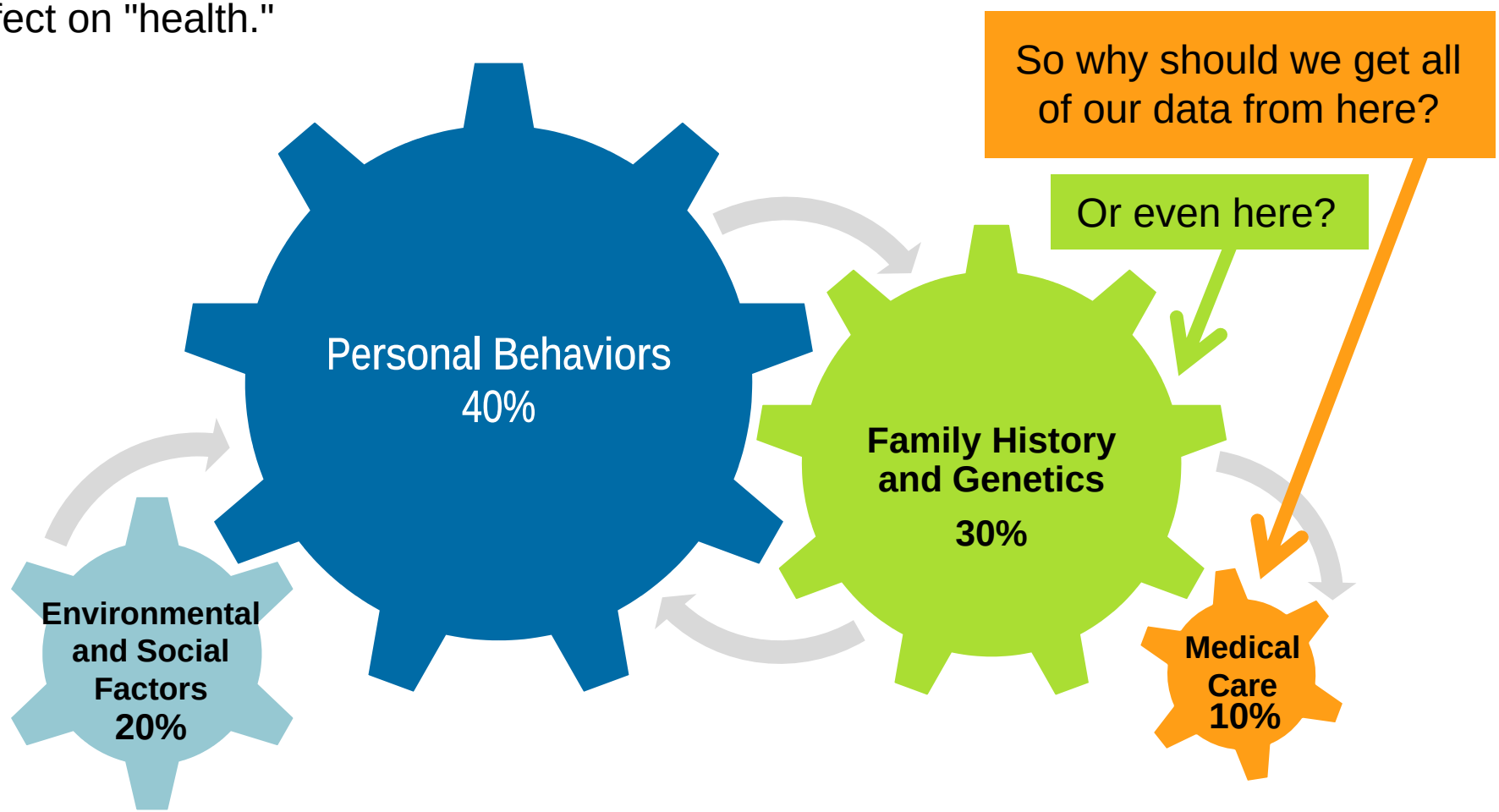
Health is About More Than Clinical Care

Healthcare encounters and interventions have a comparatively small effect on "health."



There is a real need for tools that capture and leverage these social determinants of health to supplement traditional healthcare process and outcome measures.

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Personal information is increasingly complex

Behavioral data

(Lifestyle choices, preferences, activities, QoL)

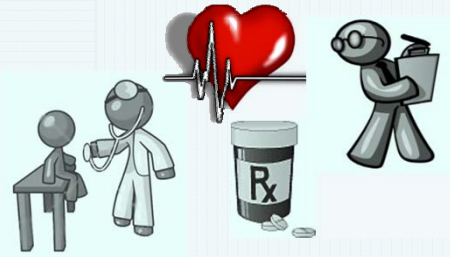
Google amazon.com TESCO

Demographics & firmographics

(Age, address, employer, industry)

Medical records

(encounter, labs, Rx, medical devices, etc.)



My Total Health My Way

Social data

(Friends, family, affiliations, communication, activities)

Personal "-omics"

(Genomics, proteomics, transcriptomes, metabolomics)

Contextual

Environment

(Temperature, humidity, pollen count,..)

Geographic

(Closest hospital, pharmacy, fare clinic,...)

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Chevron Richmond refinery: August 6, 2011

Photo: U.S. Chemical Safety and Hazard Investigation Board, Regulatory Report, August 6, 2012

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Thank You!