

The Electronic Health Record in A Patient-Centric Environment: Making IT Count

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What does patient-centric mean?

- **Patient-centric care is for the benefit and convenience of the patient. I am seen when I want and need to be seen by my health care provider.**
- **Patient-centric care focuses squarely on improving medical care . It reflects a belief, based on mounting evidence, that patient involvement improves health outcomes.**
- **Patient-centric care enhances patient satisfaction. No more long waits. My time is important.**
- **Patient-centric care insures safe health for the patient.**
- **Patient-centric care makes sure all appropriate care is delivered to the patient.**
- **Patient-centric care customizes treatment, recommendations, and decision making in response to an individuals preferences, needs and belief.**

Patient-centric means

- **Specifying my age in ...**
 - Hours if I am a newborn
 - Days if I am a baby
 - Months if I am a child
 - Years if I am an adult
- **Tracking developmental progress for children**
- **Immunizations based on age**
- **Screening tests driven by age and gender and latest evidenced-based medicine**
- **Worrying about my problems and insuring they are dealt with properly by my health care provider, the health care system, and myself.**

Birthday letter

Dear Ms. Patient,

Happy Birthday! I hope your birthday is a joyous one. As your family physician, I would like to give you the gift of good health. While this is not always possible, there are a few things we can do to help you stay healthy and prevent disease. I would like to give you a reminder of what you need to do to stay healthy.

My records at the Duke Family Medicine Center show you need the following:

Tetanus Booster: Everyone 18 years of age and older needs a tetanus booster every 10 years. This shot prevents tetanus (lockjaw), which might result from a burn, cut, or puncture wound.

Pneumococcal Vaccine: Everyone 65 years of age and older should have this vaccine once. This pneumococcal vaccine helps protect against some serious infection of the lungs, blood or brain.

Cholesterol letter

Dear Mr. Doe,

During your visit of August 18, 2003, a cholesterol level was ordered as part of your medical care. Your level was **301**. This is much higher than the recommended level of 200. I would like for you to obtain a fasting lipid panel at your convenience. This blood test can be obtained at Duke Family Medicine, Monday through Friday beginning at 8:00 a.m. You will need to eat or drink nothing after 8:00 p.m. the night before the test and present this letter to our clinic receptionist after 8:00 a.m. Please schedule an appointment with me one to two weeks after your blood work is done. If you have questions, please contact me.

What is happening in today's patient's world?

- Today's population is living longer and the percentage of people over the age of 65 is increasing rapidly in most countries.
- 65% of people over the age of 65 have three or more chronic diseases and get their health care in three to five different clinical settings.
- As a consequence, a person's health data is scattered over a number of different settings.
- About 75% of healthcare spending is for treating chronic disease.
- Much of that money is spent unnecessarily because of duplicate tests and treatments from the different providers who do not know what the other providers are doing.

Patients

- **Patients are typically seen asynchronously in multiple settings within a single health care setting and in different settings; therefore data must be combined to provide a single, integrated view of the patient.**
- **Having complete and appropriate data about a patient will improve decision making, reduce errors and improve care.**
- **The spectrum of patient care includes the home, outpatient setting, inpatient setting, intensive care settings, emergency rooms, nursing homes and involves multiple specialties.**
- **Patients are mobile. We live in a global society.**
- **Healthcare data must be accessible internationally for optimal care.**
- **Patients move. Recent census showed 50% of US population moved every 5 years. Therefore, patient records must be able to follow the patient and be understandable and useable at the new settings.**

Why it's important to the patient

- **Effective management of chronic disease is essential for enabling those individuals to enjoy a high quality, longer life and stay out of hospitals and nursing homes.**
- **Comprehensive and complete data about a person coupled with appropriate knowledge for clinical decision making and treatment at point of care is mandatory.**
- **The practice of medicine has become much more complex than ever before.**

Value of chronic care management

- **63% reduction in hospital admissions and significant improvement in quality of life**
- **40% reduction in use of Emergency Room**
- **64% reduction in nursing home transfers**
- **80% reduction in nursing home bed days**
- **Increased continuity of care for elderly, underserved and chronically ill**
- **Improved patient safety**
- **Improved patient compliance**

From 2 year VA study

More Requirements

- **Knowledge is increasing exponentially and exceeds the capacity of the human mind to retain this knowledge.**
- **Evidenced-based medicine requires knowledge and data at the point and time of care.**
- **Study suggests that it takes 17 years for the results of research to become routine practice.**
- **Options in diagnostic tests have increased and vary greatly in cost.**
- **Options for treatment have increased and have become more person specific.**

A Report Card

Condition	% Rec. Care Rcvd.
Breast Cancer	75.7
Prenatal Care	73.0
Low Back Pain	68.5
Coronary Artery Disease	68.0
Hypertension	64.7
Congestive Heart Failure	63.9
Chronic Obstructive Pulmonary Disease	58.0
Depression	57.7
Asthma	53.5
Diabetes Mellitus	45.4
Alcohol Dependence	10.5

From: McGlynn, et.al. NEJM 2003

A Detail

- **For patients with diabetes**
 - Only 24% received 3 or more HgbA1c over 2 year period
 - Only 29% had blood sugar tested in a year
- **For patients with hypertension**
 - Poor blood pressure control contributes to over 68,000 preventable deaths annually
- **For patients with acute myocardial infarction**
 - Only 45% received beta-blockers which reduce risk of death by 13% in first week and 23% over long term

Compounding Factors

- **IOM study reports 98,000 deaths result from medical errors. These data are based on errors of commission in an inpatient setting only. Medical errors are the 5th leading cause of death.**
- **New studies considering errors of both omission and commission suggest medical errors are the 2nd leading cause of death and cost billions of dollars annually.**
- **The risks of bungee jumping are less than the risks of using the health care system.**

Focus on Quality Issues

- **Health care should be**
 - **Safe**
 - **Effective**
 - **Patient-centered**
 - **Timely**
 - **Efficient**
 - **Equitable**

From: IOM Crossing the Quality Chasm

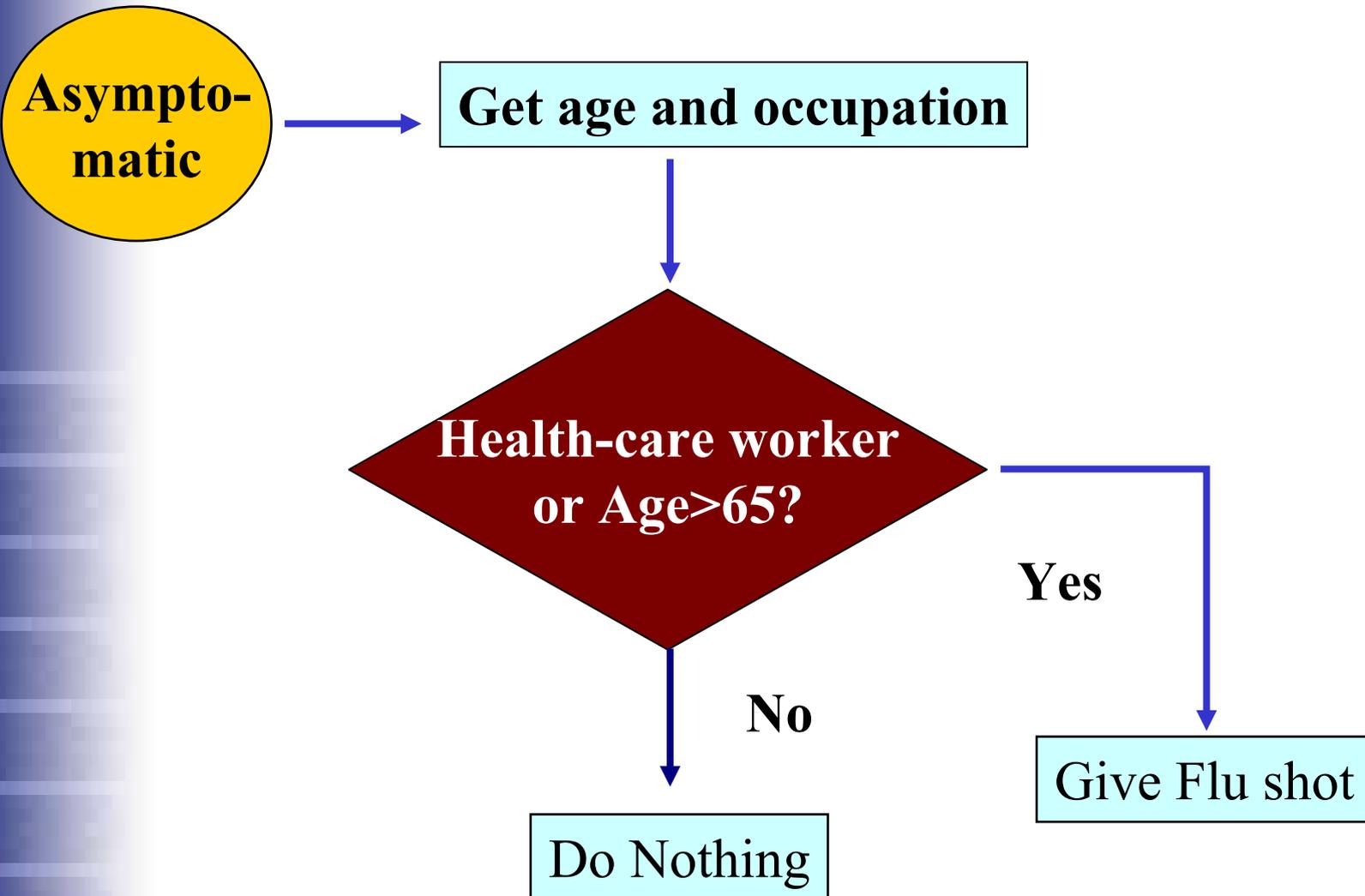
A Patient–centric Approach

- **The use of disease registries and performance indicators play a major role in the management of patients with chronic disease.**
- **The use of performance indicators permits an easy evaluation of the quality of care. Risk adjustments are necessary.**
- **Proper use of IT should guarantee appropriate care in a timely, affordable fashion.**
- **But disease registries won't really work without a complete, comprehensive and aggregated Electronic Health Record to populate and update the registries**

Decision Support Tools Support Patient-centric Care

- **Clinical Guidelines**
- **Care Maps**
- **Computerized Physician Order Entry Systems**
- **ePrescribing Systems**
- **Adverse event detection and prevention**

Flu vaccine guideline



The Problem

- **Health care is not taking full advantage of the information and communications technologies that have revolutionized other industries.**
- **Until clinical data can be reliably, efficiently and consistently shared and integrated in a manner that protects patient privacy and security, the health care system will continue to struggle with large gaps in the information that is needed at the bedside, in the office, at home, in the emergency room, at local and state public health departments, and in national policy setting and decision-making.**

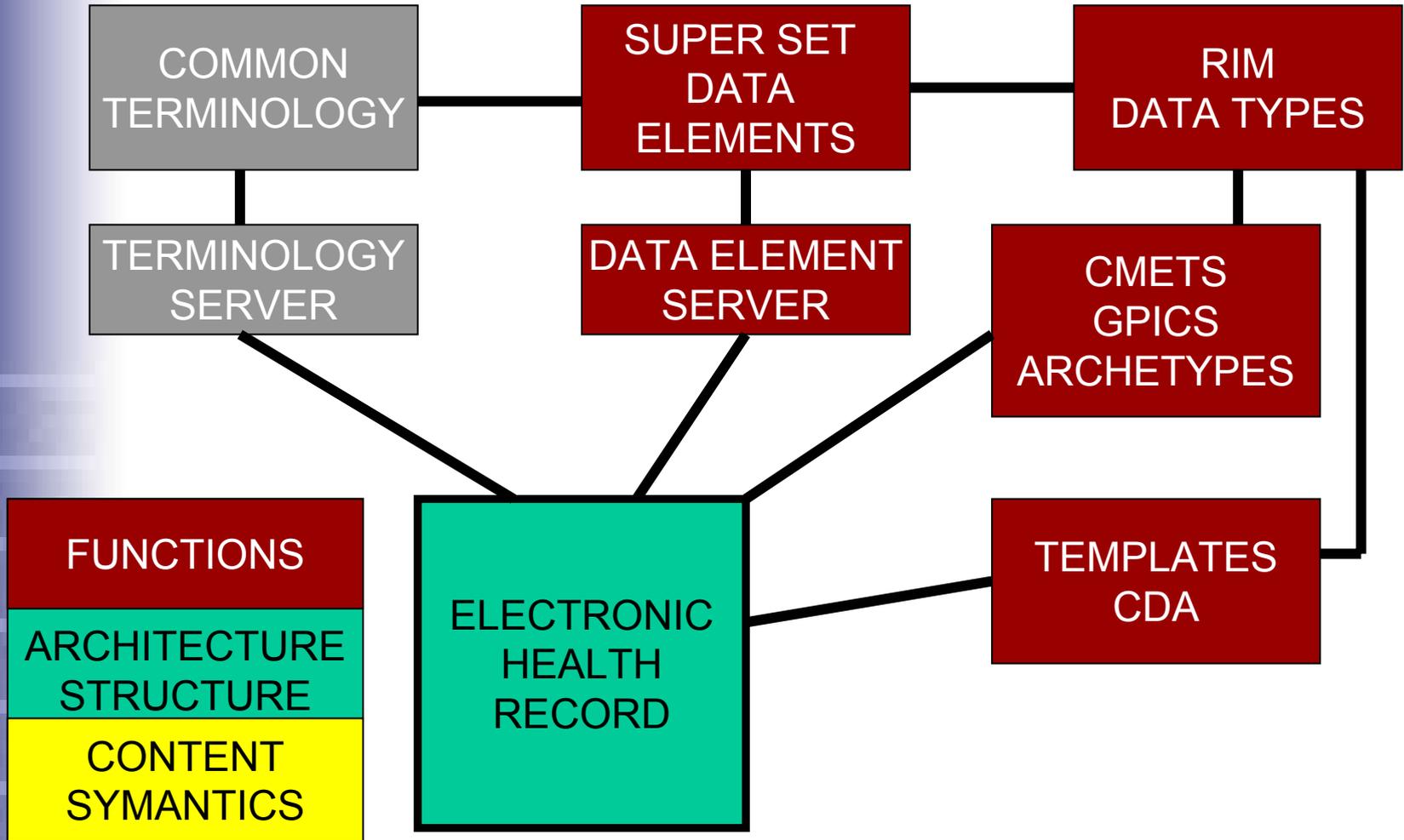
So how do we get there?

- **It's a matter of data**
 - Key to the creation of knowledge
 - Key to judgment and evaluation
 - Key to understanding outcomes
 - Key to the creation of processes
 - Key to decision making and action in health care
 - Provides the evidence of evidence-based medicine
- **And knowledge**
 - Appropriately applied at the right time and place
- **Data are the key to health care and thus to the Electronic Health Record.**

The Solution

- **An aggregated, patient-centered Electronic Health Record that serves all stakeholders.**
- **Aggregation requires interoperability.**
- **Interoperability requires**
 - **Data standards**
 - **Data interchange standards**
 - **Sharable EHRs**
 - **Infrastructure to support sharing and aggregation**
- **Such an EHR will support high quality, safe, efficient and effective patient-centric care**

ELECTRONIC HEALTH RECORD



What are other –centric approaches to health care?

- **Provider-centric**
- **Institution-centric**
- **Payer-centric**
- **Encounter-centric**
- **...**

- **What difference does it make? Does being patient-centric change the way the data should be stored? Does it change the EHR architecture?**
- **What is the difference between how the data is presented to the provider and how the patient might like to view the data?**
- **Does the focus of the data change?**
- **Are EHRs active or passive?**
- **Should the EHR be the same or different than the paper system?**
- **We need multiple views of the data.**

Diagnoses:

During your recent visit to Duke University Medical Center, you were cared for on the **Cardiology Associates Service** by **Dr. Donald Duck** for the following medical problems:

Atrial Fibrillation

Irregular heart beat that usually requires medication to control the heart rate and in many instances will include a blood thinner (aspirin or Coumadin [Warfarin]) to prevent blood clots from forming in the heart chambers. These blood clots have been known to cause heart attacks and strokes in some people.

Diabetes Mellitus

Many times, it is sugar diabetes. This condition can lead to many complications including kidney damage, damage to vision, damage to the nervous system if not properly treated. Typically, this condition is treated with medicines including insulin or occasionally pills. The most frequent way to monitor the most successful way of controlling this condition is by frequent glucose checks which can be done with a home monitoring device.

Prescription	Drug Class	Explanation	Call you physician if you experience:
<p>opressor 50 mg (1 tablet) twice a day by mouth</p>	<p>beta-blocker</p>	<p>Beta blockers are medicines used to slow the heart rate and to decrease the strength of each beat. This class of medicines is also used to treat extra heart beats that would be found in heart rate disturbances like atrial fibrillation.</p>	<ul style="list-style-type: none"> • Extreme fatigue • Difficulties with sexual activities
<p>nteric Coated aspirin 325 mg</p>	<p>anticoagulant</p>	<p>Aspirin prevents a blood clotting element call a platelet from clumping. These clumps can lead to heart attacks or strokes</p>	<ul style="list-style-type: none"> • Severe heartburn, indigestion, or gas • Bleeding from mouth or with bowel movement
<p>nitroglycerin patch 0.4 mg every 24 hours. Apply patch to skin once a day</p>	<p>anti-angina</p>	<p>Nitroglycerin is used to increase the size of the arteries supplying blood to the heart, preventing angina from occurring.</p>	<ul style="list-style-type: none"> • Severe headaches • Dizziness • Fainting spells

What is the EHR?

- Is the EHR a series of encounters or is it a structured group of components and data elements?
- The EHR should contain only those data elements necessary for the patient's care. Other data is superfluous and should be removed.
- The storage of the data in the EHR should be independent of source and the presentation of the data should be independent of the source. If I am viewing blood glucose, I should see all glucoses independent of where the test was ordered, where the result was created, whether it was ordered as part of a panel or as an individual test.
- Data integrity is obviously critical.
- Data should be ordered around disease management and be used for making a diagnosis, suggesting a treatment, evaluating a treatment, or for screening.

Multiple views of the EHR must exist.

- The institutional/provider view that serves the need of the institution in patient care, service management, workflow management, provider credentialing, legal and billing. This view provides the source of data for other views, since it is in this setting that the patient/provider encounter takes place. This is the traditional medical record and must relate to different settings: inpatient, outpatient, nursing homes, home health, etc.
- The composite view that represents a complete summary, aggregated view (the patient-centric view) of the person's health. This view also serves needs of health surveillance, bioterrorism surveillance, and global epidemiology.
- The personal health view that is customized to each individual and their current and future health needs. This view is the patient-centric view. This is for me!

Provider/Institutional Record

- **Presentation of data for direct patient care**
 - Ease documentation requirements
 - Early trend recognition
 - Care guidelines for convenience, consistency
 - Multiple views of data, correlation of view for family members
 - Provides a longitudinal view of the patient
- **Task and work flow management**
 - Automatic linkage to task management
 - Coupled to scheduling
 - Coupled to benefit plan, E&M guidelines
- **Asynchronous communication among healthcare providers and workers**

Conceptual architecture of summary population data

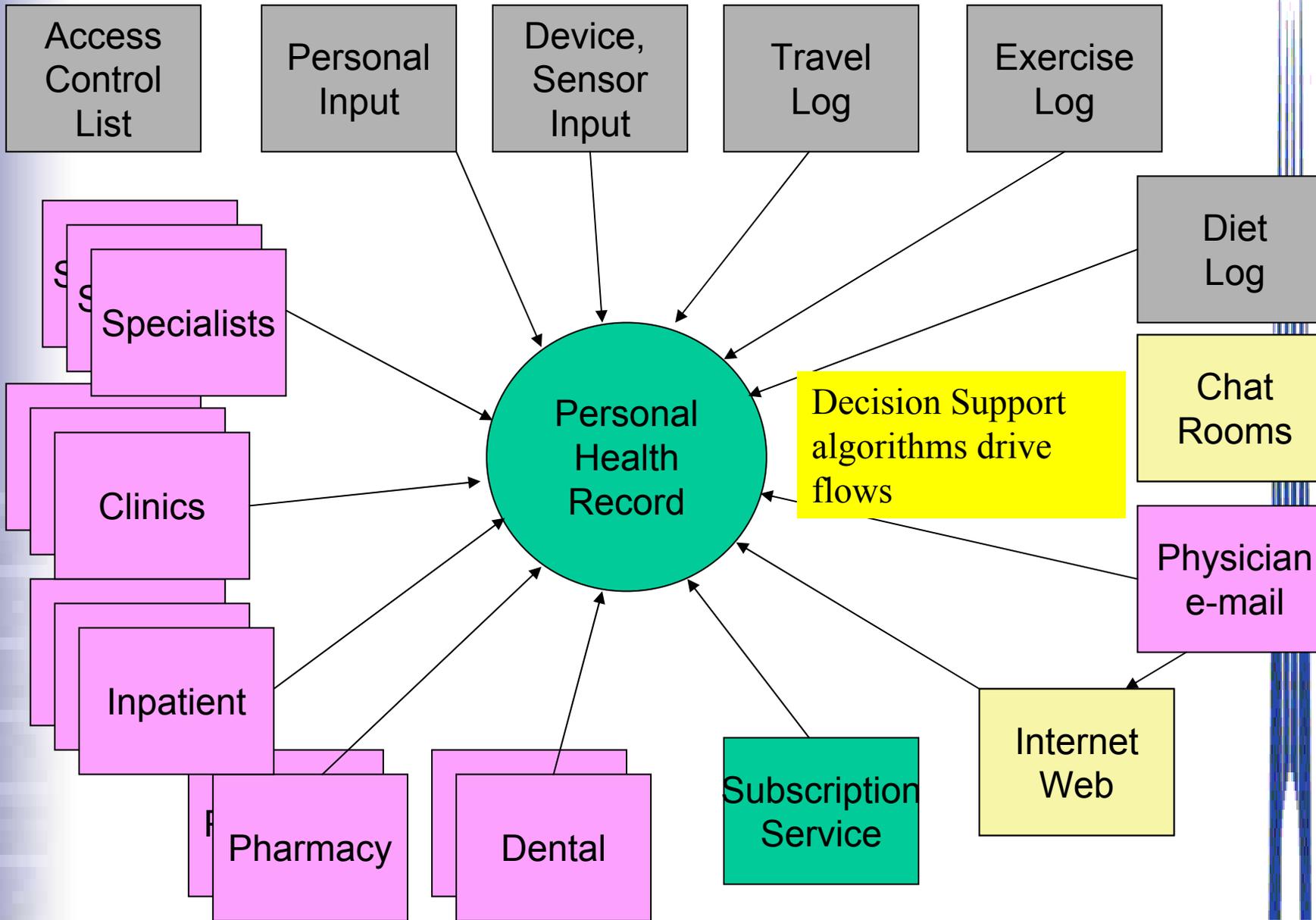
- Truly patient-centered
- Data is aggregated across all points of care for each person.
- Regional database contains summary data for each individual in that region.
- High level MPI, contains data to identify person and linkages to regional database.
- Data is identified for aggregation but de-identified for presentation unless necessary for patient care.
- Detailed data is retained at source site.
- Person's data moves with the person and appropriate linkages are updates.

Uses of Summary Population Record

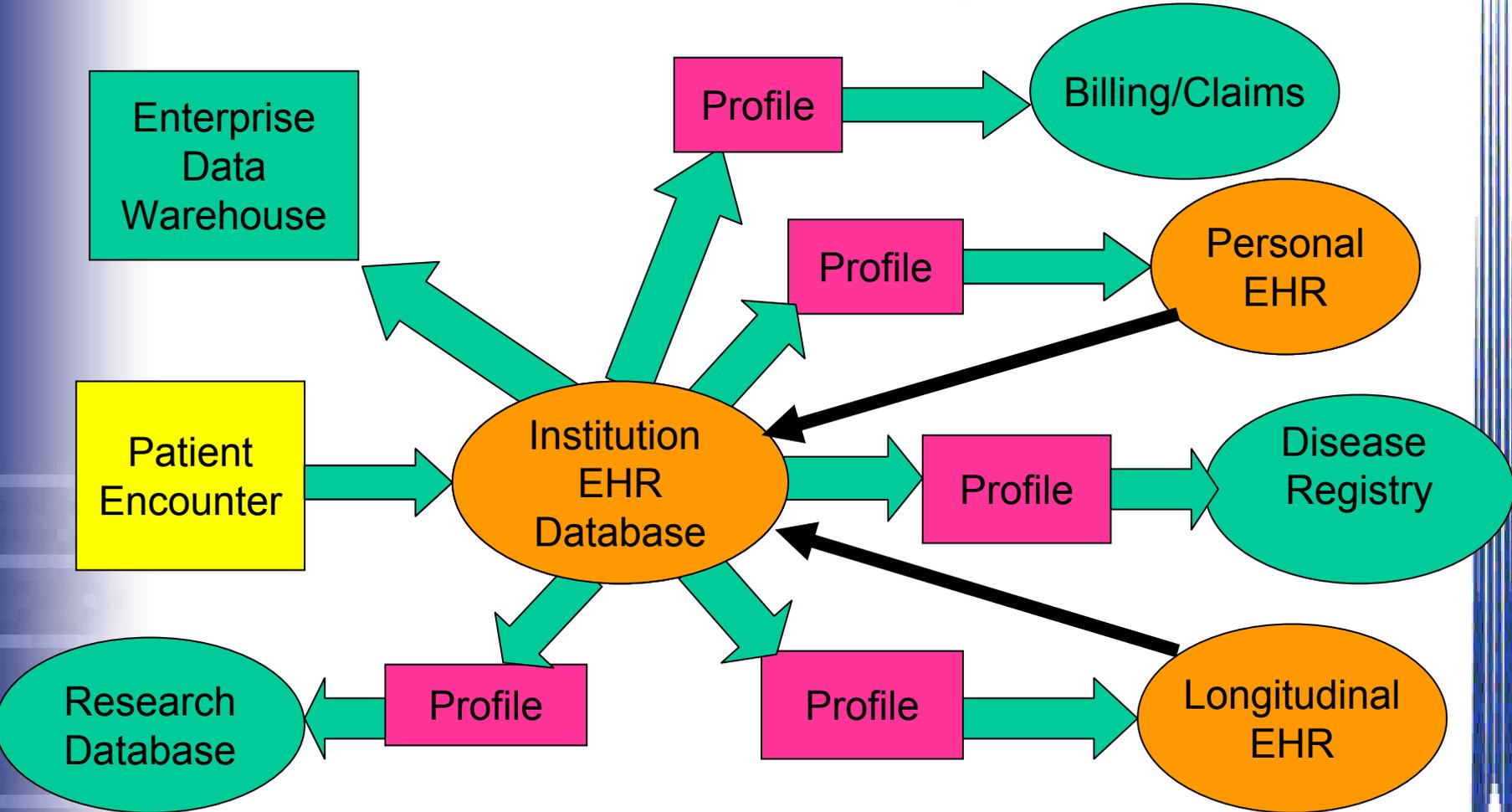
- Automated data search and analyses programs scan data in regions to evaluate occurrence of problems and identified symptoms
- Automated analyses programs scan all records in all databases to create epidemiological reports.
- Variations in outcomes are analyzed.
- Candidates for randomized controlled clinical trials are identified.
- Completeness and quality of care is evaluated.
- Research funding is influenced by statistics.
- Knowledge is extracted from clinical data.

Personal Health Record

- **Model to meet consumer needs and understanding and permit individual responsibility for planning and execution of their own care.**
- **May ultimately become first line of care with PCP providing backup and linkage.**
- **Focus on individual responsibilities, functioning, behavior and work management not just data repository.**
- **Contains personalized linkage to knowledge, particularly in disease and treatment options.**
- **Information displays driven by query, personal preferences, and behavioral needs.**
- **Some home entry of data coupled with controlled downloads from provider encounters.**
- **Person-controlled release.**

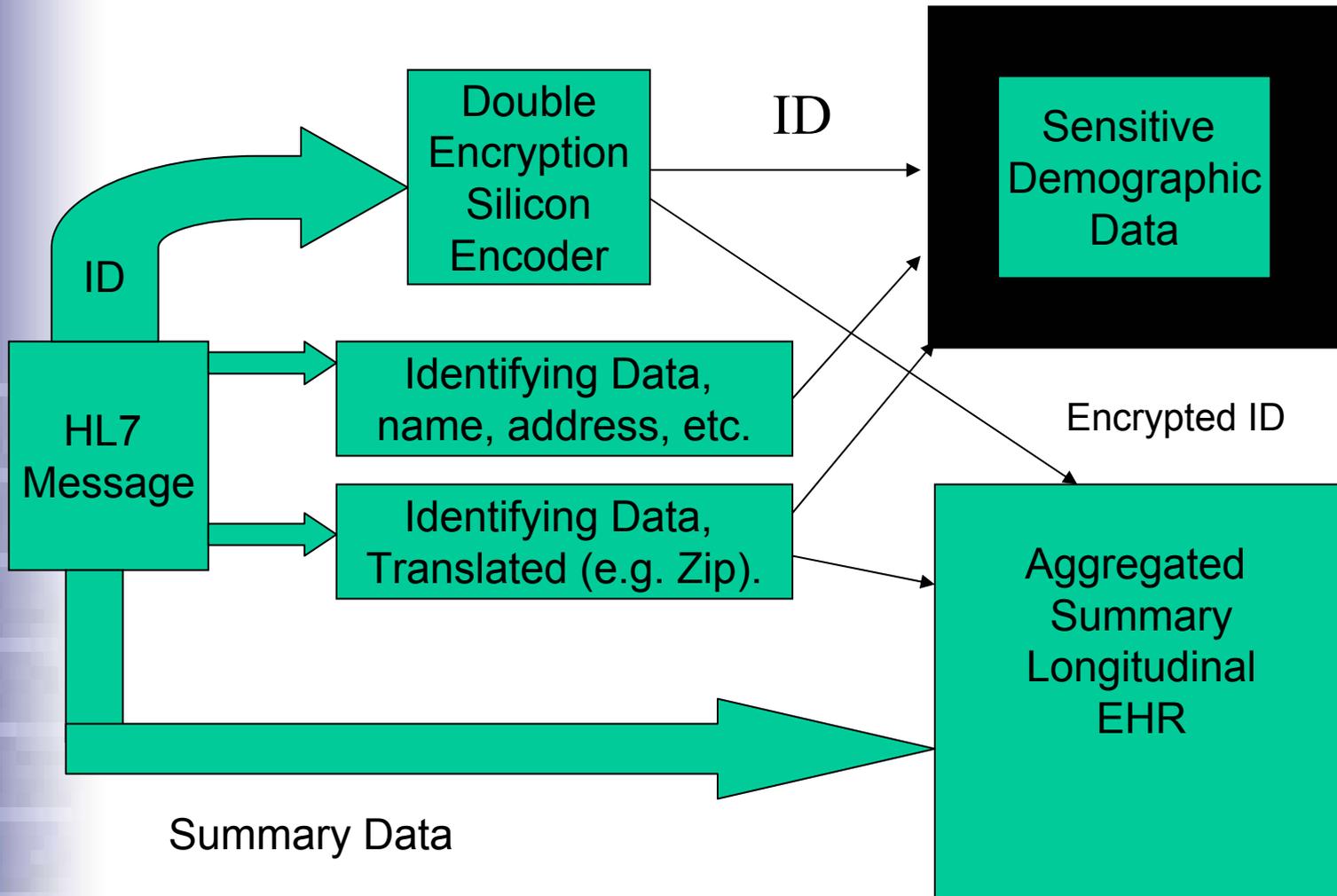


EHR Interoperability Diagram



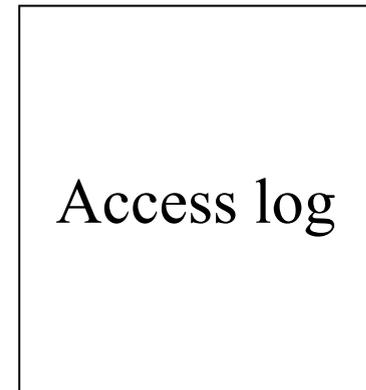
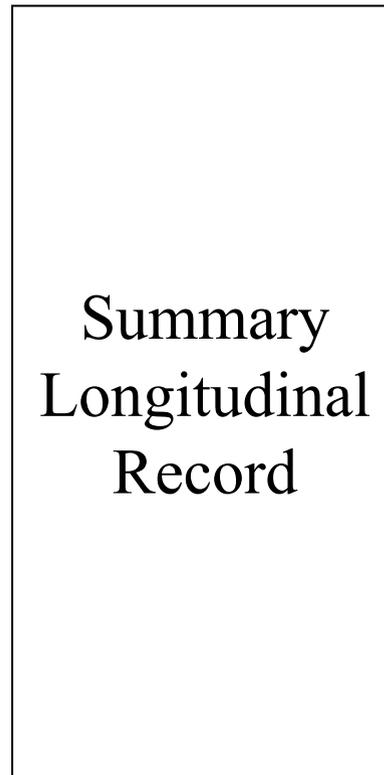
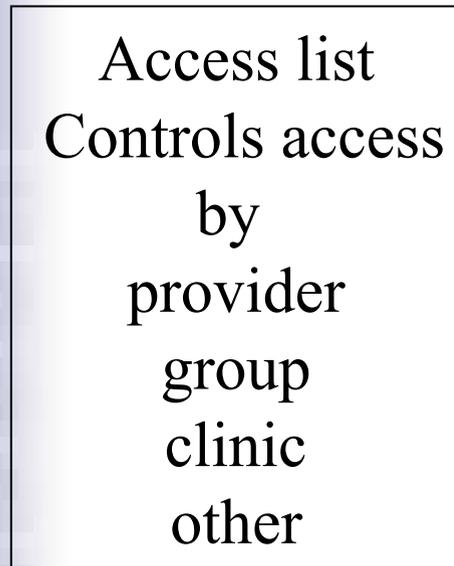
Profiles contain business rules

Download Process



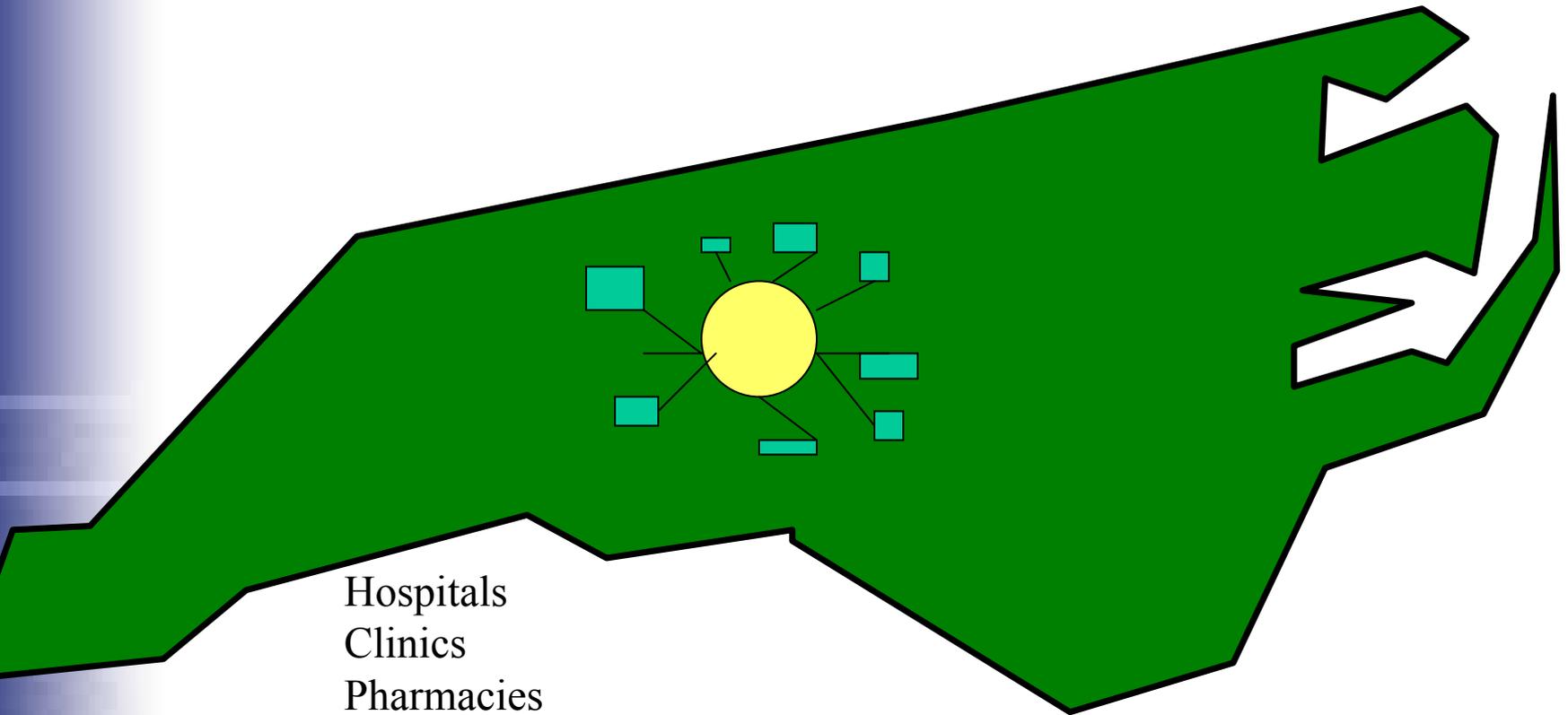
Summary Longitudinal Record

Patient
controlled
access



Feeds PH
surveillance,
patient safety,
epidemiology

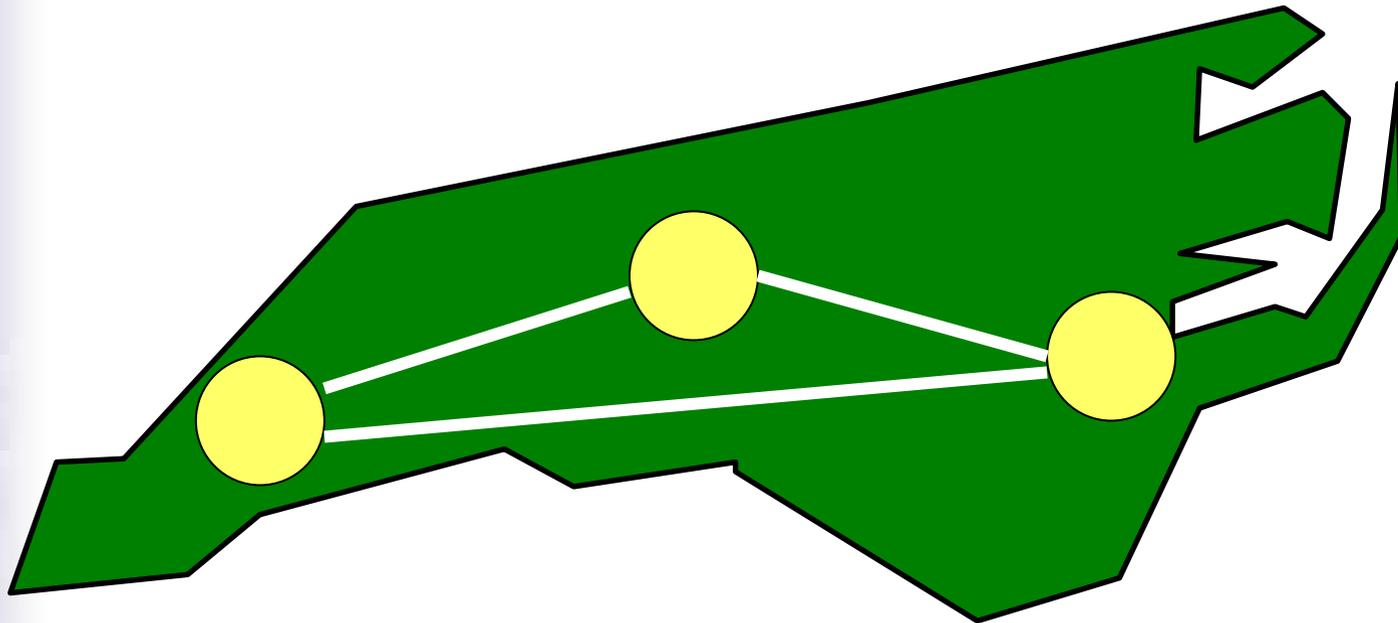
Regional Linkages



- Hospitals
- Clinics
- Pharmacies
- Nursing Homes
- Home Health
- Public Health
- Community Health
- Patient

4 million population

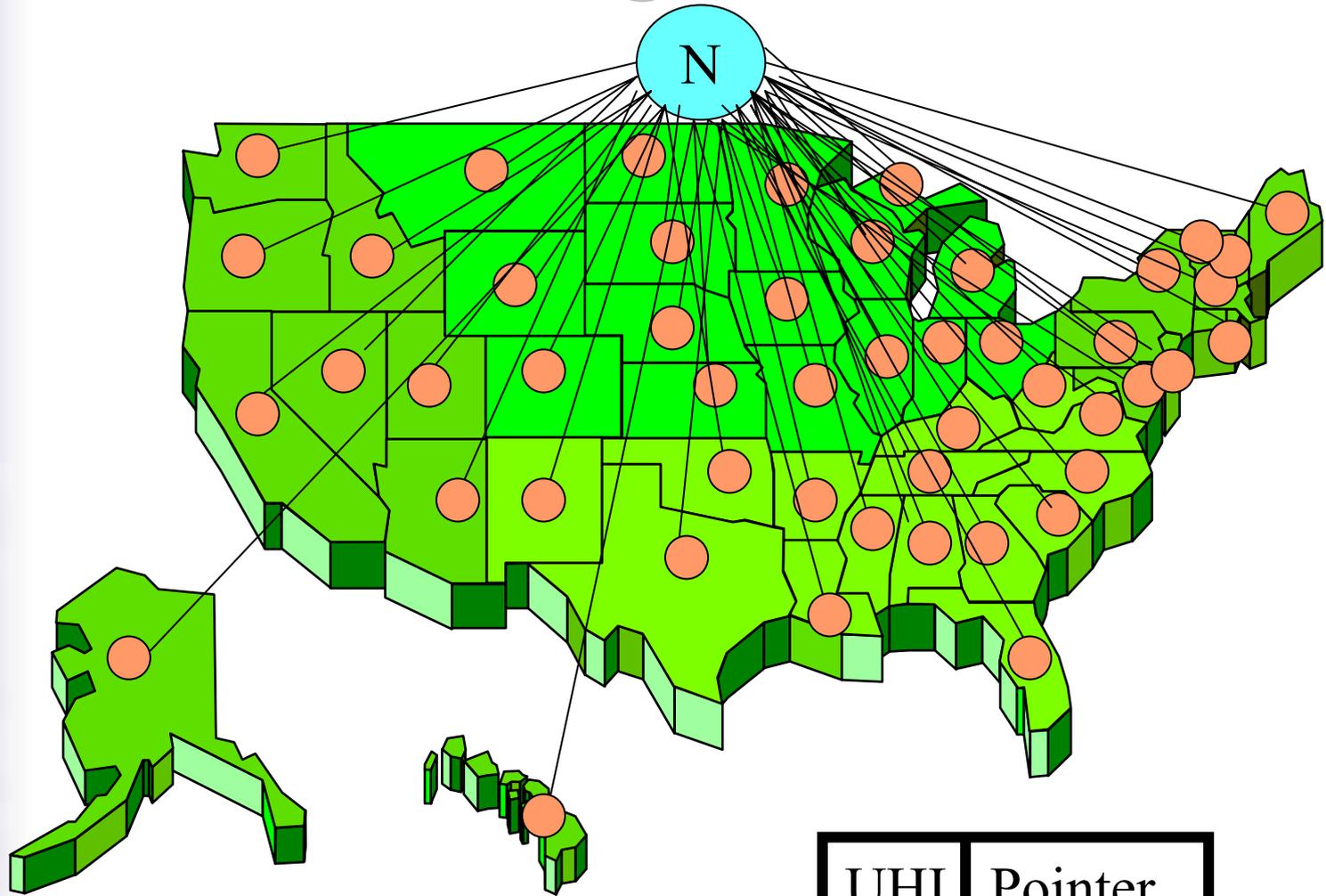
State-wide Linkage



12 million population

UHI	Pointer
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National Linkage



280 million population

UHI	Pointer
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The Future

- **Use of ICT must become an essential requirement in health care.**
- **Connectivity and accessibility are mandatory.**
- **Decisions cannot be made in the absence of information.**
- **Standards are necessary for sharing data. Governments must support standards.**
- **Leadership is important.**
- **Knowledge will continue to grow in volume.**
- **We will need more persons skilled in and understanding of medical informatics.**
- **Simple, affordable systems can bring significant value.**
- **Rhetoric is insufficient – we must have action.**

*Without health, there
is no happiness.*

Thomas Jefferson