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Health Information Technology: Will it Improve Quality and Reduce Cost?

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What Is Health Information Technology (HIT)?

- **Includes wide range of functions—e.g.,**
  - **Computerized billing, administration, and supply**
  - **Email and use of telehealth**

- **This presentation focuses on HIT functions involved directly in clinical care, including**
  - **Electronic medical records**
  - **Computerized order for medications (CPOE)**
 - **Decision-support systems**

Overview

- **Requirements for a successful HIT system**

- **Effects of HIT: evidence from the literature**
  - **2005 review Ann Intern Med**
  - **2007 update review**

- **Implementation: lessons learned**

- **Looking to the future**

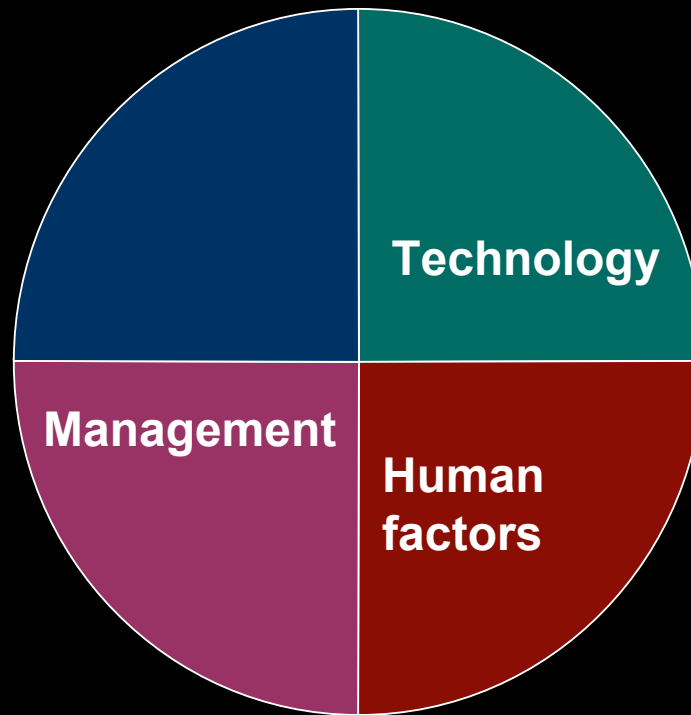# *Technology Is Only One Part of a Successful HIT System*
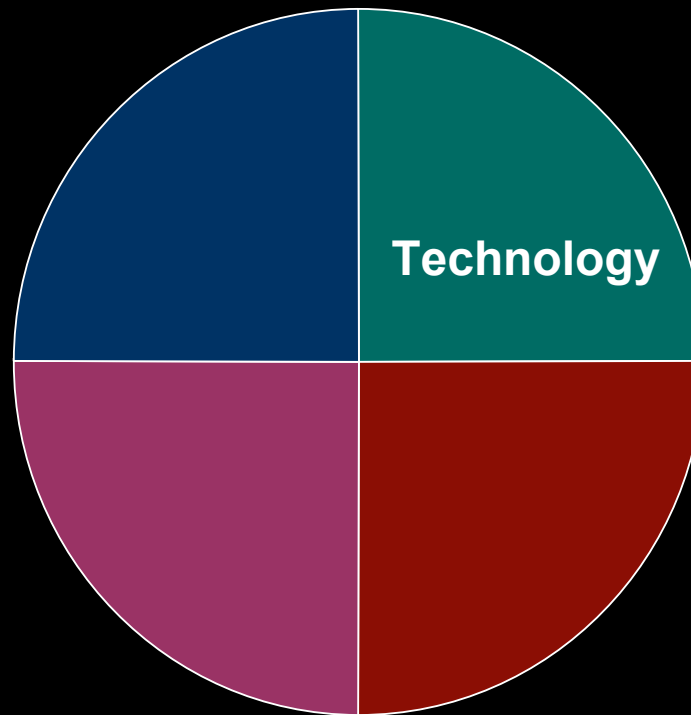
Technology

- **What technology is being tested?**

- **What technology is already in place?**

- **How does the new technology fit in the existing system?**

Human Factors Are also Important
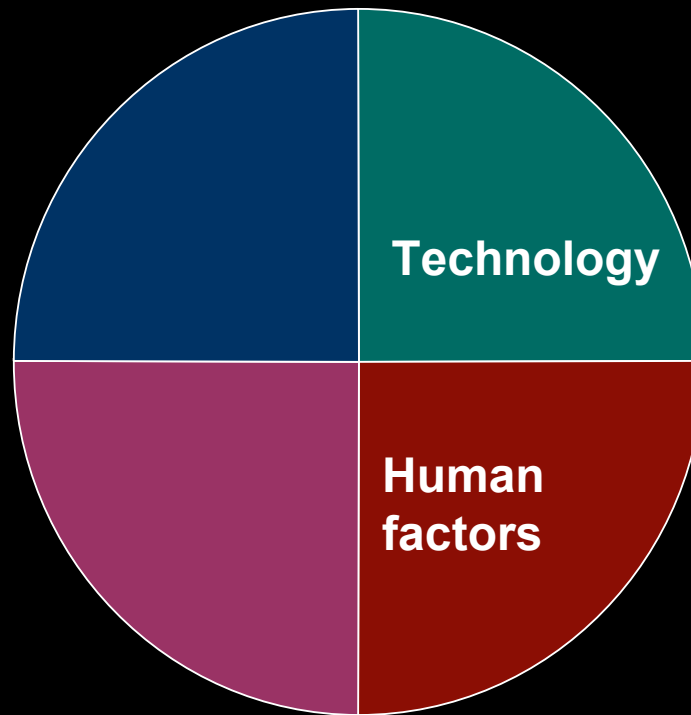
- Is the HIT system usable?

- How well is it supported?

Effective Management Is Necessary for Success

• **How must management change to make HIT successful?**

Technology

Management

Human factors

Organization and Culture Must Be Supportive

- **How can HIT become part of an organization's culture?**

We Reviewed Studies of HIT Benefits in 2005

Among 256 high quality studies identified:

Functionality:
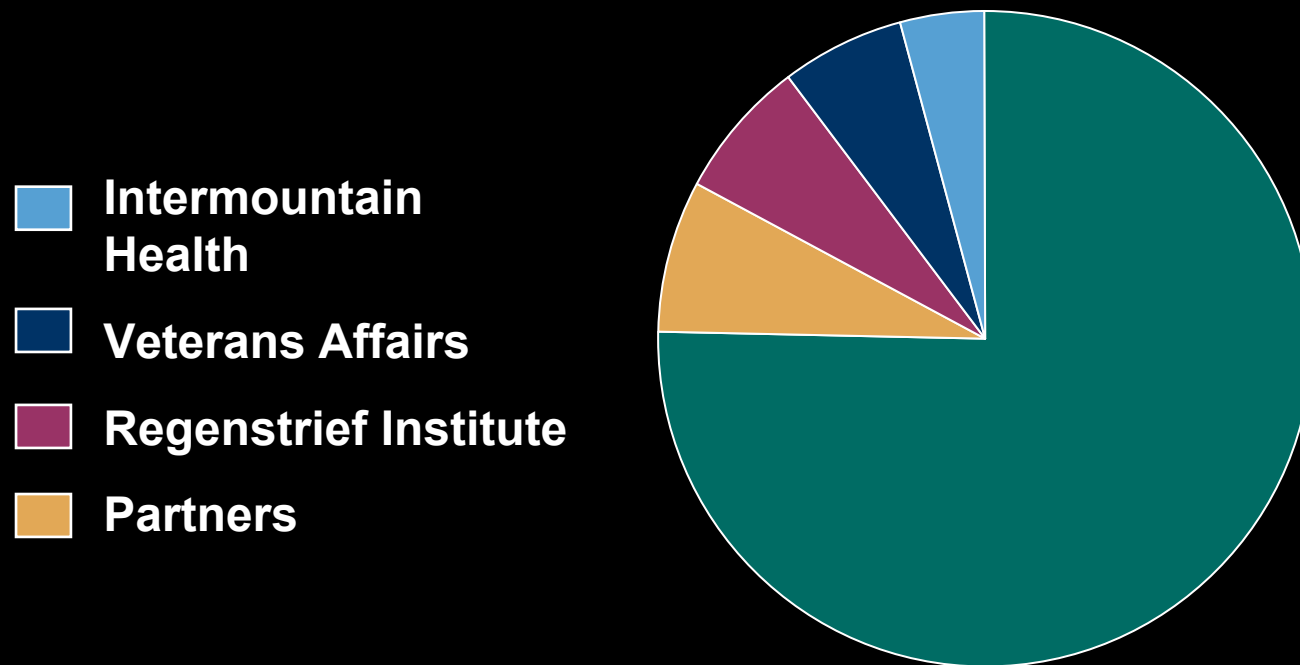- 156 decision support
- 84 EHR
- 30 CPOE

Setting:
- 124 outpatient
- 82 inpatient

Design:
- 97 RCTs
- 11 CCTs
- 33 pre-post
- 20 time series
- 17 case studies with concurrent control

One-fourth of the High Quality Studies Come from just 4 HIT Leaders

- Intermountain Health
- Veterans Affairs
- Regenstrief Institute
- Partners

HIT Systems Have Significantly Improved Quality at the HIT Leaders' Institutions
Example: Partners

Introduced computerized physician order entry and decision systems

- 24% reduction in redundant lab tests

- 86% reduction in serious medication errors

- 21% increase in ordering the appropriate test

- 38% decrease in time until treatment was ordered

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HIT Systems Have Significantly Improved Quality at the HIT Leaders' Institutions
Example: Regenstrief

Added computerized reminders to an existing electronic health record system

- 10%-20% increase in screening and prevention activities by general internists

- 10%-20% increase in the rates of advanced care directives and advanced care plans

- Computer-based standing orders were even more effective than reminders at improving vaccination

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VA Health System: HIT Success Story (but caveats later)

RAPID LEARNING

Advancing Evidence-Based Care For Diabetes: Lessons From The Veterans Health Administration

A highly regarded EHR system is but one contributor to the quality transformation of the VHA since the mid-1990s.

by Joel Kupersmith, Joseph Francis, Eve Kerr, Sarah Krein, Leonard Pogach, Robert M. Kolodner, and Jonathan B. Perlin

ABSTRACT: The Veterans Health Administration (VHA) is a unique laboratory for using the electronic health record (EHR) to transform health care and accelerate discovery. This is particularly evident in the care of veterans with diabetes, who constitute a quarter of those served by the VHA. Although EHRs have enabled rapid learning, additional factors were nec-

The Veterans Affairs Health Care System

- **Cares for more than 5 million veterans**

  - **~150 hospitals**

  - **>1000 clinics**

- **Doctors are salaried**

- **VA both pays for and provides care**

VISTA Makes it Possible to Monitor Quality and Outcomes of Diabetes Care

EXHIBIT 2

Trends In Mean Glycosylated Hemoglobin (HbA1c) Levels Among Veterans Health Administration (VHA) Clinic Users, By Age Category, October 1998–September 2000
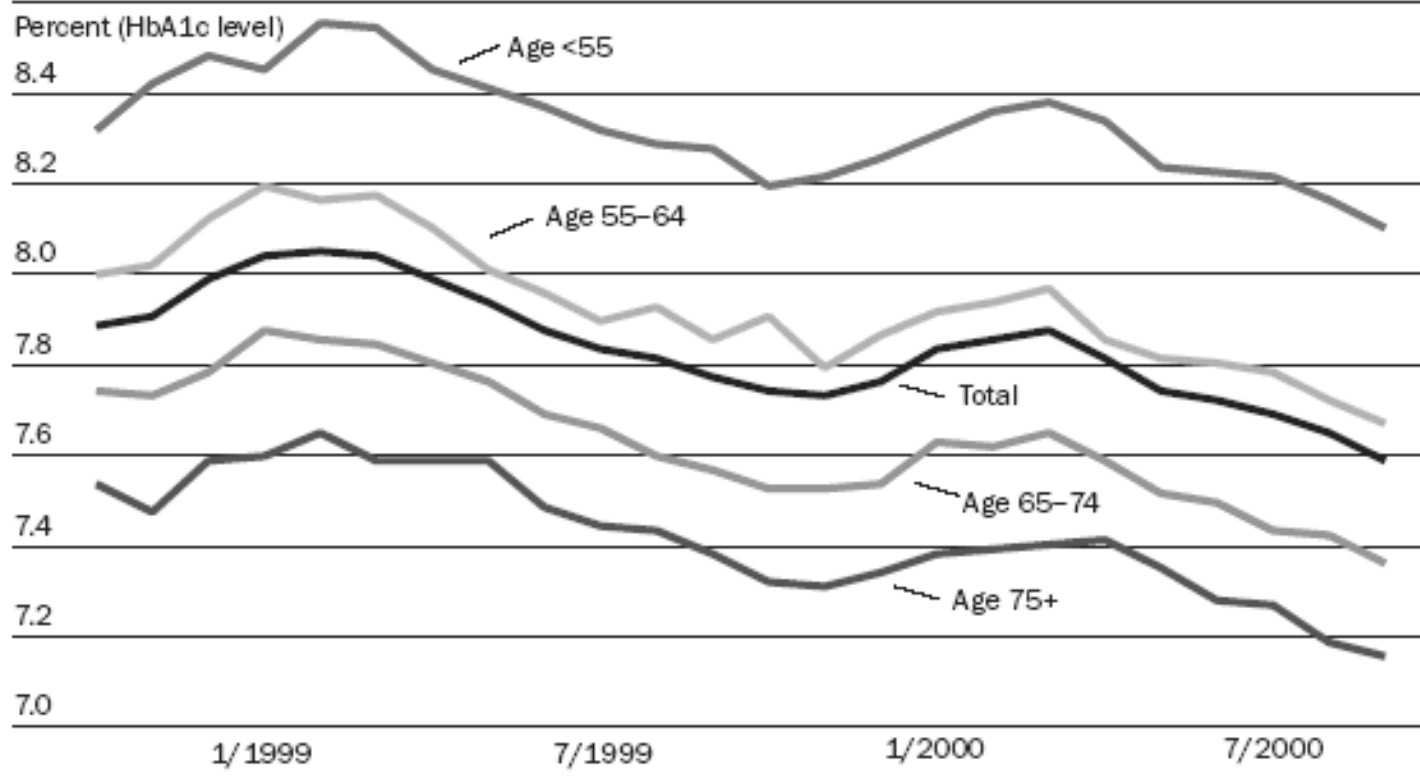
SOURCE: Diabetes Quality Enhancement Research Initiative (QUERI).

NOTE: Additionally, a regression model that adjusts for clustering (patient and facility) and seasonal effects was used to confirm the downward linear trend in monthly HbA1c levels overall (-0.013, $p </= 0.0001$) and minimal differences in this trend by each age category ($p = 0.492$)

VISTA's Performance Indicators and Clinical Reminders Help Providers, Patients, & the System to Achieve Specific Goals

EXHIBIT 3
Diabetes Process Quality In The Veterans Health Administration (VHA), Selected Years 1995–2005
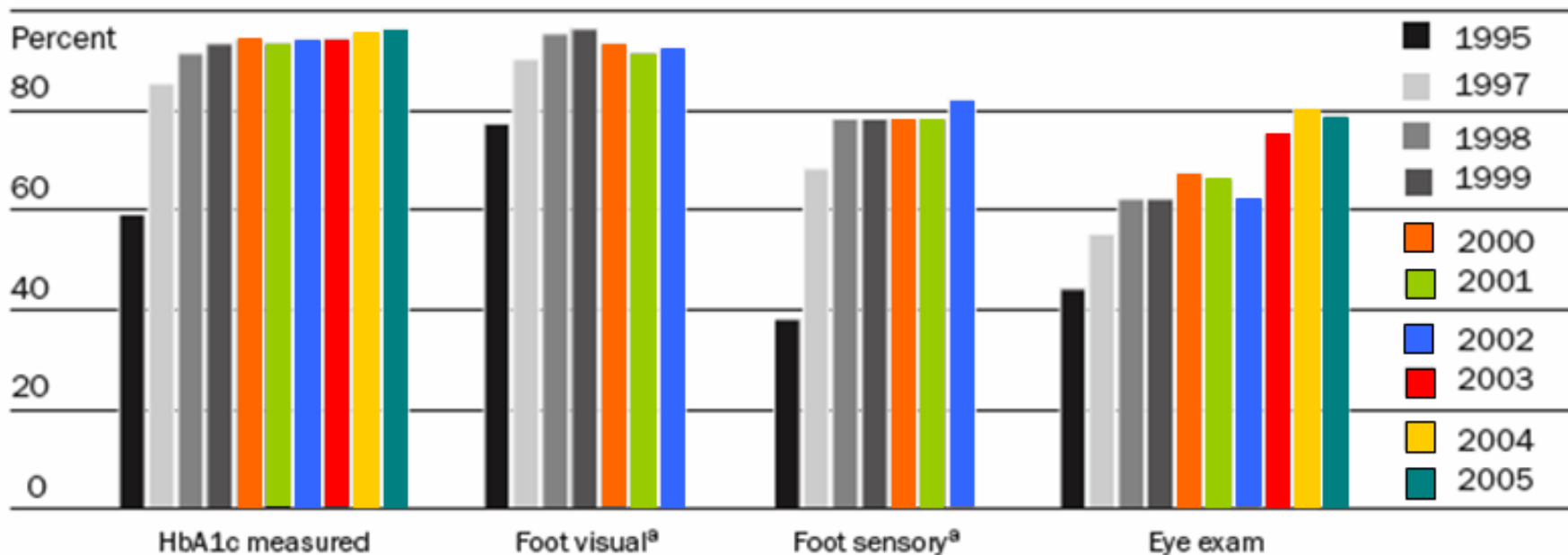
SOURCE: Based on results from the VHA External Peer Review Program.
NOTE: Results are for VHA primary care outpatients with diabetes mellitus.
[a] Data for 2004 and 2005 are not provided.

Little Evidence In 2005 About Costs and Benefits of HIT Systems in other Institutions

- **15 RCT/CCTs reported costs**
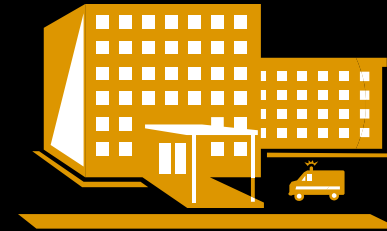 - **None assessed a system with broad functionality**

- **45 "other hypothesis-testing" studies reported costs**
  - **None assessed a system with broad functionality**

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The Unanswered Question:
How Will HIT Work in your Institution?

HIT Leaders

- Locally developed systems
- Local champions
- Real benefits
- Costs = ?

Your Hospital or Office

- Commercial HIT system

Organizational Context

"Context and confounders lie at the very heart of the diffusion, dissemination, and implementation of complex innovations. They are not extraneous to the object of study; they are an integral part of it."

Trish Greenhalgh

Milbank Quarterly,2004.82(4)581-629.

Little Evidence In 2005 About how Organizational Context Affects HIT Systems

Among hypothesis-testing studies:

- Only 3 studies provided information about the institution's financial context

- Only 6 studies provided information about system penetration

- One study discussed facilitators to implementation

- One study discussed sustainability of the HIT intervention

- Six studies reported initial costs

- Nine studies reported implementation costs

Cedars-Sinai Suspends Use of Computerized Physician Order Entry

January 22, 2003

Cedars-Sinai Medical Center in Los Angeles has indefinitely suspended use of its computerized physician order entry (CPOE) system, after hundreds of doctors complained it was difficult to use and compromised patient safety, the Los Angeles Times reports. Cedars-Sinai introduced the customized system in October 2002 in response to a state law that requires hospitals to adopt plans to reduce medical errors by 2005.

Kaiser Permanente Computer Glitches May Harm Patients

February 15, 2007

Repeated technical problems have hampered Kaiser Permanente's $4-billion effort to computerize medical records and has led to potentially dangerous incidents involving patients, according to a published report citing hospital documents and current and former employees.

Kaiser officials acknowledge the digital effort, called Health Connect, has had technical challenges, but say those have been resolved and patients should feel safe getting care at any Kaiser facility, the Los Angeles Times reported Thursday.

Available at http//cbs5.com/local/local_story_046110813.html. Accessed 2007 Mar 1

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2007 Update: 179 Studies

Functionality

40 CPOE

39 EHR

22 Decision support

21 Patient decision support

11 Electronic communication

4 Mobile computing

Setting

70 Hospital/Inpatient

64 Outpatient/ambulatory

18 Patient home/internet

15 Pediatrics

9 Emergency room

Study Design

46 Randomized controlled trial

7 Controlled clinical trial

34 Pre-post

18 Time Series

5 Historical control

27 Cross-sectional

18 Predictive analysis

14 Systematic review/meta-analysis

4 Cohort

2 Case control

5 Descriptive quantitative

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2007 Update: General Themes

- **More articles than expected indicating more rapid expansion of published HIT assessments**

- **HIT leaders continue to refine HIT applications**

- **Descriptions of commercial HIT systems more common**

- **Increasing numbers of clinical HIT applications external to an EHR**

- **Greater knowledge of factors important for HIT implementation but still much to be learned**

Commercial Multi-Function EHRs

More studies than in 2005 review

- **2 studies reporting on implementation of a commercially-available EHR (Kaiser, rural family practice in NY state)**

- **Study of effect on organization culture after converting to an EHR**

- **12 studies assessing effect of adding new functionalities (CPOE, DSS) to an existing EHR**

- **2 studies (weaker) associating community EHR use with quality**

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Kaiser EHR Implementation

- **Kaiser in Colorado – locally developed EHR (in collaboration with IBM)**

- **Kaiser Northwest – EpicCare**

- **Both EHRs include**
  - **Integrated documentation**
  - **Results reporting**
  - **CPOE**
  - **Decision-support systems**

- **Pre-post comparison – 4 years before and after**

Outcomes at Kaisers

- **Ambulatory care: 8% decrease**

- **Telephone contacts:**
  1.26 → 2.09 calls per member per year

- **Radiology use**
  - **Initial 14% decrease in radiology use with subsequent increase**
  - **Overall 4% decrease**

- **Smoking cessation advice, cervical cancer screening, diabetes eye exams:
  no change or slight improvement**

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A7233-26 03/07

Understanding Successful HIT Implementation

- **Some elements may be critical for successful implementation**

- **Evaluating these elements can increase understanding of why implementation works or does not work**

- **More studies needed that incorporate these factors into their HIT evaluations**

John Ovretveit et al. *Improving Quality through Effective Implementation of Information Technology in Healthcare*. Int J Qual Health Care **2007;19(5):259-266**

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Factors Important for HIT Implementation

The EHR System

- Ease of use
- Physician acceptance
- Absence of system failures
- Meets clinical/managerial needs

Implementation process

- User involvement
- Quality education
- Previous IT experience

Leadership

- Strong management support
- Physician champion

Resources

- Adequate people and financial support

Organization culture and climate

- Ready for change

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A7233-28 03/07

HIT & the VA: Lessons Learned

- VISTA has helped to transform all aspects of VA care

- Much more than technology was required

    - Culture of academic clinicians who value quality

    - Culture of scientific evidence & accountability

    - Health services researchers who were active clinicians, policymakers, and developers of VISTA

    - Research infrastructure

    - Incentives are aligned: the VA pays for HIT and benefits from cost savings

    From VISTA's inception to now has been 25 years

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Health Information Technology: Will it Improve Quality and Reduce Cost?

- **Good evidence that HIT can dramatically improve quality and safety**

- **Evidence for cost savings is less clear**

- **Challenges of implementing HIT systems have been underestimated and poorly studied**

- **Successful implementation will certainly require substantial time, resources, & leadership**

A7233-30 03/07

Looking to the Future

- **More data about successes and failures will be emerging**

- **Key to our learning process will be understanding the role of *other factors*: human factors, management, organizational context**

- ***Implementation Science* is a new term describing study of these factors**

    - **There is now a BMC journal devoted to this: http//www.implementationscience.com/**

- **Institutions interested in implementing HIT should study the VA experience**

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Requirements for Successful HIT Implementation

- **Aligning the financial incentives**

- **Strong commitment by clinical champions**

- **Phased implementation**

- **Realization that successful transition to an EHR will take many months—or years**