

NHII 04
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National Health Information Infrastructure (NHII): Tutorial

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Overview

- I. Background & History
- II. What is NHII?
 - A. Vision
 - B. Benefits
 - C. Principles
 - D. Elements
 - E. Operation
- III. NHII challenges
- IV. Current status of NHII
- V. Accelerating NHII Progress
- VI. How can you help with NHII?
- VII. Summary
- VIII. Questions & Discussion



I. Background & History



“Current practice depends upon the clinical decision making capacity and reliability of autonomous individual practitioners, for classes of problems that routinely exceed the bounds of unaided human cognition”

**-- Dan Masys, MD
IOM Annual Meeting (2001)**



A. Health Care System Challenges

- Error rates are too high
- Quality is inconsistent
- Research results are not rapidly used
- Costs are escalating
- New technologies continue to drive up costs
- Demographics of baby boomers will greatly increase demand
- Capacity for early detection of bioterrorism is minimal



B. National Expert Panel Reports

IOM	1991 1997	Computer-Based Patient Record
IOM	2000	To Err is Human
NRC/ CSTB	2001	Networking Health: Prescriptions for the Internet
IOM	2001	Crossing the Quality Chasm
PITAC	2001	Transforming Health Care Through Information Technology
NCVHS	2001	NHII
IOM	2002	The Future of the Public's Health in the 21st Century
IOM	2002	Fostering Rapid Advances in Health Care: Learning from System Demos



C. President's Executive Order April 27, 2004

- **Creates position of National Health IT Coordinator in HHS**
 - **David Brailer MD, PhD**
 - **Reports to HHS Secretary**
 - **New Office in HHS**
- **Responsible for**
 - **Coordinating all Federal and private sector efforts toward NHIT**
 - **Report in 90 days on incentives**
- **OPM to report on incentives using FEHB program**



II. What is NHII?



A. NHII Vision

- **Comprehensive knowledge-based network of interoperable systems**
- **Capable of providing information for sound decisions about health when and where needed**
- **“Anywhere, anytime health care information and decision support”**
- **NOT a central database of medical records**



A. NHII Vision (continued)

- **Includes organizing principles, systems, standards, procedures, and policies, e.g.**
 - **Communication networks**
 - **Message & content standards**
 - **Computer applications**
 - **Confidentiality protections**
- **Individual provider Electronic Health Record (EHR) systems are only the building blocks, not NHII**



Four Domains for NHII

NHII



B. NHII Benefits

- 1. Linkage between medical care & public health (e.g. for bioterrorism detection)**
- 2. Test results and x-rays always available
→ eliminate repeat studies**
- 3. Complete medical record always available**
- 4. Decision support always available:
guidelines & research results**
- 5. Quality & payment information derived
from record of care – not separate
reporting systems**
- 6. Consumers have access to their own
records**



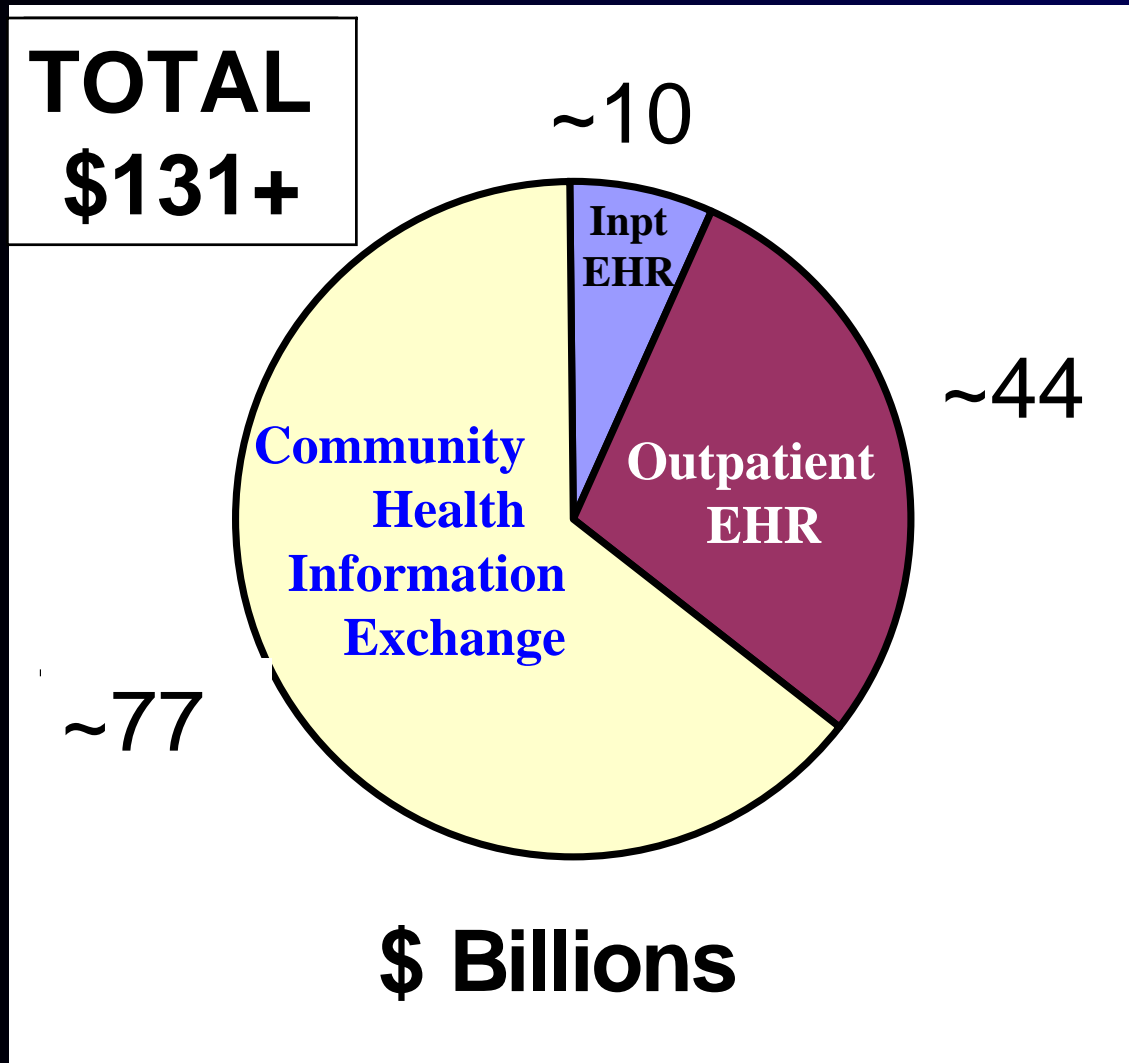
B. NHII Benefits (continued)

- **20% of labs and x-rays done because prior results unavailable**
- **1 in 7 hospitalizations occur because information about patient not available**
- **Medication errors reduced by 55% (Bates et al, 1998)**
- **Ambulatory computer-based provider order entry (CPOE) could save \$44 billion/year (Johnson et al, 2003)**



B. NHII Benefits (continued)

Net National Savings



Source:
Center for
Information
Technology
Leadership,
Partners
Health
Care,
Harvard
(2004)



C. NHI Principles

1. **Protect Privacy**
2. **Patient Centered**
3. **Inclusive**
4. **Private Sector**
5. **Voluntary**
6. **Collaborative**
7. **Alignment of Incentives**
8. **Incremental**
9. **Local**
10. **Interoperable**



D. Elements of NHII (1 of 3)

- **Standards: Messaging & Content**
 - **Foundation for remainder of NHII**
- **Electronic Health Record (EHR) Systems**
 - **Hospital**
 - **Outpatient**
- **Consumer Health Information Systems**
 - **Personal health record**
 - **Electronic patient-provider communication**
 - **Support groups**
 - **Authoritative information**



Messaging Standards

- What information is requested
- Where is the information in the message
- Example: “phone number” message
 - Pick up phone
 - Listen for dial tone
 - Dial number
 - If first digit is 1, then long distance, otherwise local



Content Standards

- A common, agreed-upon, detailed vocabulary for all medical terminology
- Without a standard:
 - “high blood pressure”
 - “elevated blood pressure”
 - “hypertension”
- With a standard
 - C487231, hypertension
 - Unambiguous meaning for both sender and receiver



D. Elements of NHII (2 of 3)

- **Ancillary health care systems**
 - **Pharmacy**
 - **Laboratory**
 - **Physical therapy**
 - **Post-acute care**
 - **Public health reporting**
- **Communication/networking systems**
 - **Information moves with patient**
 - **Integrated information from all types of providers**
 - **Electronic consultation (telemedicine)**



D. Elements of NHII (3 of 3)

- **Decision Support & Education**
 - Professional
 - Consumer
- **Confidentiality protections**
 - Information available on need-to-know basis
 - Authentication of all users
 - Encryption of data in transit
 - Audit trails of all usage
 - Penalties for violations



E. NHI Requirements: Functions

- Overall: “Anytime, anywhere health care information and decision support”
- Immediate availability of complete medical record (compiled from all sources) to any point-of-care
- Enable up-to-date decision support at any point of care
- Enable selective reporting (e.g. for public health)
- Enable use of tools to facilitate delivery of care (e.g. e-prescribing)
- Allow patients to control access to their information



E. NHII Requirements: Implementation Strategy

- **No national database or identifier**
- **Alignment of incentives**
- **Allow each care facility to maintain its own data**
- **Minimize cost & risk**
- **Use proven implementation strategies (where possible), e.g. incremental approach**
 - **Each implementation step benefits all participants**
 - **Implementation scope coincides with benefits scope**



community



Hospital Record



Laboratory Results



Specialist Record

Requests for Records

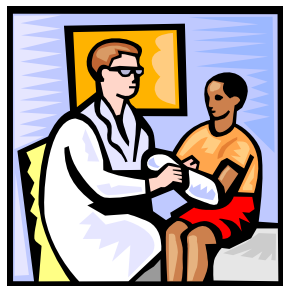
Records Returned

Patient Authorized Inquiry

Index of where patients have records

Temporary Aggregate Patient History

LHII system



Clinical Encounter

Patient data delivered to Physician



U.S.



Hospital Record



Laboratory Results

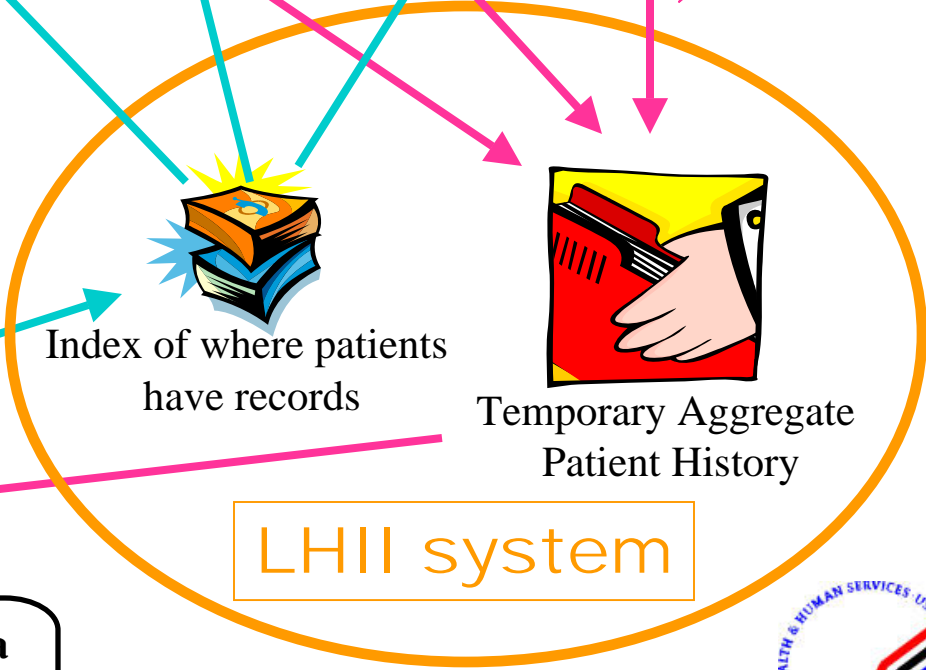


Specialist Record

Requests for Records

Records Returned

Authorized Inquiry from LHII



another LHII

Patient data delivered to other LHII



E. Advantages of LHII Approach

- Existing HII systems are local
- Health care is local → benefits are local
- Facilitates high level of trust needed
- Easier to align local incentives
- Local scope increases probability of success
- Specific local needs can be addressed
- Can develop a repeatable implementation process
- Parallel implementation → more rapid progress
- Use of standards allows connectivity between LHII → NHII



III. NHII Challenges



III. NHII Challenges

- Health care is the largest sector of the economy that has not fully embraced information technology
- Analogies to NHII in other sectors
 - Airline reservation systems
 - Banking information infrastructure
 - Access to funds via ATMs
 - Personal financial management
 - Auto industry: supply chain management
 - Retail industry: supply chain management, inventory control

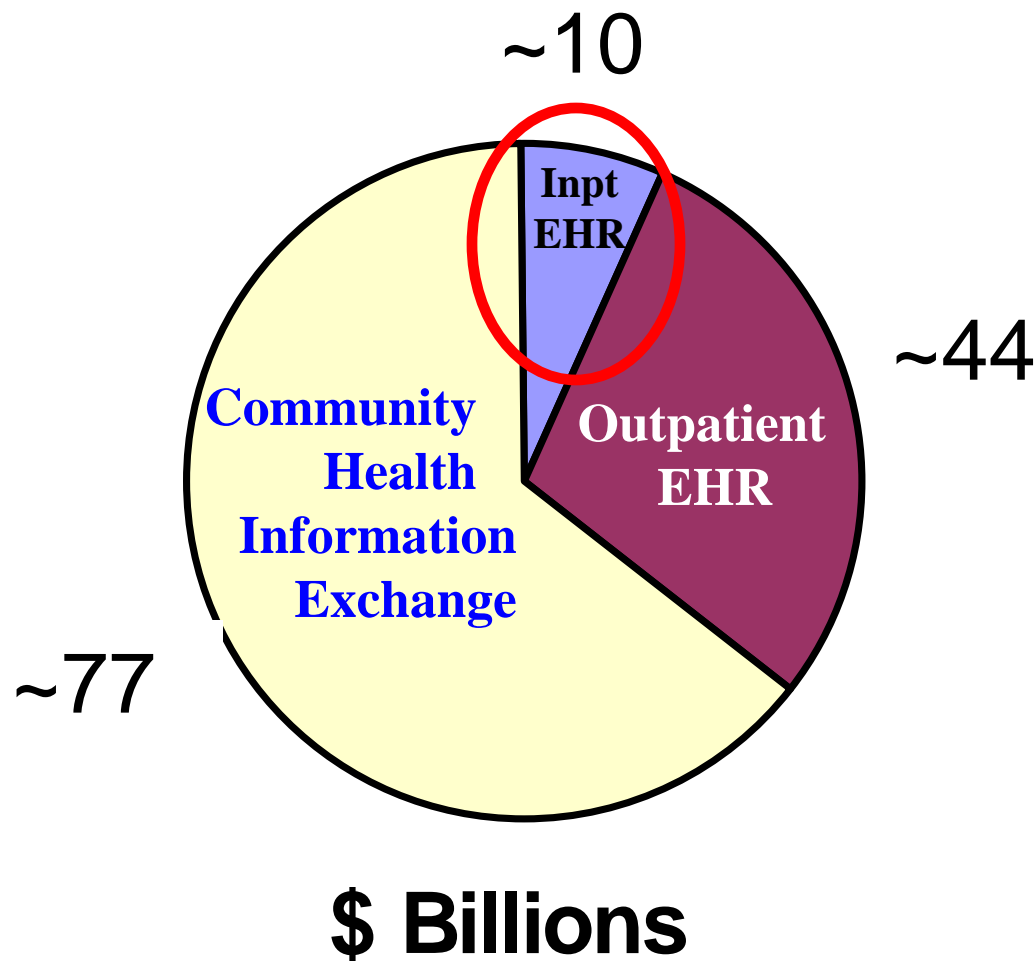


III. NHII Challenges (continued)

- **Health care information is very complex → IT systems more expensive and difficult to build**
- **Health care is highly fragmented**
- **Organizational and change management issues from IT systems are difficult to manage in clinical environment**
 - **Physicians are independent contractors**
 - **Reimbursement does not provide ROI for IT**
- **Difficult to generate capital needed for IT investment**
 - **IT is regarded as an add-on cost, not an investment for competitive advantage**



Inpatient EHR



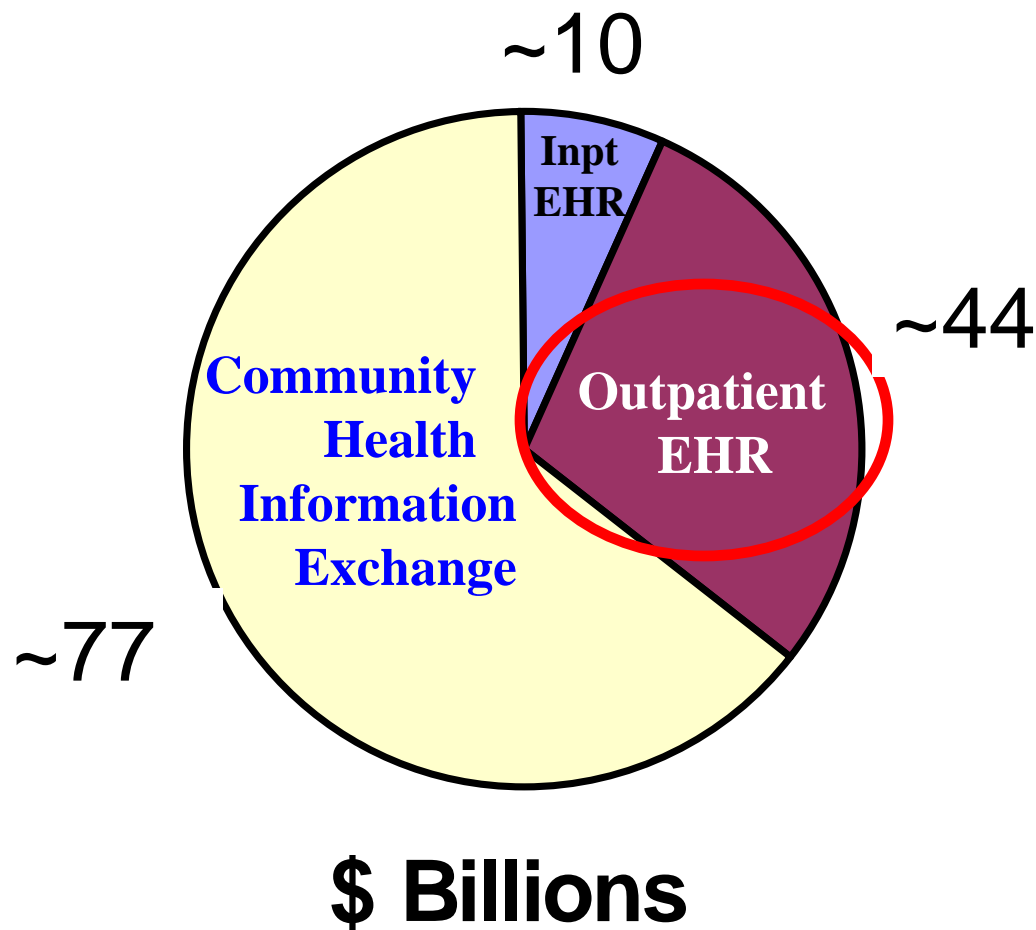
- Benefits go to hospital

- Larger hospitals are investing

- Capital is obstacle for small & rural institutions



Outpatient EHR



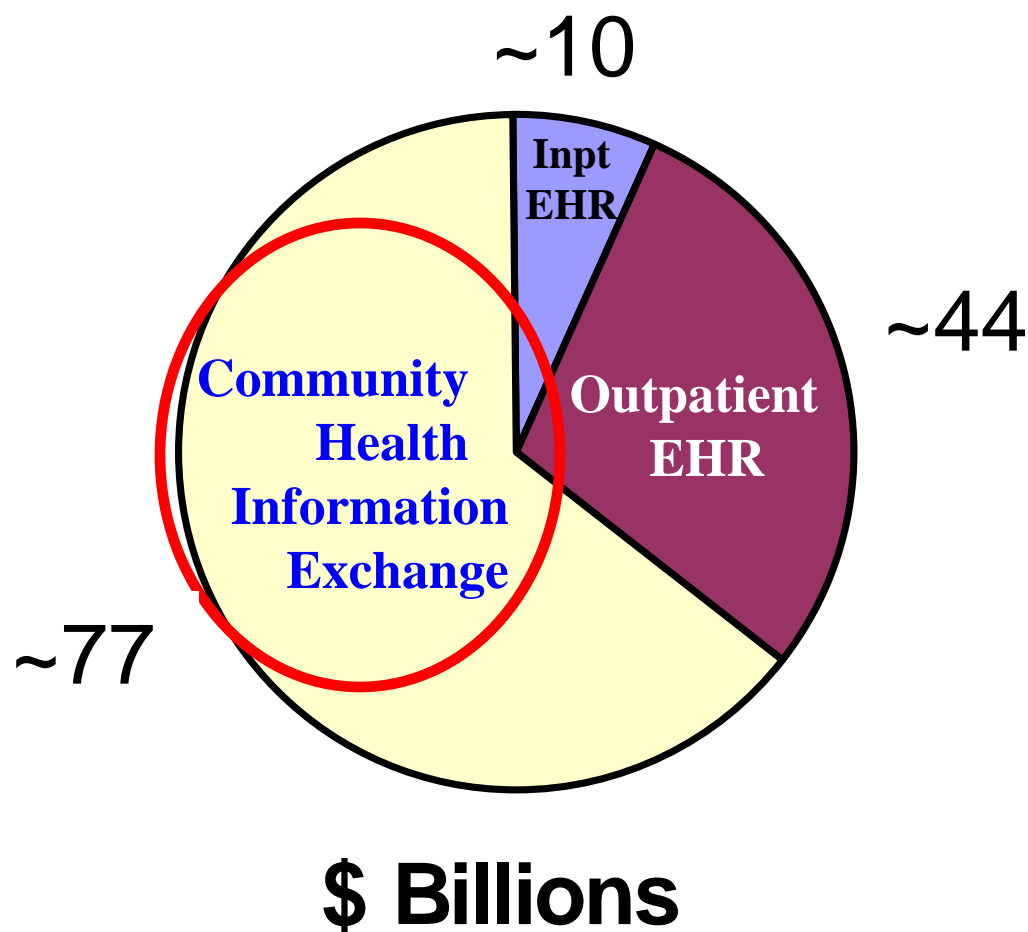
- Benefits go to payer

- No business case for physicians (especially small practices)

- Payer incentives needed (e.g. Maine)



Community Health Information Exchange



- Substantial benefits to all
- First mover disadvantage
- Seed funding needed
- Focus of current Federal initiatives



III. NHI Challenges (continued)

- **Protect Confidentiality**
- **Standards**
 - Data representation for exchange
 - Decision support encoding
 - Basic services
- **Incentives**
 - Align for EHR adoption
 - Create for LHI development
- **Collaboration for data sharing**
 - Governance
- **Legal & Regulatory**
 - Allow appropriate investments



IV. Current Status of NHII

- Islands of Information
- Fragmentary & isolated elements of NHII exist
 - Uneven distribution
 - Lack of coordination
 - Minimal interoperability
 - Many “one-of-a-kind” systems
- Much duplicative work
 - Limited dissemination of
 - Systems
 - Lessons learned



V. Accelerating NHII progress

- Inform
 - Disseminate NHII vision
 - Catalog NHII activities
 - Disseminate “lessons learned”
- Collaborate with Stakeholders
- Convene
 - NHII 03: 6/30-7/2/2003 in D.C.
 - National meeting to
 - Develop a consensus action agenda



NHII 03

Final Recommendations

I. Management

- 1) Governance
- 2) Education
- 3) Shared Resources
- 4) Metrics

II. Enablers

- 1) Financial Incentives*
- 2) Standards*
- 3) Legal Issues

III. Implementation Strategy

- 1) Demonstration Projects
- 2) Architecture*
- 3) Identifiers

IV. Targeted Domains

- 1) Consumer Health*
- 2) Research*

*original breakout track



I. Management: 1) Governance

- **Public/private NHII Task Force**
 - **Steering group**
 - **Architecture task force**
 - **Privacy oversight**
 - **Patient safety task force**
- **Regional non-profit public/private health IT corporations to coordinate LHII investment**
- **NCVHS should have consumer representative**
- **“consumers union” public/private partnership to rate quality**



I. Management: 2) Education and Communication

- **Inform public on NHII concept, implementation, privacy issues**
- **Educate senior execs & public re: health IT & patient safety/quality link**
- **Health IT education for consumers**
- **Health IT education & hands-on experience required in health professional training**
- **Increased clinical informatics training**
 - **Health professionals**
 - **Clinical Informatics specialists**



I. Management:

3) Shared Resources

- **Shared repositories**
 - **Rules/knowledge for health IT systems**
 - **Nationally-vetted clinical guidelines**
 - **Biodefense preparedness**
 - **Data definitions, datasets, metadata for research**
 - **National quality measurement database**
- **Facilitate alliances in research & population health communities**
- **Health promotion/prevention/treatment information available electronically to consumers**



I. Management: 4) Metrics

- **Establish metrics to track NHII progress, including**
 - **Biodefense preparedness**
 - **Availability in high-risk populations**
 - **Consumer management of patient information**
 - **Standardized safety & quality measures**
- **Tie funding to achievement of goals**
- **Measure and promote credibility of health information resources**



II. Enablers:

1) Financial Incentives

- **Acquiring health IT**
 - **Public/private financing: \$10 billion**
 - **Loans for IT → quality**
 - **Stimulate private investment**
- **Sustaining health IT (all payers)**
 - **Reimbursement for IT-driven care**
 - **Pay for quality & safety**
- **Financial incentives for standards use**
- **Research funding: private & govt.**
 - **Make standard data available**



II. Enablers: 2) Standards

- Funding: reliable & consistent
- Adoption
 - Decrease barriers, increase benefits
 - Improve dissemination
 - Require use:
 - standards-based labeling for medications, tests, devices
 - Code clinical data with reference standards at its source
- Maintenance: robust & nimble including
 - Designate core reference terminologies
 - Inter-vocabulary mapping
 - Alignment of message & terminology standards
 - Continue CHI* for federal standards
- Include consumer data elements
- Consider privacy issues



II. Enablers: 3) Legal Issues

- Remove legal barriers to
 - Health IT investment
 - Health information sharing
 - Collaboration in BT emergency
 - Safety & quality reporting
- Evaluate state & federal laws that affect NHII
 - Architecture
 - Development
 - Implementation



III. Implementation Strategy:

1) Demonstration Projects

- **Community health info exchange**
 - 40-50 projects
 - Support safety & quality
 - Led by regional steering committees
 - Sharing of lessons learned
 - Coordinated national investment plan
 - Incremental interoperability approach
 - Include consumers, biodefense preparedness
 - Address privacy issues



III. Implementation Strategy:

2) Architecture

- **Architecture task force (ATF)**
- **Key principles for architecture:**
 - **Privacy, confidentiality, security**
 - **Standards-based**
 - **Non-proprietary**
 - **Scalable; incremental growth**
 - **Technology: simple & easy-to-use**
 - **Low barriers to entry**
- **Align Public Health Information Network (PHIN) with NHII**
- **Affordable broadband to homes**



III. Implementation Strategy:

3) Identifiers

- **Resolve patient identification issue**
 - **Proceed without identifier**
 - **review mechanisms for patient matching**
 - **New national unique patient identifier**
 - **Establish patient linkage algorithm for research (< 100% accurate)**
- **New national unique provider identifier**



IV. Targeted Domains:

1) Consumer Health

- **Establish personal health records (PHR)**
 - **No charge to consumers**
 - **Trusted authority**
 - **Using defined basic platform**
- **Promote e-health tools, e.g.**
 - **Link PHR to relevant information resources**
 - **Provide health alerts & decision support**
- **Evaluate role of individuals in control & management of medical information**



IV. Targeted Domains:

2) Research

- **Research on impact of health IT on safety & quality: \$1 billion/year**
 - **Evaluate existing systems**
 - **Improve adverse event detection algorithms**
 - **Improve methods for maximizing effectiveness of communicated info**
 - **Establish ethical, legal, and social issues (ELSI) program for NHII**
 - **Evaluate privacy policy options informed by public surveys**



V. Accelerating NHII progress (2)

- **Standardize**
 - HL7, DICOM, IEEE 1073, NCPDP SCRIPT
 - SNOMED, LOINC
 - HL7 projects: EHR functions, EHR interchange format
- **Demonstrate**
 - \$50 million in FY 04 budget for NHII demonstration projects (AHRQ)
 - President has requested additional \$50 million for FY 05 for LHII
- **Evaluate**
 - Rigorous assessment of NHII benefits
 - Policy options for aligning financial incentives



VI. How can you help with NHII?

- **Cost-benefit data needed**
 - **Good data hard to find**
 - **Consider making your internal studies available**
- **Consider starting an LHII**
 - **Convene community partners**
 - **Discuss information sharing**
- **Keep informed on these issues**
 - **Ask for periodic reports**
- **Make your views known**



VII. Summary

- NHII = “anytime, anywhere health information and decision support”
- Not a new concept
- Needed to improve safety, quality, and efficiency of health care
- Key elements
 - Standards
 - Electronic health records
 - Local health information infrastructures (LHIIIs)



VII. Summary (continued)

- **Key challenges**
 - **Protect Confidentiality**
 - **Standards**
 - **Incentives**
 - **Collaboration**
 - **Legal & Regulatory**
- **Most elements of NHI already exist somewhere**
- **HHS is working to accelerate progress: inform, collaborate, convene, standardize, demonstrate, evaluate**



“The committee believes that establishing this information technology infrastructure [NHII] should be the highest priority for all health care stakeholders.”

**-- Committee on Data Standards for Patient Safety:
“Patient Safety: Achieving a New Standard for Care”
Institute of Medicine, November, 2003
(Executive Summary)**



Questions?

For more information about NHII
<http://aspe.hhs.gov/sp/nhii>

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NHII References

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