

Integration of EMR/PHR and Patient Portal with Decision Support

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Overview

- Healthcare Delivery Challenges
- Critical EHR, EMR and PHR Functions
- Importance of Interoperability
- Patient-Provider Integration with Decision Support

Vision

'Medical Home' utilizing an integrated EMR/PHR with decision support will transform the healthcare system by improving patient-provider communication, quality, efficiency and reduced costs

Paper-Based Records



A handwritten medical note on a white strip. The text is written in cursive and reads: "Cervical 4-7 mm SP". The strip is placed horizontally across the slide.

- Prone to error
- Lots of information but no data (electronic)
- Limited decision support
- Does not integrate with eHealthcare

Healthcare Delivery Challenges

Medical error, patient safety, quality and cost issues

- 1 in 4 prescriptions taken by a patient are not known to the treating physician
- 1 in 5 lab and x-ray tests ordered because originals cannot be found
- 40% of outpatient prescriptions unnecessary

Healthcare Delivery Challenges

Medical error, patient safety, quality and cost issues

- Patient data unavailable in 81% of cases in one clinic, with an average of 4 missing items per case
- 18% of medical errors are estimated to be due to inadequate availability of patient information
- Patients receive only 54.9% of recommended care

Healthcare Delivery Challenges

A fractured and 'unwired' healthcare system

- Medicare beneficiaries see 1.3 – 13.8 unique providers annually; on average, 6.4 different providers/yr
- 90% of the >30B healthcare transactions in the US every year are conducted via mail, fax, or phone

IOM Recommended 21st Century Health Care System

- Safe - Avoids errors
- Effective - Evidence-based
- Patient-centered
- Timely - Reduces waits and harmful delays
- Efficient - Avoids waste
- Equitable - Provides quality of care unrelated to age, race, gender, geographic location, or socio-economic status

EMR Linkage to PHR a Critical Solution

- IOM highlighted improved information systems as a means for achieving quality
- “Effective methods of communication, both among caregivers and between caregivers and patients, are critical to providing high-quality care”

Critical EHR Functions

Core Functionalities for an Electronic Health Record (EHR) System

- Results Management
- Health Information and Data
- Order Entry/Management
- Decision Support
- Electronic Communication and Conductivity
- Patient Support
- Administrative Processes
- Reporting & Population Health Management

Tang PC, and the IOM Committee on Data Standards for Patient Safety. Letter Report: Key Capabilities of an Electronic Health Record System. Institute of Medicine, July, 2003.

Personal Health Records

Project HealthDesign:

Rethinking the Power and Potential
of Personal Health Records

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Project HealthDesign supports technology pioneers to design the next generation of personal health record systems in ways that empower patients to better manage their health and health care.

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Have the latest in news and insights delivered to your inbox.

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Newsroom

Expert Teams to Design New Solutions for Personal Health Records to Help Consumers Manage Their Health

Thursday, December 7th, 2006

Project HealthDesign Selects Nine Teams to Design and Test Innovative, Consumer-Centered PHR Applications

[Read More >>](#)

Rethinking Potential of Personal Health Records is Goal of New RWJF Program

Monday, July 17th, 2006

Project HealthDesign accepting proposals through September 19, 2006

[Read More >>](#)



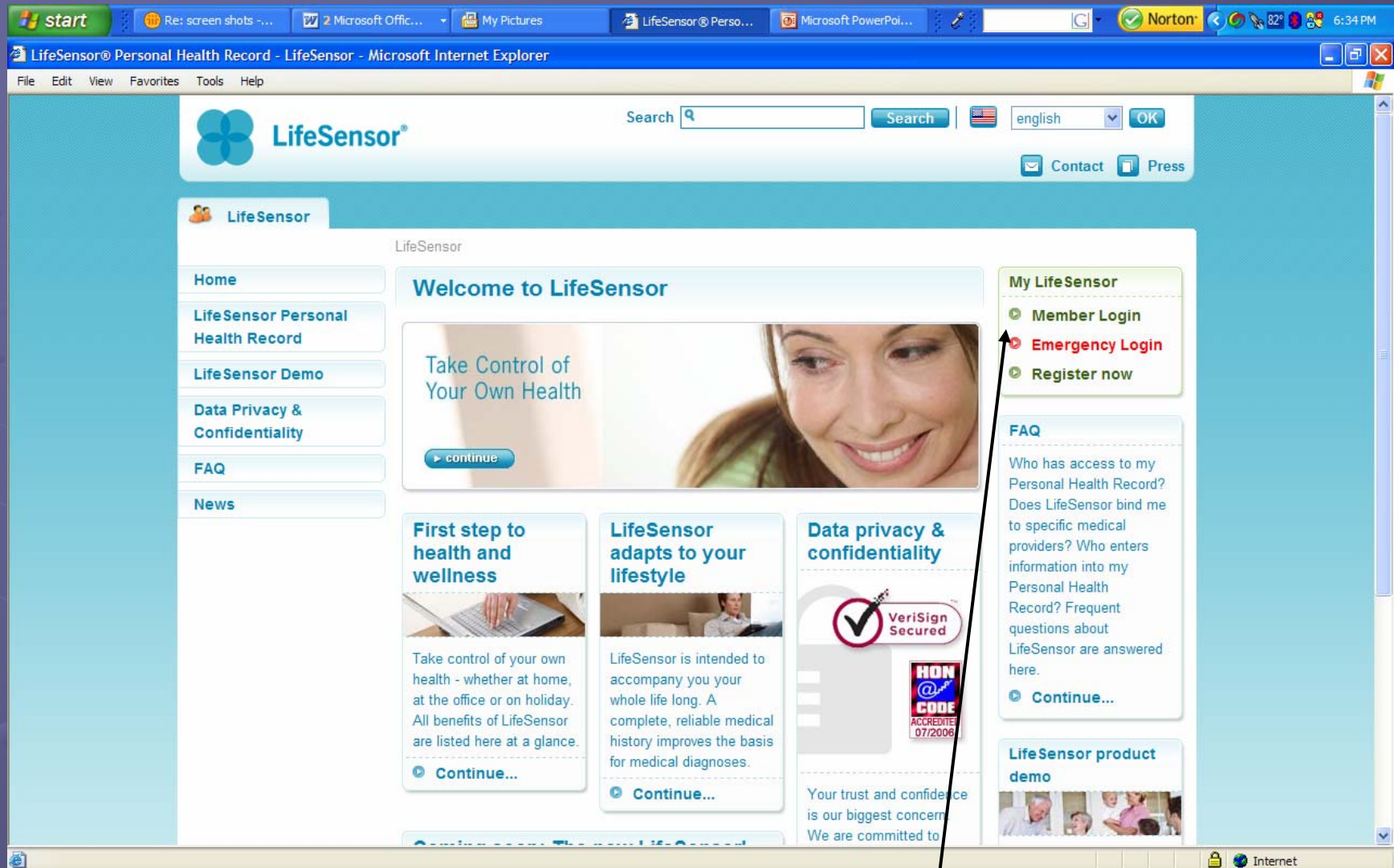
Robert Wood Johnson Foundation

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LifeSensor® website www.us.lifesensor.com



Secure login to LifeSensor Personal Health Record

LifeSensor® user “Katharina Ruhland” homepage

The screenshot shows the LifeSensor user homepage for Katharina Ruhland. The browser window is titled "LifeSensor 7.2 - Microsoft Internet Explorer". The top navigation bar includes the LifeSensor logo, a login status "Logged in as Katherine Spence" with a "Log Out" link, and links for "Help", "My Account", "Manage Permissions", and a language dropdown set to "English (EN)". Below this is a "Startpage" section with user avatars for Katharina, Achim, and Michael.

WELCOME, KATHARINA RUHLAND

MY LATEST ENTRIES
Here you can find the latest entries and alerts from your care providers and additions to your file.

Diabetes and fitness
Dr. Henke, GP | 13.07.2006 Suggestions how to plan your work-outs with regard to diabetes.
Submitted by Dr. Henke | 13.07.2006 [More...](#)

Ambulatory Encounter
Dr. Henke, GP | 13.07.2006 On patient's request | Emergency | Linked information available.
Submitted by Dr. Henke | 13.07.2006 [More...](#)

Laboratory findings
Dr. Henke, GP | 11.07.2006 HDL and LDL at upper limit of normal range, Triglycerides slightly ...
Submitted by Katharina | 11.07.2006 [More...](#)

NEWS

Seasonal Specials
FSME vaccination protects !
Protect yourself from an FSME infection after a tick bite by FSME vaccination.
[More...](#)

Topic of the month
Losing weight...
You want to lose weight but do not know which would be the right way for you? We will inform you about various approaches...
[More...](#)

Latest News | 01.09.2006
Medical treatment abroad - what you should know when travelling
[More...](#)

01805 433 736767
Questions ? Need Help ? Give us a call !

EVENT OUTLOOK
All records | [Katharina](#) | [Achim](#) | [Michael](#)
Katharina | Wednesday July, 12th
[More...](#)

The bottom of the browser window shows the taskbar with the "My Computer" icon and the system clock displaying "8:02 PM".

(top half of home page)

LifeSensor® user “Katharina Ruhland” homepage

The screenshot shows a web browser window titled "LifeSensor 7.2 - Microsoft Internet Explorer". The address bar displays the file path: `file:///C:/Documents%20and%20Settings/Administrator/My%20Documents/ICW/LifeSensor/phr-web-prototype/index.html#`. The page layout includes a sidebar on the left and a main content area on the right.

MY LATEST ENTRIES

Here you can find the latest entries and alerts from your care providers and additions to your file.

Diabetes and fitness

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Submitted by Katharina | 11.07.2006 [More...](#)

LifeSensor | FITNESS-ASSISTANT

Health-goal oriented training with performance and target control. Try it now - for a month free membership

Topic of the month

Losing weight...

You want to lose weight but do not know which would be the right way for you? We will inform you about various approaches... [More...](#)

Latest News | 01.09.2006

Medical treatment abroad - what you should know when travelling [More...](#)

01805 433 736767

Questions ? Need Help ? Give us a call !

EVENT OUTLOOK

All records | [Katharina](#) | [Achim](#) | [Michael](#)

Katharina | Wednesday July, 12th

Eye Exam | Dr. Schneider [More...](#)

Achim | Friday July, 14th

Vaccination | Dr. Henke [More...](#)

Michael | Monday August, 14th

Routine Wellness Check-up | Dr. Henke [More...](#)

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(bottom half of home page)

LifeSensor Diabetes

Overview Statistics Log Action Plan Profile Learn



"I'm doing this to be at Emily's Graduation."

Stephanie

Will be notified when you have reached your medicine and activity goals.



Goal Progress

[View All](#) | [Print Summary](#)

Good Job! You are doing really well in your diet and medicine goals this week. Keep up the good work on your testing and exercise to meet the goals you set for yourself.

Medicine



Diet



Activity



Testing



Positive Health Trends

[View All](#) | [Print Summary](#)

Blood Glucose

Weight

HbA1c

Mood

Quick Log Today's Stats

[View Full Log](#)

BG Results

[Add More](#)

Quickly log your blood glucose results for today. Select your testing time and enter your blood glucose readings. Want to record more than just today? [View Full Log](#)

Breakfast

- after mg / dl

Diet

[Add More](#)

Your goal was to eat 200 less calories per meal each day. How well did you do on your goal?



Activity

[Add More](#)

Your goal was to walk for 15 minutes today. How well did you do on your goal?



Mood

[Add More](#)

Your mood can affect how well you monitor your diabetes and maintain your goals. Click on the icon that best describes your mood today.



March 16, 2007

Today's Goals

[View Calendar](#)

- Eat under 200 fewer calories/meal
- Walk 30 minutes
- Test 3 times today
- Take my medication

Reminders

[Schedule New Appointment](#)

HbA1c Test

Thursday, March 8th, 2007

Dr. Wilev

[View Details](#)

Cholesterol Test

Saturday, March 10th

Dr. Wilev

[View Details](#)

Refill

Diabetes

[View Details](#)

KATHERINE

Calendar / Journal

Medical Data

Emergency Data

Documents

Medical Content

Personal Data

MY ASSISTANTS

Fitness

Diabetes

Mother-Child

 1-800-867-5309
Need Help? Give us a call!

CALENDAR

[Maximize](#)

Mo	Tu	We	Th	Fr	Sa	Su
26	27	28	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	1

March 2007



LifeSensor Diabetes

Overview Statistics Log Action Plan Profile Learn

2/16/2007 - 3/16/2007

Last 30 days

print summary

Actions



Results



Blood Glucose



Related Graphs

[weight](#)
[HbA1c](#)
[medication](#)
[testing](#)
[diet](#)
[activity](#)

Activity

Edit Goals

'I resolve to walk 15 minutes a day on weekdays and 30 minutes a day on weekends.'



Related Graphs

[weight](#)
[HbA1c](#)
[blood-glucose](#)
[cholesterol](#)
[mood](#)
[blood-pressure](#)

KATHERINE

- Calendar / Journal
- Medical Data
- Emergency Data
- Documents
- Medical Content
- Personal Data

MY ASSISTANTS

- Fitness
- Diabetes
- Mother-Child

1-800-867-5309
Need Help? Give us a call!

CALENDAR

Maximize

Mo	Tu	We	Th	Fr	Sa	Su
26	27	28	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	1

March 2007

Patient-Provider Portal

Tour of Patient Gateway - Prescription Renewal - Microsoft Internet Explorer provided by Partners HealthCare System

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print Mail News RSS Feeds

Address <http://www.patientgateway.org/ptgwlogin.htm> Go

PATIENT GATEWAY

Home Feedback Site map Logout Policies

Mail Requests ~ Prescription Health Record Health Library Practice My Profile Help

Demonstration Patient MRN: 6005

▼ Instructions to the Practice

*** Where should the prescription go?**

☒ Phone or fax into Pharmacy ☐ Mail it to me
☐ Mail it to Pharmacy ☐ Hold it for pick-up

Select a pharmacy:

☒ From My Profile
CVS Pharmacy #1866 ▼

☐ Other Pharmacy

Name:
Address:
City:
State: MA ▼
Zip:
Phone:

Address and Phone Number
Insurance and Providers
Mail Settings
Contact Info
Pharmacy Settings
Appointment Settings
Change Password

4

Importance of Interoperability

- Emerging Standards
- System Integration
- Health Information Exchange/RHIO
- Universal Health Care

How might EMR/PHR Improve Medication Utilization?

- Eliminate over-use, under-use, and misuse of medications
- Make more efficient
 - Brand to generic substitutions
 - Therapeutic substitution
 - Formulary compliance
 - Exceptions to formulary compliance in order to improve patient safety or quality of care
- Provide information to assist patients in the safe and proper use of their medications

Solutions

EMR (error reduction)

- Drug-drug interactions
- Pediatric dosing
- Renal-based dosing

Solutions

E-prescribing (pharmacy connected solutions)

- Formulary compliance
- Refill requests
- Other providers prescriptions

Solutions

PHR (patient connected solutions)

- Patient verification of medication/compliance
- OTC and herbal usage
- Self-management questions and feedback

How Might EMR Improve Lab and Radiology Utilization?

- Charge display
- Redundant test reminders
- Structured ordering with counter-detailing
- Consequent or corollary orders
- Indication-based ordering

Other EMR/PHR Process Benefits

- Reduced transcription costs
- Reduced chart pulls
- Improved clinical messaging and workflow
- Improved charge capture and accounts receivable
- Improved referral coordination
- Improved patient-provider communication and service

How Does Healthcare Information Exchange Impact the Bottom Line?

- Expected Effects

(Validation Processes Continue to Document Real Life Successes)

- Reduced healthcare information management labor costs
- Reduced duplicative tests and procedures
- Reduced fraud and abuse
- Improved service delivery efficiency
- Improved patient convenience
- Reduced medical error

Memorial Hospital of RI (MHRI)

- Center for Primary Care and Prevention:
- 2 million dollars in NIH research support yearly
- Best Practice Technology Test Center
- 60+ users of GE Centricity - v5.6, moving to v6.0
- 12,000 patients in system

MHRI EMR System - Current

- Scheduling, internal messaging, medication lists, problem lists, flow sheets
- Progress notes, lab and transcription transfer, referrals, chart reminders
- Patient self-management tools, chronic disease registries, decision support tools, disease management reporting
- Ongoing quality improvement team and patient satisfaction reporting, patient and family advisory team

EMR and PHR Integration Plan

- Personal Health Record (LifeSensor[®]) interoperable with electronic medical record (GE Centricity) at MHRI (3 providers; 1,000 patients for pilot)
- Secure patient portal having evidence-based and patient-centric self management tools (HeartAge, LifeSensor Diabetes)
- Secure emailing between patient and provider
- Adjudicated medication list using e-prescribing

MHRI

- HeartAge system - Patient self-management support website; Go-to-Goal: PDA and web-based Decision Support tool regarding CHD risk factor reduction and patient-centered communication tool
- In progress - seamless integration/interoperability of DSS with electronic health record

User-Centered Design

Patients' Perceptions of Cholesterol, Cardiovascular Disease Risk, and Risk Communication Strategies

Roberta E. Goldman, PhD^{1,2}

Donna R. Parker, ScD^{1,2}

Charles B. Eaton, MD^{1,2}

Jeffrey M. Borkan, MD, PhD^{1,2}

Robert Gramling, MD^{1,2}

Rebecca T. Cover, BA^{2,3}

David K. Abern, PhD⁴

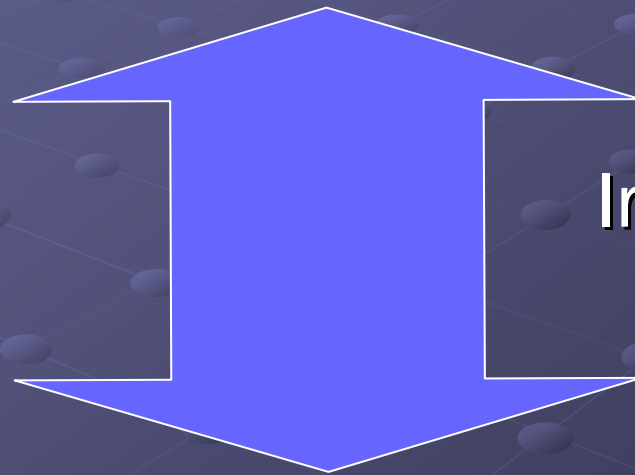
ABSTRACT

PURPOSE Despite some recent improvement in knowledge about cholesterol in the United States, patient adherence to cholesterol treatment recommendations remains suboptimal. We undertook a qualitative study that explored patients' perceptions of cholesterol and cardiovascular disease (CVD) risk and their reactions to 3 strategies for communicating CVD risk.

METHODS We conducted 7 focus groups in New England using open-ended questions and visual risk communication prompts. The multidisciplinary study team performed qualitative content analysis through immersion/crystallization

Cholesterol Education and Research Trial Hypothesis

Informed, activated patient
(Computer in Doctor's waiting room)



Improved Cholesterol
Management

Prepared, proactive practice team aided by
information technology (PDA)

Patient Activation Software Program in Doctor's Waiting Room on Computerized Kiosk

Spend a few minutes to see if you can gain a few years...



[Click Here to Enter](#)

THIS PROGRAM IS FREE & CONFIDENTIAL

Patient Enters Data



HeartAge™

Follow 4 Easy Steps

♥ Step 1 Please enter your age in the box. Then, enter your gender by clicking on the button.

Age: Gender: ☒ Male ☐ Female

♥ Step 2 Select "Yes" or "No" to the following five questions.

Have you smoked any cigarettes in the past 30 days? ☒ Yes ☐ No

Are you currently taking any medication for high blood pressure? ☐ Yes ☒ No

Do you have Diabetes? ☐ Yes ☒ No


Have you ever had a heart attack or heart surgery? ☐ Yes ☒ No

Do you have a family history of heart disease? ☐ Yes ☒ No ☐ Don't Know

EXIT

♥ Step 3 **NEXT** 

Patient Enters Lipid Values (or Enters Estimates)



Step 3

If you know your numbers use the keyboard to enter them into the boxes. If you do not know your numbers, take a guess or [Click Here](#) for an example.

Total Cholesterol

238

Low (130 or lower) Average (200) High (240) Very High (320 or higher)

"Bad" Cholesterol (LDL)

169

Low (60 or lower) Average (100) High (160) Very High (210 or higher)

"Good" Cholesterol (HDL)

38

Very High Risk (30 or lower) High (40) Average (50) Low Risk (60 or higher)

Systolic Blood Pressure (top number)

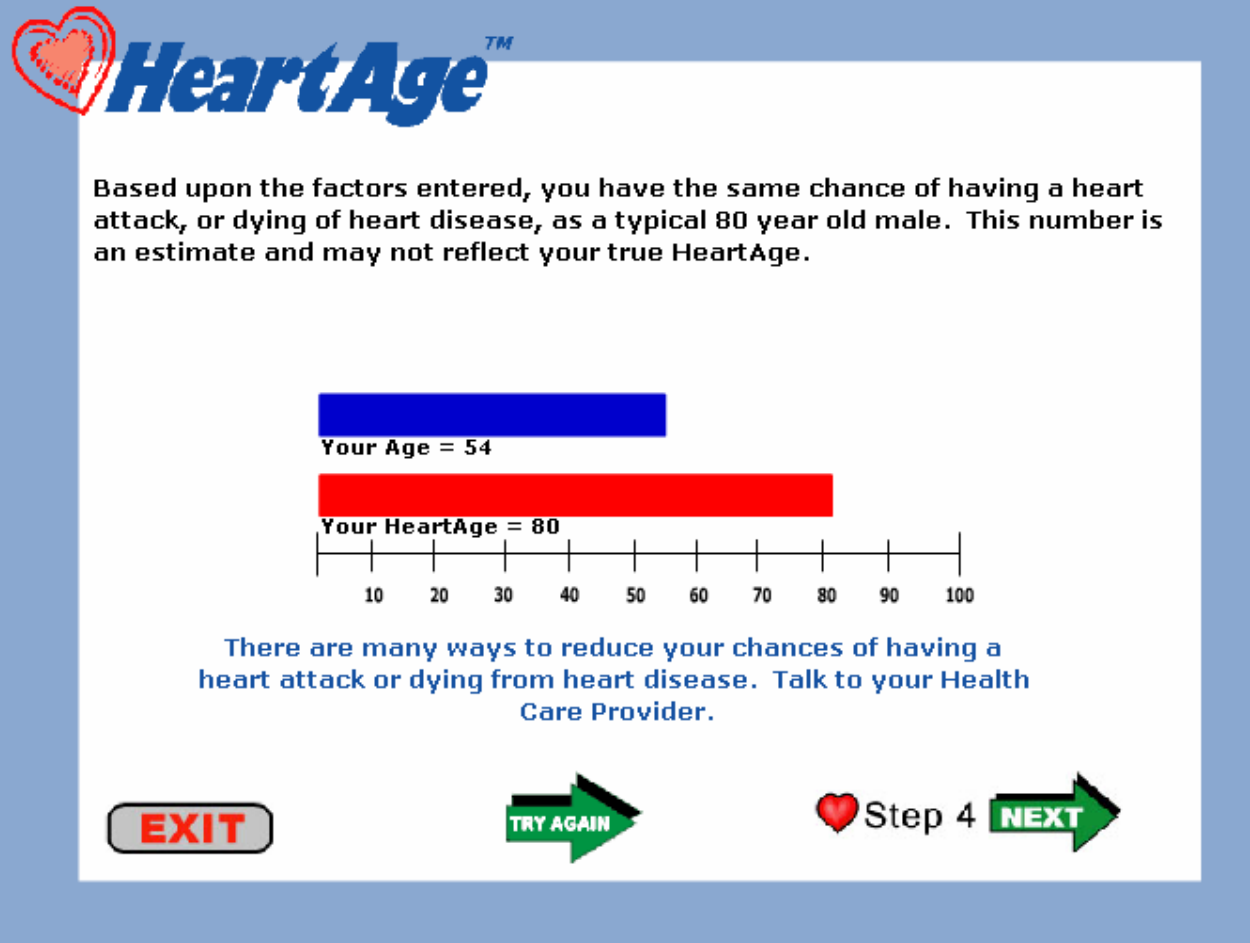
148

Low (100 or lower) Average (130) High (140) Very High (180 or higher)

EXIT

NEXT

Software Uses Framingham Risk Equation and Determines 10-yr Risk of CHD, Converts This Risk into Equivalent Risk Adjusted Age



Prompt to Discuss with Physician

♥ Step 4

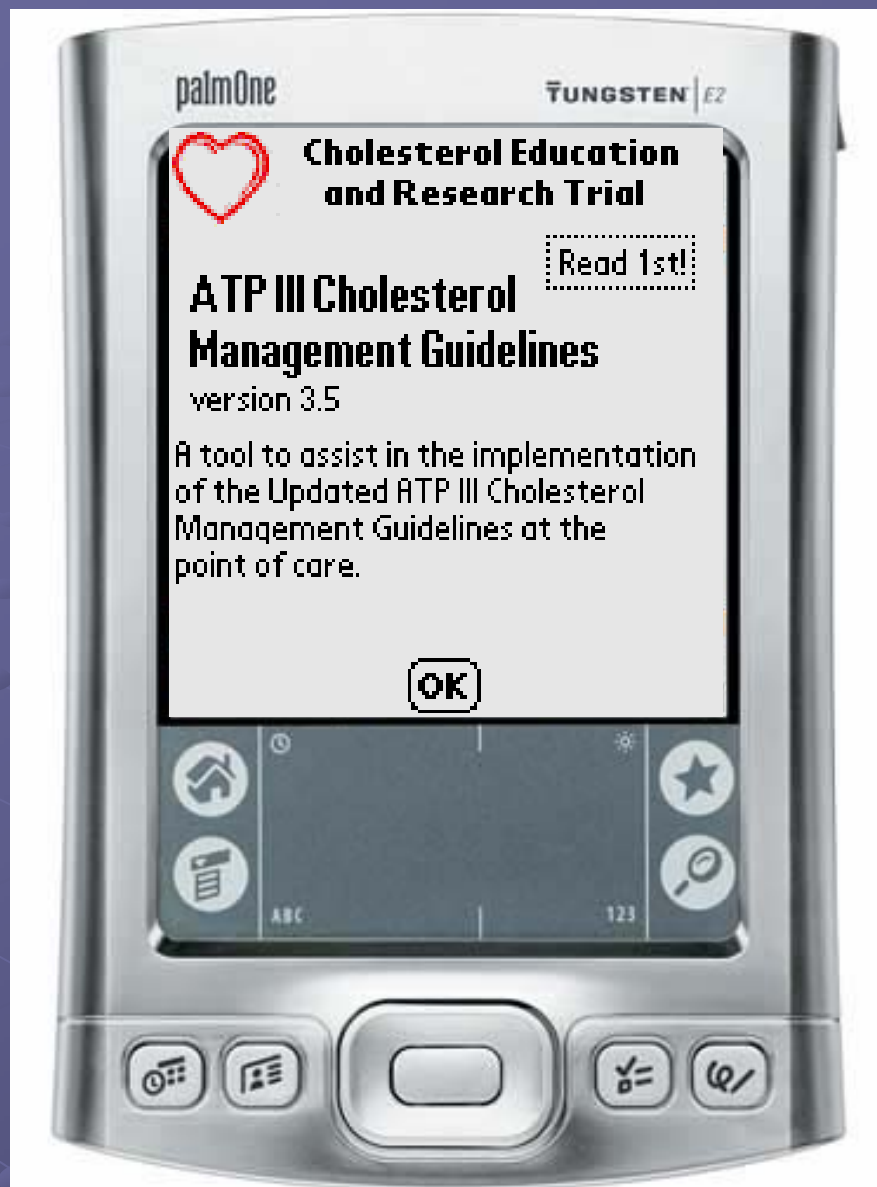
**Talk to your health care
provider about your HeartAge!**



EXIT

HeartAge Patient Activation Tool

- "My HeartAge was good, I am glad I am taking Lipitor for my cholesterol."
- "I couldn't figure out my HeartAge because I don't know my cholesterol values, so I asked my doctor's medical assistant for my cholesterol numbers."
- "It was a little scary (because my HeartAge was higher than my actual age)."



PDA's given to 32
Primary Care Providers
(PCPs) representing 15
intervention practices

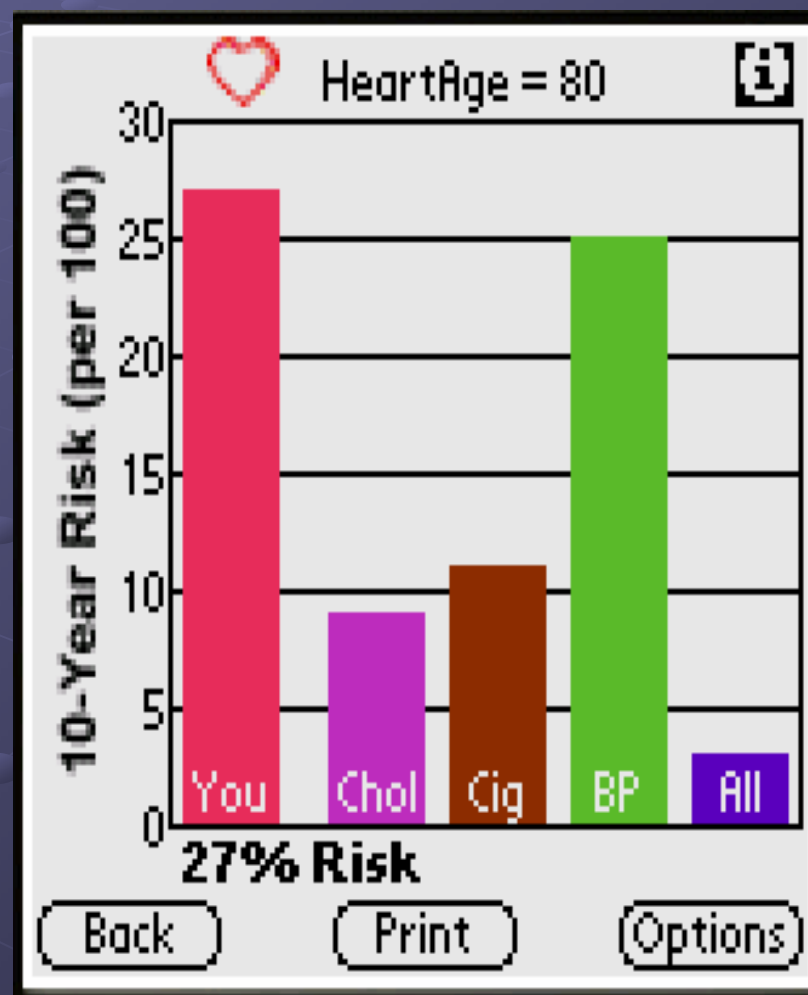
Go To Goal 

PDA Decision Support Tool with Patient Education Screen

Go To Goal ⓘ

TC: 310 HDL: 55 TG: 150
LDL: 225 Gender: ☒ M ☐ F
Age: 50 Systolic BP: 152

☐ Established CHD
☐ Other clinical atherosclerotic dz
☐ Diabetes
☒ Cigarette use
☐ HTN (or Rx for HTN)
☐ Fm Hx early CHD
☐ On Lipid Lowering Drug Therapy
☒ Fasting



Screening

- 85% of patients had screening profiles
- No change in screening rates with RCT

Practices that used HeartAge frequently*
were more likely to have patients with
lipid profile screening

OR=2.44

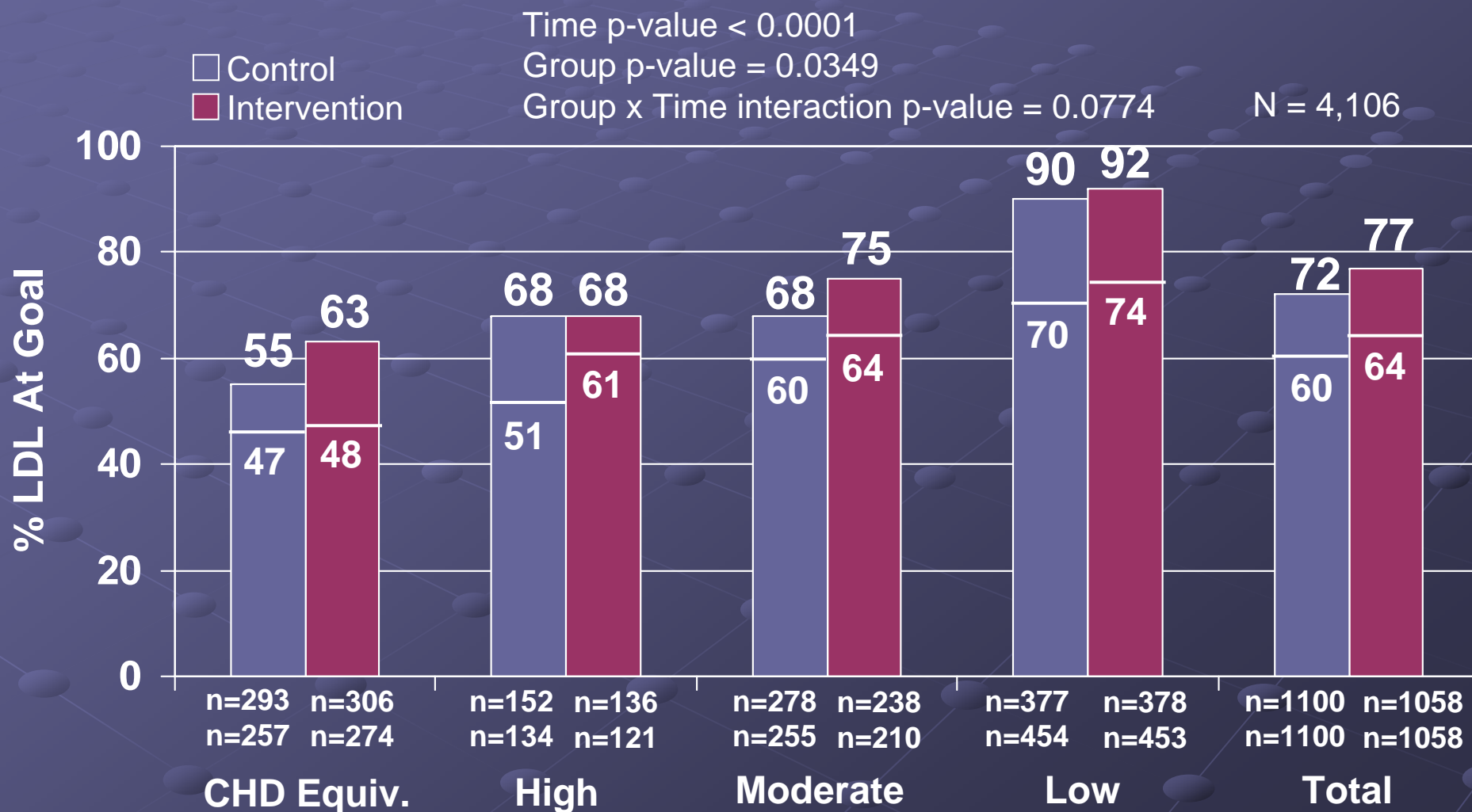
95% CI

1.88 to 3.16

*Defined as using tool 80 times per 1,000 patients per week

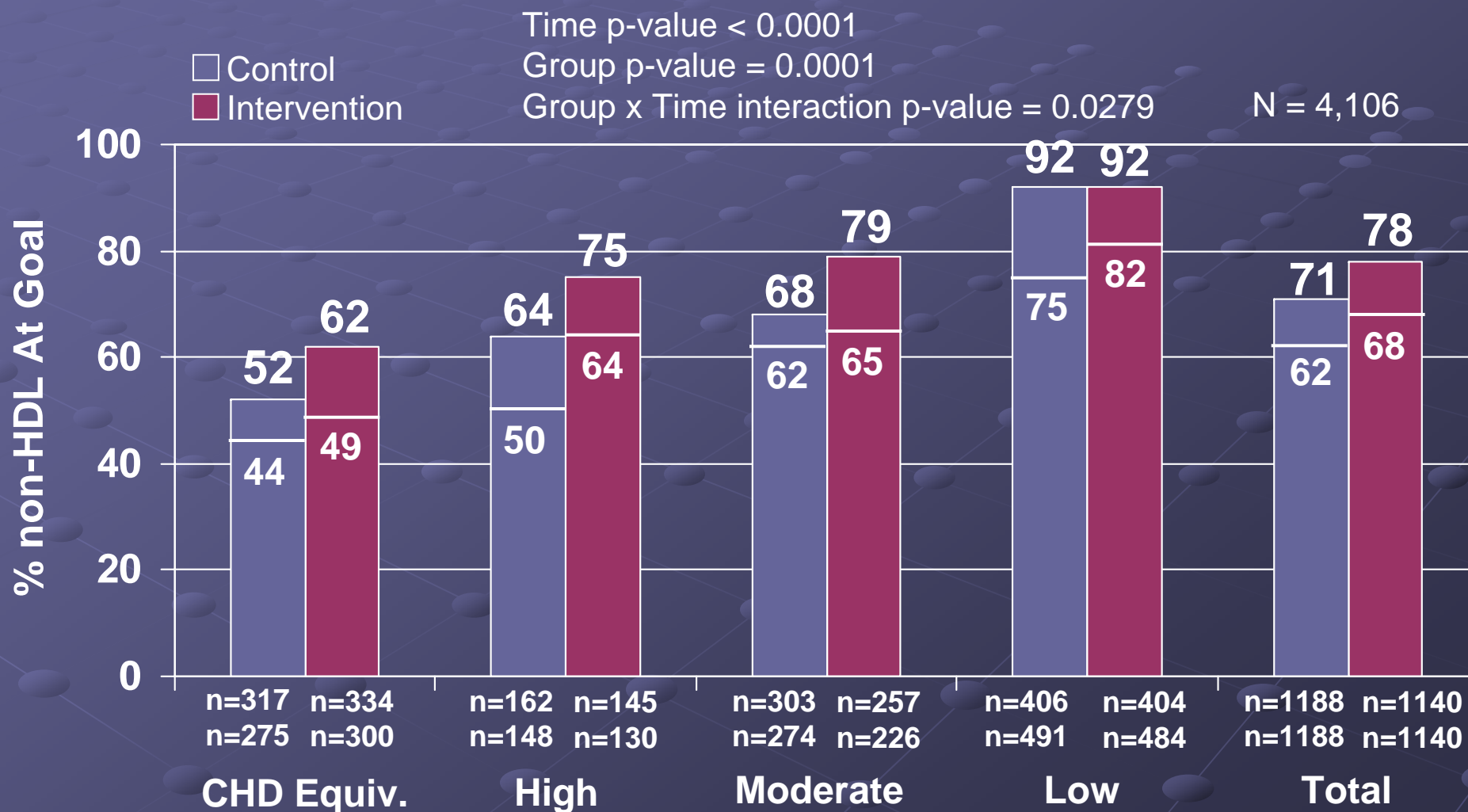
Management

ATP III Final Results



Management

ATP III Final Results



Management

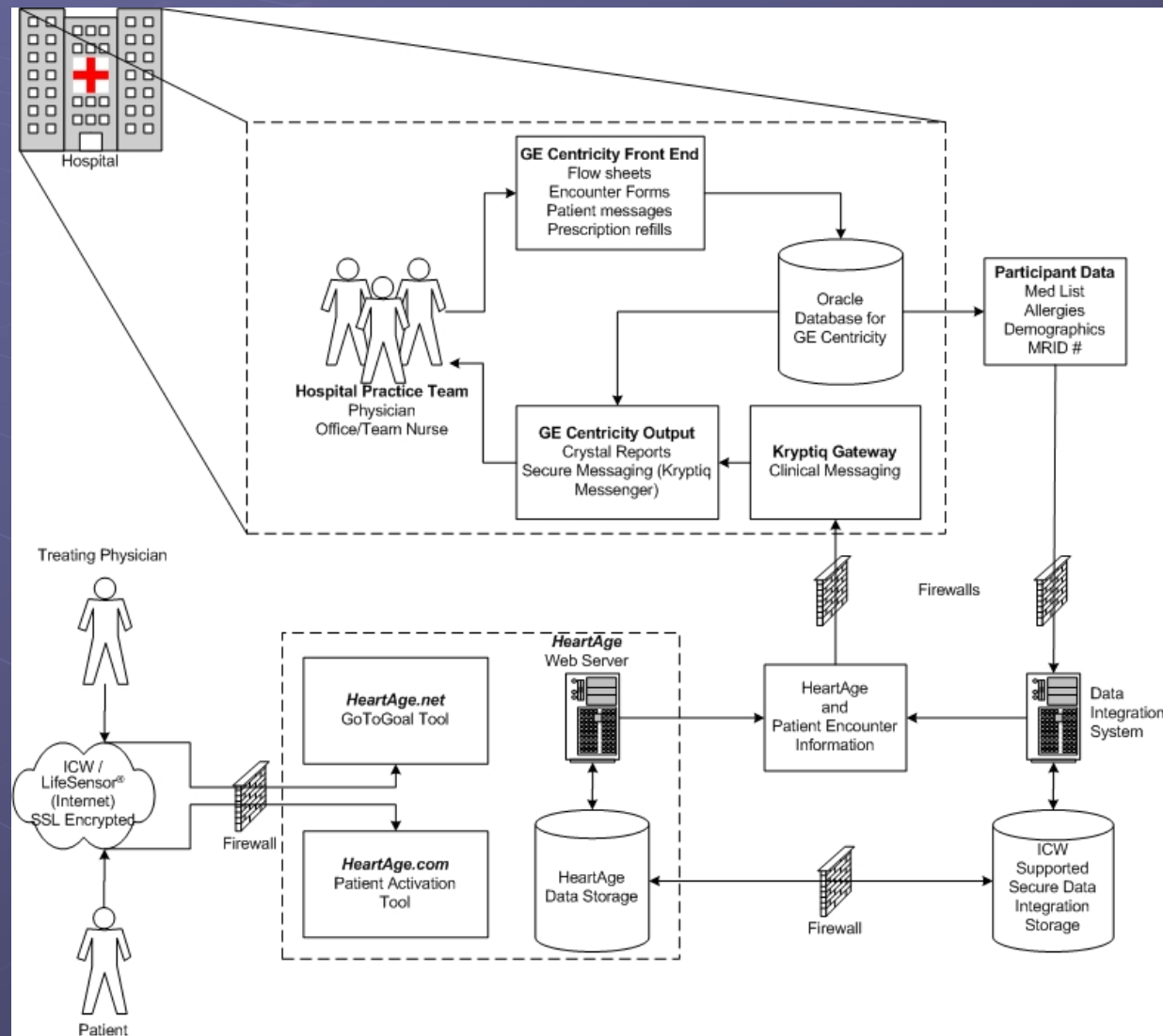
Providers that used Go To Goal frequently* were more likely to have patients at ATP III Goals

OR=1.58 95% CI 1.17 to 1.63 @ LDL goal

OR=1.21 95% CI 1.02 to 1.45 @ non-HDL goal

*Defined as using tool ≥ 3 times per week

Interoperability Model for HeartAge



Good Health Gateway

Quick Links

- Diet
- Exercise
- Quit Smoking
- Cholesterol Management
- High Blood Pressure

Tools & Resources

- HeartAge™
- My Health Maximizer®
- myMedicationAdvisor®
- Quick Tools
- Bookshelf
- Progress Logs

Testimonials

"I really appreciate the individualized, helpful information I received through the Ask-a-Health-Coach. Charles"

[Back](#) [Add](#) [Next](#)

AD SPACE

What's Your Risk for Heart Disease?

Find out NOW! [>](#)

My Gateway

My Messages

5

- Join Shape-up RI
- Check out AHRQ health & wellness booklets
- Access your employer benefits

My Rewards

★ 1350

- Congratulations! You've earned 500 points for Registering.
- Great Job! Add 300 points for calculating your Heart Age.
- Calculate your BMI to earn more points.
- [See all Rewards earned to date](#)

My Plan

Last updated: March 30, 2007

MY PROGRESS

27% 40% 60% 80% 100% 0%

- My HeartAge
- My Health Risk Appraisal Results
- My Goals
- My Action Steps

Tools & Resources

- HeartAge
- myHealthMaximizer
- Bookshelf
- Progress Logs
- myMedicationAdvisor
- Quick Tools

Recommendations

- List of MHM titles

[Search](#)

Health News

My Employer Links

My Recently Used Tools

- Health e-logbook: Fruits & Vegetables
- Body Mass Index Calculator 21.6
- Health e-logbook: Weight & Measurements

Health Blog

- ..
- ..
- ..

AD SPACE

Healthy Eating. Portion Control.

Do you know what a correct portion size is?

Test your knowledge today!

Need Help?

Need assistance reaching your health & wellness goals?

Ask-a-Health-Coach

Have questions about how to use this service?

Call our HelpLine
(800) 643-8028

Conclusions

- Integration of the EMR to an interoperable PHR/web portal to create a comprehensive virtual medical home is critical in transforming medical care to meet the IOM 21st century patient centric healthcare system
- Patient activation and clinical decision support are essential components for transforming medical care and improving quality
- Further research is necessary to determine extent of benefits and potential ROI for the various stakeholders: providers, patients, payors