Technology and Knowledge: The Two Driving Forces of DM Innovation and Impact

Presented at

The Disease Management Colloqium
June, 2004

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Next Generation Challenges for DM

1. Improve the impact of existing programs
2. Develop new DM programs that can reduce costs and improve quality – for **NEW** diseases and patient populations
   - Beyond CHF, Diabetes, Asthma, COPD, and CAD....
3. Reduce the operational costs of current DM programs
   - Leverage valuable and expensive nursing personnel
In other words, the challenge is to simultaneously improve the efficiency and effectiveness of Quality Improvement programs.....

• Efficiency can be significantly improved by deploying better technologies...

• Effectiveness is improved by deploying better clinical and care management knowledge...
Types of Care Management Knowledge

- Clinical guidelines (this is the easy one!)
- Methods for identifying appropriate patients
- Risk stratification methodologies
- Interventions to create behavioral change & empower patients
- Interventions to encourage providers to follow evidence-based medicine
- Approaches to managing a complex case
  - Assessment, Planning, Coordination, Advocacy
- Tools to assess and monitor patients
- Approaches to defining and measuring outcomes
Future “Killer Apps”?

- EMR
- Remote Patient Monitoring
- E-Prescribing
- POE/Computerized Reminders
- Care Management IT Platforms
- Predictive Modeling
- Web-based patient education and interactivity
  Personal Medical Record and Self Care
- Self Monitoring Tools
- Secure messaging (physician to patient)
- Patient reminder systems
Electronic Medical Record: Benefits

• Increased accuracy of data
• Sharing of data between providers across geographic sites
• Automatic reminders for preventive interventions or F/U visits
• Tracking and trending of data
• Profiling of outcomes
• Automated guidelines
### Current Problems for My Chart Room

There are 2 Unrecognized Problems

<table>
<thead>
<tr>
<th>Problem Name</th>
<th>ICD-9</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>431.9</td>
<td>512 (31%)</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>272.4</td>
<td>205 (12%)</td>
</tr>
<tr>
<td>Depression</td>
<td>311</td>
<td>182 (11%)</td>
</tr>
<tr>
<td>Diabetes mellitus, type II</td>
<td>250.00</td>
<td>176 (11%)</td>
</tr>
<tr>
<td>Hypercholesterolemia</td>
<td>272.0</td>
<td>174 (10%)</td>
</tr>
<tr>
<td>Gastroesophageal reflux disease</td>
<td>530.81</td>
<td>156 (9%)</td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td>715.90</td>
<td>144 (9%)</td>
</tr>
<tr>
<td>Hypothyroidism</td>
<td>244.9</td>
<td>138 (8%)</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>411.00</td>
<td>122 (7%)</td>
</tr>
<tr>
<td>Obesity</td>
<td>311</td>
<td>116 (7%)</td>
</tr>
<tr>
<td>Asthma</td>
<td>493.90</td>
<td>106 (7%)</td>
</tr>
<tr>
<td>Allergic rhinitis</td>
<td>477.3</td>
<td>100 (6%)</td>
</tr>
</tbody>
</table>
Guidelines for coronary artery disease

All patients with coronary artery disease should be on beta blockers unless otherwise contraindicated.

Of your 122 patients with coronary artery disease, 41 (34%) are not recognized as following the guideline.

Reference: Stable coronary artery disease

Patients Meeting the Guideline

- On Guidelines (55%)
- Off Guidelines (34%)
Inpatient EMR/Computerized Reminders

- RCT of computerized reminders for preventive Rx
- 6,372 patients and 10,065 admits over 18 months
- Physicians in intervention group viewed reminders when using POE

<table>
<thead>
<tr>
<th>Preventive Rx</th>
<th>Control Group</th>
<th>Intervention Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumovax</td>
<td>0.8%</td>
<td>35.8%</td>
</tr>
<tr>
<td>Flu Vaccine</td>
<td>1.0%</td>
<td>51.4%</td>
</tr>
<tr>
<td>Heparin SQ</td>
<td>18.9%</td>
<td>32.2%</td>
</tr>
<tr>
<td>CV/ASA</td>
<td>27.6%</td>
<td>36.4%</td>
</tr>
</tbody>
</table>
Quality and the EMR

• A POE/EMR system offers user organizations:
  – Reduced errors
  – Disease management reporting
  – Quality of care reporting
  – Practice profiling
  – Computerized reminders
  – The ability to use ambulatory data for clinical research
  – A potential revenue stream from data
E-Prescribing

Provides integrated prescribing, drug reference, and charge capture in one wireless handheld device.

• Fully connected, from a Palm to 95% of pharmacies
• Accessible anywhere with a wireless handheld device
• Secure with an encryption technology
• Easy to use
In 1996, a Texas jury decided that due to illegibility, this prescription caused the patient to die.

The patient received not only the wrong medication, but at 8x the drug's usually recommended strength.

Experts believe that 25% of medication errors might be related to illegible handwriting.

--CNN Health
E-Prescription Capture: Allscripts EP module

1. Select Patient
2. Select Diagnosis
3. View Formulary & Select Drug
4. Confirm Dosing & Print/Fax Rx

EPrescribing through a formulary list strongly encourages compliance
1. Physician clearly sees preferred v. non-preferred drugs
   - Physician risks callbacks from pharmacists, plans and patients by prescribing off formulary
2. It takes longer to prescribe off formulary
EMRs contain Electronic Prescribing modules within comprehensive patient information systems.

Full prescribing capability including search & selection from formulary lists.
Projected Adoption Rates: Various accelerators and inhibitors could cause rapid or slowed adoption

- **Rapid Adoption 2005**
- **Moderate Adoption 2007-2008**
- **Slow Adoption 2011**

20% Penetration

40% express future interest in EP, given the right system**

(short term limit unless significant mandates are introduced – no major ones proposed yet)

---

Manhattan Research expects EP usage to reach 13% & 17% in 2003 & 2004, respectively

** CyberDialogue / Manhattan Research, Physician Surveys
• 5-10% of prescribing physicians in the US currently use EP tools actively

• Short term limit on EP of ~40% To get beyond there within 10 years would require either:
  – usage mandates (Feds, MCOs, employers)

• EP can provide a powerful DM tool to:
  – disseminate guidelines
  – provide care management “prompts”
  – share confidential provider profiles and outcomes
Remote Patient Monitoring

- Monitor chronically ill patients
- Prevent hospital admissions
- Tracking/trend clinical data
- Data transmitted via phone
- Cost plummeting ($30/month)
- Center of Excellence Tool
- Already used by many DM vendors and some MCOs
MEDStar™ 210

MEDSTAR SPECIFICATIONS:
Size: 4.94" x 2.75" x 1.28"
Weight: 5.7 Ounces with Batteries
Battery: 2 AA Alkalines
Battery Life: 6 Months

LCD DISPLAY:
Text: 2 Lines x 16 Characters Alphanumeric

PHONE COMMUNICATIONS TO MEDSTAR SERVER

OPTIONAL WEB-BASED DATA MANAGEMENT SOFTWARE

Digital Blood Pressure Monitor
Precision Health Scale
Spirometer
Pulse Oximeter
Problems With Web Content

**Turned Off**

Why some consumers turn away from a health information site.

- Site was too commercial: 47%
- Couldn’t determine the source of the information: 42%
- Couldn’t determine when information was last updated: 37%
- Site lacked endorsement of a trusted independent organization: 30%
- Site appeared sloppy or unprofessional: 29%
- Site contained information they knew to be wrong: 26%
- Information disagreed with own doctor’s advice: 20%

Source: Pew Charitable Trust
Answer the following questions so we can determine possible causes of your symptom:

Did you fall or have trauma to the ankle?
- Yes
- No

When you press your thumb along the back of the Achilles tendon, is it painful?
- Yes
- No

Where is most of your pain in your ankle?
- On the outside of the ankle
- On the back of the ankle
- On the inside of the ankle

Push on the area of pain. Is it tender?
- Yes
- No
Profile:
You indicated Ankle Pain (not from Recert Injury).

This is not a substitute for a medical evaluation by a licensed physician. Your profile suggests the following possibilities. Click on the possibilities and read the explanation and treatment options. We hope this helps you with your health decisions.

Possibilities:

<table>
<thead>
<tr>
<th>Name</th>
<th>Severity Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>BROKEN ANKLE</td>
<td>severe</td>
</tr>
<tr>
<td>SPRAIN</td>
<td>mild</td>
</tr>
<tr>
<td>ACHILLES TENDON TEAR (RUPTURE)</td>
<td>severe</td>
</tr>
</tbody>
</table>
Knowledge Embedded in Care Management Technology

Utilization Management Protocols
M&R, Optimed, Interqual

Predictive Modeling
CaseAlert, DxCG

Disease and Case Management Content
Clinical algorithms CM knowledge

Care Management Platform
Data Exchange

Increased Efficiency and Effectiveness
What is DM “Clinical Content”?  

The 5 Components

1. Care Manager workflow tools
2. Clinical best practices
   - Evidence-based medicine
   - Expert opinion
3. Care management processes (for providers and patients)
4. Reporting tools
   - To patients
   - To providers
5. Recommended outcomes metrics
Patient Identification and Primary Risk Stratification

Clinical Rules:

<table>
<thead>
<tr>
<th>ID</th>
<th>EDF_DESCRIPTION</th>
<th>CM</th>
<th>OBS</th>
<th>RULE FREQ</th>
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<tbody>
<tr>
<td>21</td>
<td>DIABETES AND ACUTE MYOCARDIAL INFARCTION</td>
<td>2</td>
<td>365</td>
<td>3684</td>
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<tr>
<td>28</td>
<td>HIGH-RISK PATIENT WITH ALL OF THE FOLLOWING: DIABETES &amp; HBP &amp; ASCVD &amp; HYPERLIPIDEMIA AND NO ADMISSIONS WITHIN LAST 12 MONTHS</td>
<td>2</td>
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<td>41</td>
<td>DIABETES WITH CHRONIC ISCHEMIC HEART DISEASE AND HYPERLIPIDEMIA ON NO LIPID-LOWERING MEDICATIONS</td>
<td>2</td>
<td>365</td>
<td>6983</td>
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<td>42</td>
<td>DIABETES, HYPERTENSION, HYPERLIPIDEMIA AND OBESITY</td>
<td>2</td>
<td>365</td>
<td>995</td>
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<tr>
<td>91</td>
<td>DIABETES AND RECENT ACUTE MYOCARDIAL INFARCTION WITH ADMISSIONS</td>
<td>2</td>
<td>91</td>
<td>167</td>
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</tbody>
</table>

- **CVD plus multiple risk factors:** no admissions
- **Diabetes and MI within 91 days**
- **Diabetes, CVD, high lipids:** no lipid lowering medications
<table>
<thead>
<tr>
<th>Due date &amp; time</th>
<th>Priority</th>
<th>Receipts</th>
<th>Case/issue ID</th>
<th>Patient</th>
<th>Patient ID</th>
<th>Reason</th>
<th>Provider</th>
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<td>BARIS, ELMA</td>
<td>61547381400</td>
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<td>CASEALERT IHD REFERRAL</td>
<td>Disease Management</td>
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<td>CASEALERT IHD REFERRAL</td>
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<td>64571377000</td>
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<tr>
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<td>CASEALERT IHD REFERRAL</td>
<td>Disease Management</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Have you had an MI?

- Y: MI within the last 12 months?
  - Y: History of cardiac rehab?
  - N: Patient on a Beta-blocker?
  - N: Patient on a ACE?
  - Y: Would you do rehab now?
  - Y: Educate patient on benefit of a beta-blocker
  - N: Educate on benefit of ACE
  - N: Contra to B-blocker?
  - N: Contra to ACE?

- N: Instruct patients on signs and Sx. of a MI

Patient Letters & Reports

Physician Alerts & Letters

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Questionnaire

Patient

Name: BARIS, ELMA
CAD DM/High
Sex: Female
ID: 61547381400
DOB: 01/01/1952
Age: 52
LDB: POS

1. Do you have heart disease?
2. Have you had a stroke?
   2.A. Do you have any residual effects from your stroke?
   2.B. Are you taking a anti-platelet medication?
   2.C. (If yes) Did you have your stroke within the past 12 months?
3. Do you have TIA’s?
   3.A. (If yes) Is your physician aware that you are having TIA’s?
   3.B. Are you taking blood thinner medications such as aspirin or coumadin?
4. Have you had a heart attack?
   4.A. (If yes) Have you made changes to prevent another MI?
   4.B. How long ago was your heart attack?
   4.C. Did you attend cardiac rehabilitation classes?
   4.D. (If no) Would you consider cardiac rehabilitation now?
   4.E. Are you taking a beta-blocker medication?
   4.F. Are you taking an ACE-inhibitor medication?
# Questionnaire history

**Patient**

<table>
<thead>
<tr>
<th>Name: BARIS, ELMA</th>
<th>ID: 61547381400</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD DM/High</td>
<td></td>
</tr>
<tr>
<td>Sex: Female</td>
<td></td>
</tr>
<tr>
<td>DOB: 01/01/1952</td>
<td>Age: 52</td>
</tr>
<tr>
<td></td>
<td>LDL: POS</td>
</tr>
</tbody>
</table>

## Coronary Artery Disease Management Questionnaire

<table>
<thead>
<tr>
<th>Question</th>
<th>03/22/2004 (Baseline) (incomplete)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Aware of heart disease diagnosis</td>
<td>help Yes</td>
</tr>
<tr>
<td>2. Stroke</td>
<td>No</td>
</tr>
<tr>
<td>3. TIA</td>
<td>No</td>
</tr>
<tr>
<td>4. MI</td>
<td>Yes</td>
</tr>
<tr>
<td>4.A. Risk modification</td>
<td>Yes</td>
</tr>
<tr>
<td>4.B. MI date</td>
<td>&lt; 12 months</td>
</tr>
<tr>
<td>4.C. Cardiac rehab</td>
<td>Yes</td>
</tr>
<tr>
<td>4.E. Beta blocker post MI</td>
<td>No</td>
</tr>
<tr>
<td>4.F. ACE post MI</td>
<td>No</td>
</tr>
<tr>
<td>4.G. Antiplatelet post MI</td>
<td>No</td>
</tr>
<tr>
<td>5. Angina</td>
<td>Yes</td>
</tr>
<tr>
<td>5.A. Nitroglycerine for angina</td>
<td>Yes</td>
</tr>
<tr>
<td>5.B. Angina changes</td>
<td>No</td>
</tr>
<tr>
<td>5.C. Beta blocker for angina</td>
<td>No</td>
</tr>
<tr>
<td>5.D. Antiplatelets for CAD</td>
<td>No</td>
</tr>
<tr>
<td>6. Angioplasty</td>
<td>No</td>
</tr>
<tr>
<td>7. Stent</td>
<td>No</td>
</tr>
<tr>
<td>8. CABG</td>
<td>No</td>
</tr>
</tbody>
</table>
## Patient

Name: **BARIS, ELMA**  
ID: **61547381400**  
DOB: **01/01/1952**  
Age: **52**  
LOB: **POS**  
Client code: **Mega Corporation**  
Plan code: **CAD DM/High**

### New problems identified by: Coronary Artery Disease Management Questionnaire

<table>
<thead>
<tr>
<th>Select to open</th>
<th>Problem description</th>
<th>Question/answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑</td>
<td>BM1 &gt; 25</td>
<td>BM1 &gt; 26 - Yes</td>
</tr>
<tr>
<td>☑</td>
<td>Elevated cholesterol</td>
<td>Hypercholesterolemia - Yes</td>
</tr>
<tr>
<td>☑</td>
<td>Hypertension</td>
<td>Hypertension - Yes</td>
</tr>
<tr>
<td>☐</td>
<td>Knowledge deficit: Sign-symptoms TIA</td>
<td>TIA - No</td>
</tr>
<tr>
<td>☐</td>
<td>Knowledge deficit: Sign-symptom stroke</td>
<td>Stroke - No</td>
</tr>
<tr>
<td>☐</td>
<td>Knowledge deficit: stable angina</td>
<td>Angina - Yes</td>
</tr>
<tr>
<td>☑</td>
<td>Patient does not exercise</td>
<td>Exercise - Patient does not exercise</td>
</tr>
<tr>
<td>☑</td>
<td>Patient has diabetes</td>
<td>Diabetes - Yes</td>
</tr>
<tr>
<td>☑</td>
<td>Patient has not had a PPV</td>
<td>Pneumococcal - No</td>
</tr>
<tr>
<td>☑</td>
<td>Patient is status post-MI</td>
<td>MI - Yes</td>
</tr>
<tr>
<td>☑</td>
<td>Pt has not seen physician in past 6 mos</td>
<td>Last appt. - &gt;6 months</td>
</tr>
<tr>
<td>☐</td>
<td>Pt pos for depress scen-not conclusive</td>
<td>Depression - Life stressful or difficulty relaxing?</td>
</tr>
<tr>
<td>☑</td>
<td>Waist circumference &gt; 35 inches</td>
<td>Waist - Female: &gt;35 inches</td>
</tr>
</tbody>
</table>
### Nursing Plan of Care

**Patient**

- **Name:** BARIS, ELMA  
- **Sex:** Female  
- **Plan code:** CAD DM/High  
- **ID:** 615473611400  
- **DOB:** 01/01/1952  
- **Age:** 52  
- **LOB:** POS  
- **Client code:** Mega Corporation

**Existing problem(s)**

<table>
<thead>
<tr>
<th>Problem &amp; Status</th>
<th>Goals</th>
<th>Interventions</th>
<th>Outcomes</th>
<th>Barriers</th>
<th>Target Date</th>
<th>Opened</th>
</tr>
</thead>
</table>
| Elevated cholesterol     | - Patient will discuss statin therapy with physician for LDL > 100 mg/dL  
                           | - Patient will learn target LDL level: 100mg/dL  
                           | - Patient will maintain LDL cholesterol below 100                             | - Instruct patient on the efficacy of statins in reducing cholesterol with the addition of diet and exercise.  
                           | | - Instruct patient on the importance of cholesterol reduction to help reduce risk for heart attack and stroke.  
<pre><code>                       | | - Instruct patient on the significance of LDL cholesterol levels and the importance regular screening and learning LDL values | | | 03/22/2004 |
</code></pre>
<p>| Patient is status post-MI |                                                                      |                                                                              |                                                                          |          |              |              |</p>
<table>
<thead>
<tr>
<th>Due date &amp; time</th>
<th>Priority</th>
<th>Receipts</th>
<th>Case/issue ID</th>
<th>Patient</th>
<th>Patient ID</th>
<th>Reason</th>
<th>Provider</th>
<th>Phone #</th>
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</thead>
<tbody>
<tr>
<td>03/30/2004 09:00 AM</td>
<td>High/Rad</td>
<td>04082-0002</td>
<td>THOMPSON, SALLY</td>
<td>020720021</td>
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<td>Mod Education &amp; Counseling</td>
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<tr>
<td>03/30/2004 02:30 PM</td>
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<td>HUMPHREY, MARIA</td>
<td>49430107001</td>
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<td>Exercise Ed &amp; Counseling</td>
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<td>04082-0001</td>
<td>REESE, SHELLEY</td>
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<td>FOLLOW-UP ASSESSMENT</td>
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<td>BARNEY, NATALIE</td>
<td>28618613101</td>
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<td>CALL PROVIDER - CARE PLAN DISCUSSION</td>
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The “Help” Function

“The main treatment goal for survivors of an MI is to prevent a recurrent MI. Patients who recently had an MI should be strongly encouraged to enroll in cardiac rehabilitation. In all patients, the first step to preventing another MI is to develop a plan to modify lifestyle-related risk factors. Patients should quit smoking, lose weight if necessary, exercise regularly, follow a diet that is high in fiber and low in fat, and manage stress.”

“All patients who have suffered a heart attack should be started on daily aspirin therapy unless contraindicated or intolerable. In addition, the American Heart Association (AHA) guidelines recommend that all post-MI patients receive beta blockers and ACE inhibitors to help reduce the workload of the heart following the myocardial injury unless contraindicated. ACE inhibitors are particularly important in decreased myocardial function following an MI to reduce the risk for developing heart failure. Both ACE-inhibitors and beta blockers should be continued indefinitely.

“Finally, because of documented efficacy in preventing a recurrent heart attack, the AHA recommends all patients with elevated LDL-cholesterol levels (>100mg/dl) should be given lipid-lowering therapy with an HMG CoA-reductase inhibitor, also known as a statin.”
Letters, Action Plans, and Reports

• Targeted at patients
  – Health risk assessments
  – Educational materials
  – Ask-your-doctor guides

• Targeted at providers
  – Program participation notices
  – Alerts and prompts

• Program level outcomes reports
The Best Care Management Programs

- Have talented, well-trained care managers
- Have state-of-the-art care management knowledge and processes
- Imbed their knowledge in technology to:
  - Increase program efficiency
  - Provide easy access to care management knowledge
  - Increase ROI of DM programs
  - Enhance the ability to analyze data and improve program intervention
  - More effectively communicate with patients and providers
What Will be a Killer App?

- We don’t really know yet?
- Technology market is very fragmented
- Cost and capital is still a major issue
- Remember Betamax!

Nonetheless, we believe that EMRs, E-prescribing, web-based tools, RPM, and care management platforms are the most likely “winners”
Forces Driving Technology Adoption

- The need to improve patient safety
- Aging of the population: need to managed multiple co-morbidities
- Spiraling healthcare costs
- Consumer adoption of Internet tools/technologies
- Employer-driven consumer models
- Increased physician acceptance of technology
- Growth of Disease Management programs
Interventions across the population to face Intelligent RPM with Web Interaction Web Only TeleWeb (Telecare Linked with Web) Seamless integration of Telecare, Internet, smart Devices, person to person -deployed according to severity Targeted Devices (RPM)

Net Potential Savings

Baseline Medical Costs

Wellness At Risk Critical Episode Recurrence High Acuity Chronically ill
Discussion