

# Patient Safety in Physician Practice Settings

## The Role of Clinical Information Technology

Michigan Health and Safety Coalition  
Patient Safety Conference  
March 28, 2007

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**Blue Cross Blue Shield of Michigan**



# Medical Errors

- Errors of Commission
- Errors of Omission



# Two Tiers of Clinical Information System Capabilities



# Tier 1: Information Access

- Vision:
  - “Paperless medical record”
  - “Fingertip access to the right information at the right place and time.”



# Tier 1: Information Access

- Problems Addressed:
  - Paper chart at wrong location
  - Paper chart only used by one at a time
  - Multiple paper charts, each incomplete
  - Paper chart poorly organized
  - Paper summary sheets not up to date
  - Paper chart takes up too much space
  - Can't easily find clinical references, practice guidelines & patient educational mat'l.
  - Too much time spent on insurance eligibility, formulary, etc.



## Tier 1: Information Access

- Focus on Incremental Benefits, Not Strategic Imperatives
- Most of the current CIS market is here, even including the newer eHealth companies.



# Example: GE's Logician

◀ Previous

Print the note when you're done with the visit  
or print all notes at the end of the day

Chart notes are easy to  
read for you, your staff,  
and colleagues

Notes are ready as  
soon as you print them —  
no waiting for transcription

For consultations or  
referrals, simply print the  
chart note, then  
fax or mail it

The screenshot shows a web browser window titled "Logician Internet -- Chart Note". The patient information at the top reads "Cheryl L. Johnson, 42 year old female, DOB: 05/04/1958". There are buttons for "Edit Note" and "Print...". The main content area displays a "CHART NOTE" dated "05/09/2000". The note includes sections for "Chief Complaint", "HPI", "Review of Systems", "Physical Exam", "Assessment", and "Medications". The "Physical Exam" section is particularly detailed, covering General, Eyes, Ears/Nose/Throat, Neck, Respiratory, Cardiovascular, Lymphatic, and Skin. The "Assessment" section lists "Acute bronchitis (466.0) (Added)". The "Medications" section lists "SYNTHROID TAB 0.1MG 1 po". A sidebar on the left contains navigation links such as "CHART ROOM", "DESKTOP", "DEMOGRAPHICS", "CHART SUMMARY", "PREVIOUS NOTE", "CHART NOTE", "HPI", "Historical/Visits", "OB/GYN History", "Allerg./Directives", "Review of Systems", "Vital Signs", "Eye/ENT/Neck", "Resp/CV/GI", "GU/Lymph/MSK", "Skin/Neuro/MSE", "Assessment", "Medications", "Orders/Disposition", and "Service Coding".

Your printed chart note is legible and consistent —  
streamlining communications

8 of 8

◀ Previous

# Example: GE's Logician

Logician - Harry S. Winston MD @ Southside Clinic (LOCAL) - 11/14/2001 2:46 PM - [Chart]

Go Actions Options Help

Desktop Chart Appts Reg Reports LinkLogic New View Print Internet Help EXIT

**Doris S. Hellman** *CHECK PROTOCOLS* Home: 503-543-9873 Work: 503-234-3323  
 52 Year Old Female (DOB: 04/13/1949) Patient ID: 224-TEST011 Insurance: BHI (Futura) Group: BHI2344

Find Pt. Protocols Graph Handouts Update Phone Nt. Refills

Summary Problems Medications Alerts Flowsheet Orders Documents

**Problems**  
 LEUKEMIA, ACUTE LYMPHOCYTIC

**Medications**  
 CYTOXAN TAB 50MG (CYCLOPHOSPHAMIDE) 7 tabs po qd  
 DOXORUBICIN HCL SOLR 50 MG (DOXORUBICIN HCL) 100 n  
 VINCRISTINE SULFATE SOLN 1 MG/ML (VINBLASTINE SULF  
 PREDNISON PAK 10MG (PREDNISON) 4 tabs po q am

This patient has no known allergies

**Directives**

**Registration Notes**  
 Call at home before noon.


**Flowsheet: Enterprise/Medicine/Internal Medicine**

	Date	Value
HEIGHT	01/13/1998	66
WEIGHT	01/13/1998	156
TEMPERATURE	03/09/1999	98.6
TEMP SITE	01/13/1998	oral
PULSE RATE	03/09/1999	88
PULSE RHYTHM		
RESP RATE	03/09/1999	16
BP SYSTOLIC	03/09/1999	140
BP DIASTOLIC	03/09/1999	88
CHOLESTEROL	03/31/1999	165
HDL		

**Documents: All**

Date	Summary	Status
03/01/2000	Lab Rpt: CBC	Unsigned
02/28/2000	Clin Updt: Lab orders	Signed
04/06/1999	Lab Rpt: CBC	Signed
04/05/1999	Phone: Wants appointment	On Hold
04/01/1999	Clin Updt: Acute Lymphocyt	Signed
04/01/1999	Hosp D/C: Acute Lymphocy	Signed
04/01/1999	Path Rpt: Acute Lymphocyt	Signed
04/01/1999	Ext Corr: Oncology Consult	Signed
03/31/1999	Lab Rpt: CBC w/diff	Signed
03/31/1999	Lab Rpt: NI Comprehensive	Signed
03/24/1999	Lab Rpt: CBC w/diff	Signed
03/24/1999	Lab Rpt: NI Comprehensive	Signed

For Help, press F1



# Current State of Info Access Strategy

- Use of “fully operational EHRs”
  - 31% of physician group practices
  - 19% of hospitals
- Use of Physician Order Entry
  - National Average: 5.6% of hospitals
  - Michigan Average: 10% of hospitals
- No national health information network exists
  - HHS awarded \$18.6 million, divided into 4 consortia of vendors.
    - Accenture, CSC, IBM and Northrop Grumman
- Many local/regional “Community Health Information Networks” (CHINs) were launched and failed during the 1990s
  - Greater Detroit Area Health Council tried one
  - No one wanted to pay
  - Large healthcare organizations that had invested did not want to give up their competitive advantage



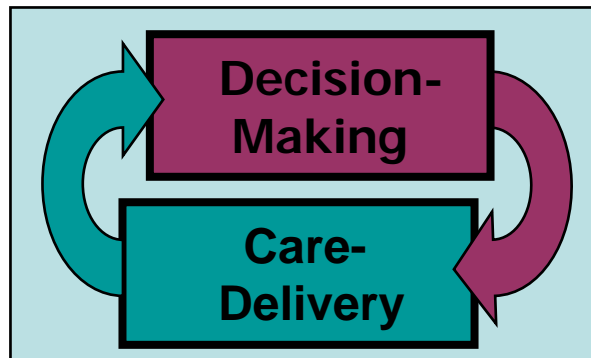
## Tier 2: Care Management

- **Vision:** “Use information technology to enable successful continual improvements in the process of caring for a patient population.”



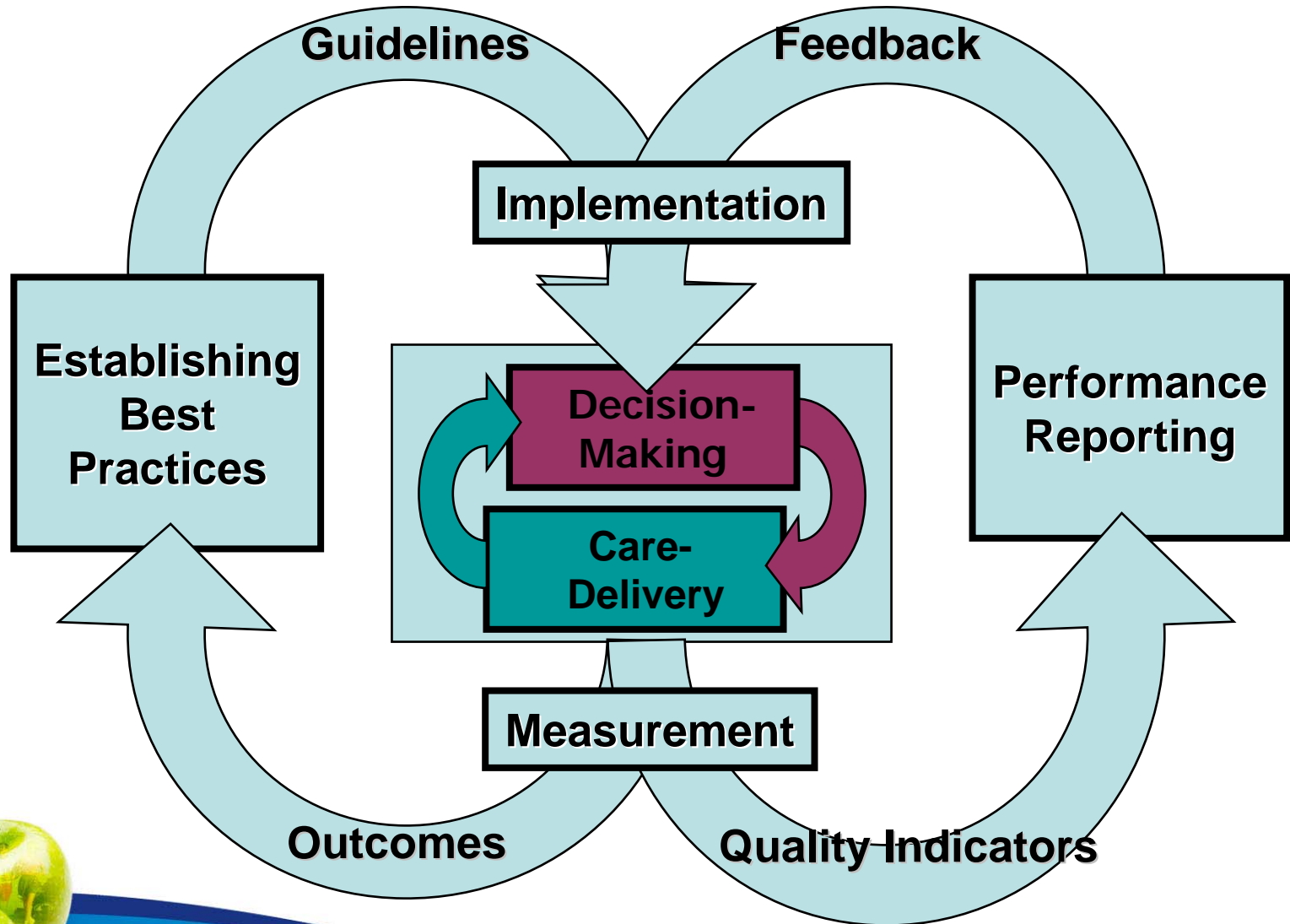
# Care Process

## Patient and Clinician



# Care Management Process

= Process of Enhancing Performance of Physicians and the Entire Health Care Team



## Tier 2 CIS: Care Management

- Current Methods for Implementation
  - Feedback, +/- Incentives
  - CME/Staff Training
  - Patient Education
  - TQM/CQI

**These have been found to be effective, but  
Not Scalable & Not Durable.**



## Tier 2 CIS: Care Management

- Problems Addressed:
  - No affordable way to collect the clinically detailed data needed for quality & outcomes measures and research.
  - No way to consistently incorporate up-to-date scientific evidence into daily practice.
  - No feasible way to carry out multiple clinical practice improvement projects over time.
  - Inadequate tools to promote teamwork and “do it once” approach for clinical and administrative tasks.



# Health Care Process Improvements

## SIMPLE

## COMPLEX

**QUALITY  
IMPROVEMENT**

Pap Smears  
Mammograms  
Childhood Immunization

Cancer & HIV Survival  
Heart Risk Reduction  
Mild-Mod Diabetes

**BOTH**

Flu Shots  
Beta Blockers

High Risk Asthma  
Class III & IV CHF  
Frail Elderly

**COST  
SAVINGS**

Avoid Unneeded Tests  
Generic Drugs

**ENABLING  
TECHNOLOGY:**

Reminders integrated  
into medical records  
& ordering process

Protocol-driven,  
Team-based care  
(WORKFLOW)

# Adult Flu Immunization: Implementation Alternatives

- Staff Training Approaches
  - Memorandum about flu guideline
  - Soft-cover preventive services manual
  - Managed Care College Course in Prevention
- Patient Education Approaches
  - Article in health plan magazine
  - Posters in clinics - lobby, waiting areas



# Adult Flu Immunization: Implementation Alternatives

- Feedback Approaches
  - Institutional performance measurement
  - Physician-level performance measurement
    - Considered, but rejected due to poor data quality from outside flu shot providers.

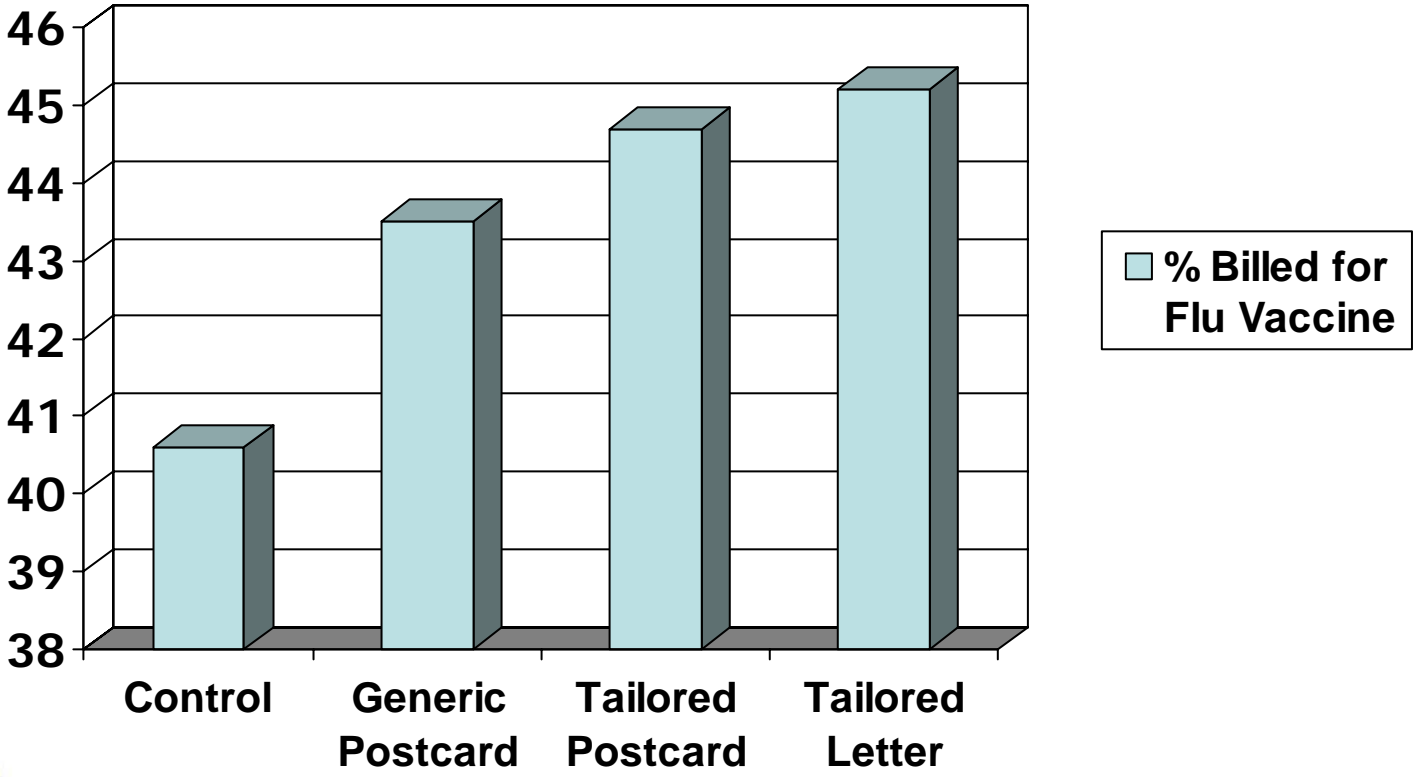


# Adult Flu Immunization: Implementation Alternatives

- CQI Approaches
  - **Saturday Flu Shot Clinics during flu season.**
- Informatics Approaches
  - **Computer-generated reminder post card**
  - **Computer-generated letter from primary care physician.**



# Results (n=24,743)



Control vs. Each Intervention:  $p < 0.001$



# Economic Outcomes of Adult Immunization Letters

- Letter costs 42 cents to produce & send
- Vaccine costs \$4.09
- Annual hospital costs reduced from \$355 to \$215 (from literature)
- Result:
  - **Save \$118,000 in non-epidemic year**
  - **Save \$268,000 in epidemic year**



# The Use of a Web-based Care Management System to Improve Diabetes-related Routine Testing

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Fred Whitehouse, MD

George Divine, PhD



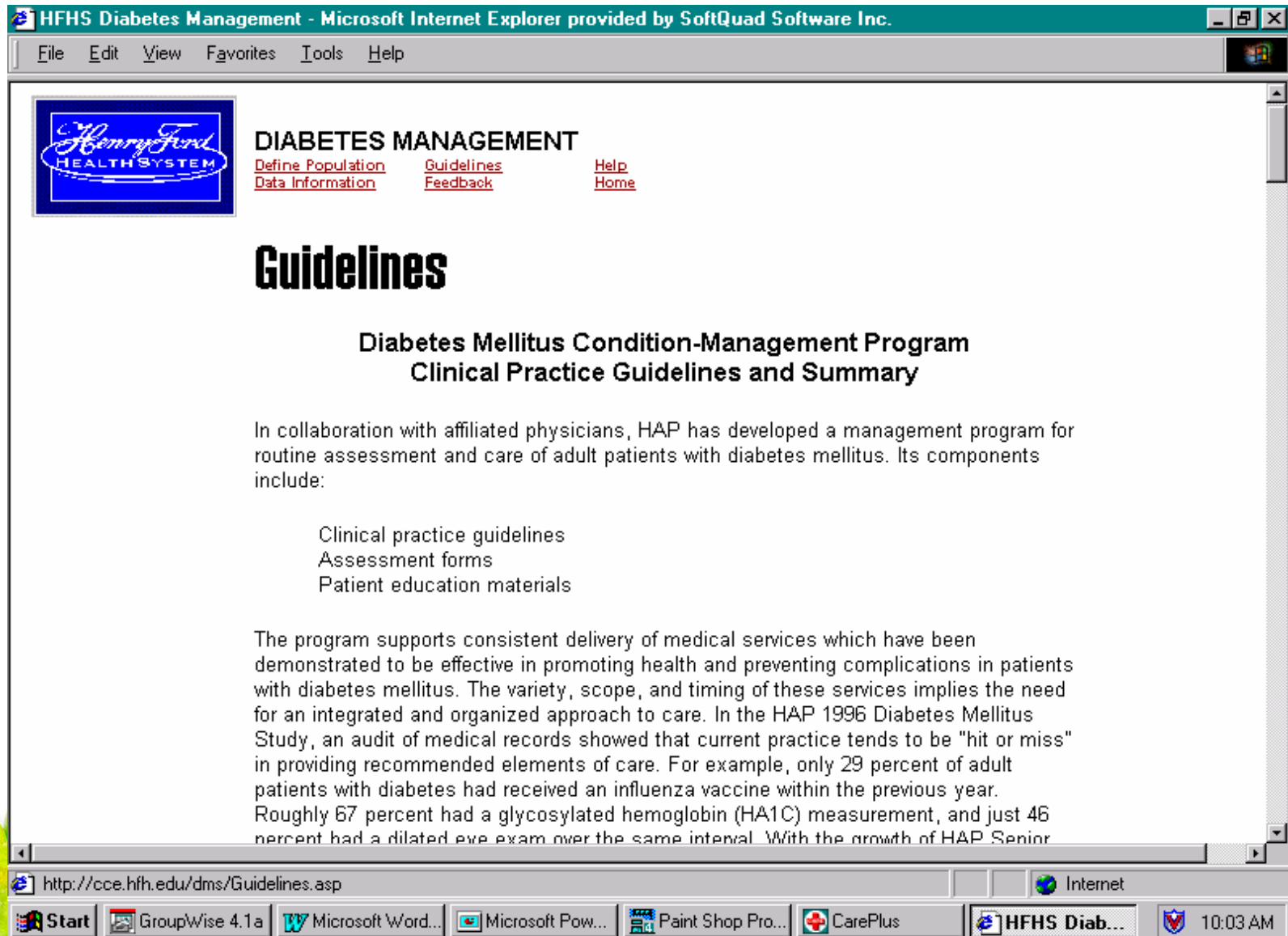


# DIABETES MANAGEMENT

- Web-based population management tool, accessible from local PCs
- Provides:
  - Guideline
  - Patient registry
  - Preliminary risk stratification
  - Practice feedback & benchmarking



# Guidelines



The screenshot shows a Microsoft Internet Explorer browser window with the title bar "HFHS Diabetes Management - Microsoft Internet Explorer provided by SoftQuad Software Inc.". The address bar contains the URL "http://cce.hfh.edu/dms/Guidelines.asp". The main content area features the Henry Ford Health System logo on the left and the heading "DIABETES MANAGEMENT" in bold. Below the heading are four red underlined links: "Define Population", "Guidelines", "Data Information", "Feedback", "Help", and "Home". The main heading "Guidelines" is displayed in a large, bold, black font. Below it is the sub-heading "Diabetes Mellitus Condition-Management Program Clinical Practice Guidelines and Summary". The text describes a management program developed in collaboration with affiliated physicians for routine assessment and care of adult patients with diabetes mellitus. It lists components: Clinical practice guidelines, Assessment forms, and Patient education materials. The text also mentions the program's effectiveness in promoting health and preventing complications, citing the HAP 1996 Diabetes Mellitus Study. The taskbar at the bottom shows the Start button and several open applications: GroupWise 4.1a, Microsoft Word..., Microsoft Pow..., Paint Shop Pro..., CarePlus, and HFHS Diab... The system clock shows 10:03 AM.

Henry Ford Health System

## DIABETES MANAGEMENT

[Define Population](#)   [Guidelines](#)   [Help](#)  
[Data Information](#)   [Feedback](#)   [Home](#)

# Guidelines

### Diabetes Mellitus Condition-Management Program Clinical Practice Guidelines and Summary

In collaboration with affiliated physicians, HAP has developed a management program for routine assessment and care of adult patients with diabetes mellitus. Its components include:

- Clinical practice guidelines
- Assessment forms
- Patient education materials

The program supports consistent delivery of medical services which have been demonstrated to be effective in promoting health and preventing complications in patients with diabetes mellitus. The variety, scope, and timing of these services implies the need for an integrated and organized approach to care. In the HAP 1996 Diabetes Mellitus Study, an audit of medical records showed that current practice tends to be "hit or miss" in providing recommended elements of care. For example, only 29 percent of adult patients with diabetes had received an influenza vaccine within the previous year. Roughly 67 percent had a glycosylated hemoglobin (HA1C) measurement, and just 46 percent had a dilated eye exam over the same interval. With the growth of HAP Senior

# Patient Registry

Policy Library - Netscape

File Edit View Go Communicator Help

Back Forward Reload Home Search Netscape Print Security Stop

*User: Feng James*

### Define Patient Population

Define the patient population that you are interested in viewing by selecting the alignment status, insurance status and practice group:

- 1. Click on the alignment status:**
  - Aligned to a PCP
  - Not Aligned
  - All (Aligned + Not Aligned)
- 2. Click on insurance status:**
  - All
  - HAP Only
- 3. Click on the practice group:**
  - Provider
  - Clinic
  - Region / HFMG

Submit Search

[Feedback & Suggestions Regarding Diabetes Management Services](#)


Document: Done

Start GroupWise ... Microsoft W... Microsoft P... Paint Shop ... HFHS Diab... Policy Li... 10:14 AM

# Who Are Our Patients?

HFHS Diabetes Management - Microsoft Internet Explorer provided by SoftQuad Software Inc.

File Edit View Favorites Tools Help



**DIABETES MANAGEMENT**

[Define Population](#) [Guidelines](#) [Help](#)  
[Data Information](#) [Feedback](#) [Home](#)

## Patient Characteristics

### Aligned Patient Population

	DR. WELBY	INTERNAL MEDICINE	REGION	HFMG
Number of Patients*	226	898	3,164	23,135
Male	61%	52%	51%	47%
Female	39%	48%	49%	53%
Age Less Than 20	0%	0%	2%	1%
Age Between 20 - 39	10%	9%	8%	8%
Age Between 40 - 64	50%	52%	51%	47%
Age Over 64	40%	39%	40%	44%
Caucasian	94%	89%	84%	51%
African American	4%	6%	8%	44%
Other race	2%	5%	8%	5%
HAP	84%	83%	82%	76%

\* Patients aligned with a HFMG provider with two or more diabetic encounters (ICD9 code 250.xx) during the measurement period of 1/1/98 to 12/31/99 or at least one HAP claim for insulin (therapeutic class code C4G) or oral hypoglycemic (therapeutic class codes C4K and C4L) during the measurement period of 1/1/98 to 12/31/99.

Start GroupWise 4.1a Microsoft Word Microsoft PowerPoi... CarePlus HFHS Diabetes... 1:44 PM

# Patient Registry

Policy Library - Microsoft Internet Explorer

File Edit View Go Favorites Help Links

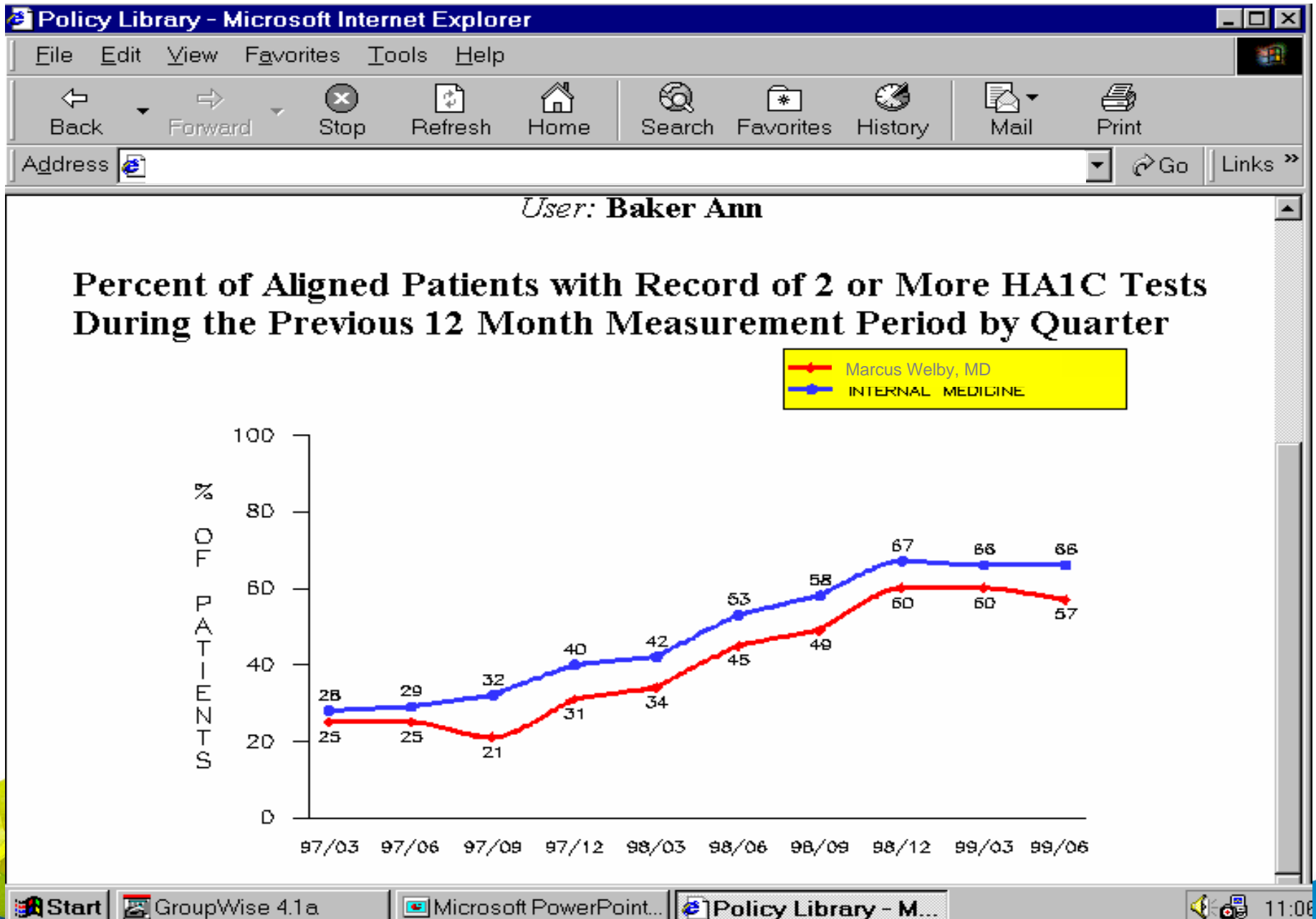
*This represents information on all patients aligned with Marcus Welby as of 02/28/99. Marcus Welby about these patients was collected between 03/01/98 and 02/28/99.*

*A Complete List of Marcus Welby Patients with Diabetes*

MRN	Name	Date Last HAI C	Value of Last HAI C %	Had >= 2 HAI C during 03/01/98 to 02/28/99	Date of Last Eye Exam	Had Eye Exam during 03/01/98 to 02/28/99	Date Last Micro.	Had Micro. Test during 03/01/98 to 02/28/99	Date of Last Lipid Profile Testing	Had Lipid Profile Testing during 03/01/98 to 02/28/99	TCHOL	LDL	TG
160	Mark	01/20/99	13.0	✓	--	--	07/30/98	✓	--	--	--	--	--
387	Mark	01/05/99	13.0	--	--	--	02/04/99	✓	--	--	--	--	--
234	Derrick	06/15/98	12.9	✓	03/13/98	✓	12/02/98	--	12/19/98	--	112	41	214
377	Joseph	06/08/98	12.2	--	--	--	06/08/98	✓	--	--	--	--	--
115	Ronald	02/04/99	12.1	--	--	--	02/04/99	✓	02/04/99	✓	221	129	279

Done Internet zone

# Feedback & Benchmarking



# Performance Improvement

- PHYSICIANS who used system at least 8 times
  - Their patients were:
    - 17% more likely to get 2 hemoglobin tests
    - 12% more likely to get a cholesterol test
    - 4% more likely to get a retinal exam
- CLINICS who had staff use the system at least 30 times
  - Their patients were:
    - 34% more likely to get 2 hemoglobin tests



# Learning from the improvement process to drive the next cycle:

## Key Issues:

10% of patients not seen in the clinic during the prior 12 months

50% of patients seen in clinic during prior 12 months did not receive tests/exams

## System Needs:

Outreach to engage patients in their care

In clinic ability to

- Track receipt of tests/exams
- Prompt for needed services



# Patient Outreach: Inbox Notification

CarePlus

File Edit Patient Library Reports Admin Options Window Help

CarePlus Inbox

Workflow Inbox - BAKER, ANN

Descending (All) (All) (All) (All) Refresh Help Support

Date	Time	Program	Notification	Priority	Status	MRN	Patient Name
04/29/1999	16:12	Diabetes	Due	Regular	New		CLA
04/29/1999	16:12	Diabetes	Due	Regular	New	3	PE
04/29/1999	16:11	Diabetes	Due	Regular	New	90000202	DEMODATAXDEMO
04/29/1999	16:10	Diabetes	Due	Regular	Open	36146185	TESTAAP

4 Notifications Confirm: 0, Due: 4

For Help, press F1

BAKER, ANN NUM Thu Apr 29 04:25 PM 1999

Henry Ford Health System, Center for Health Services Research

# Tailored Patient Letter



<s\_location>

<s\_date>

<s\_patient first name> <s\_patient last name>

<s\_address1>

<s\_address2>

<s\_city>, <s\_state> <s\_zip>

Dear <patient first name> <s\_patient last name>:

As a patient with diabetes, there is a lot you can do to protect your health. Regular exams and testing can help find problems, before they become serious. Here is a list of the exams and tests you should have each year and when you are due for each.

Test & Exams You Need Each Year	Due Date
Glycated hemoglobin (2 each year)	<s_DateDueGlycatedHemoglobin>
Urine Protein	<s_DateDueUrineProtein>
Lipid Profile	<s_DateDueLipid Profile>
Foot exam	<s_DateDueFootExam>
Dilated eye exam	<s_DateDueDilatedEyeExam>

Our records show that you are due for the following tests or exams:  
<s\_ExamsDue>

- **Please call my office today at <s\_phone> and make an appointment to see me, unless you already have an appointment scheduled.**
- **Call your eye doctor's office today and make an appointment to have a dilated eye exam. If you would like a referral to an eye doctor near your home, call 1-800-792-3262 Monday through Friday (7:00 a.m. - 5:00 p.m.)**

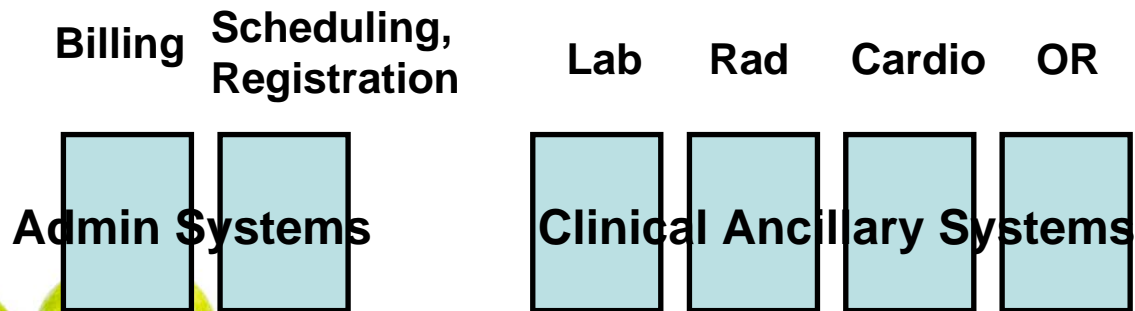
Sincerely,

<s\_pp name>, <s\_title>

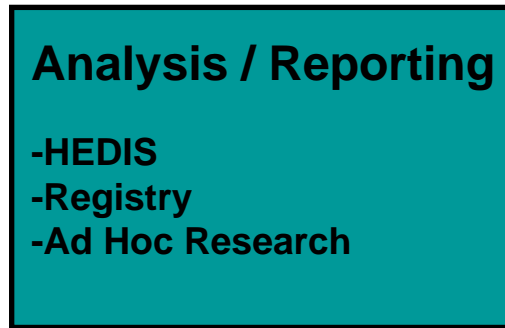
**Please bring this letter with you to your next visit.**



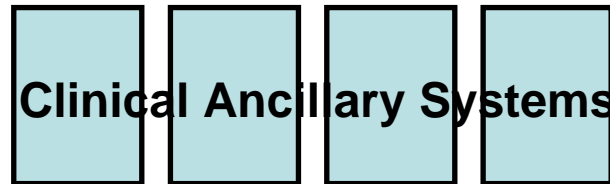
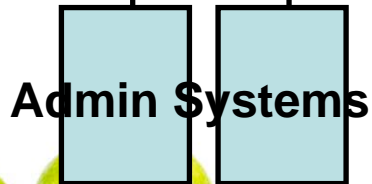
# Legacy Systems



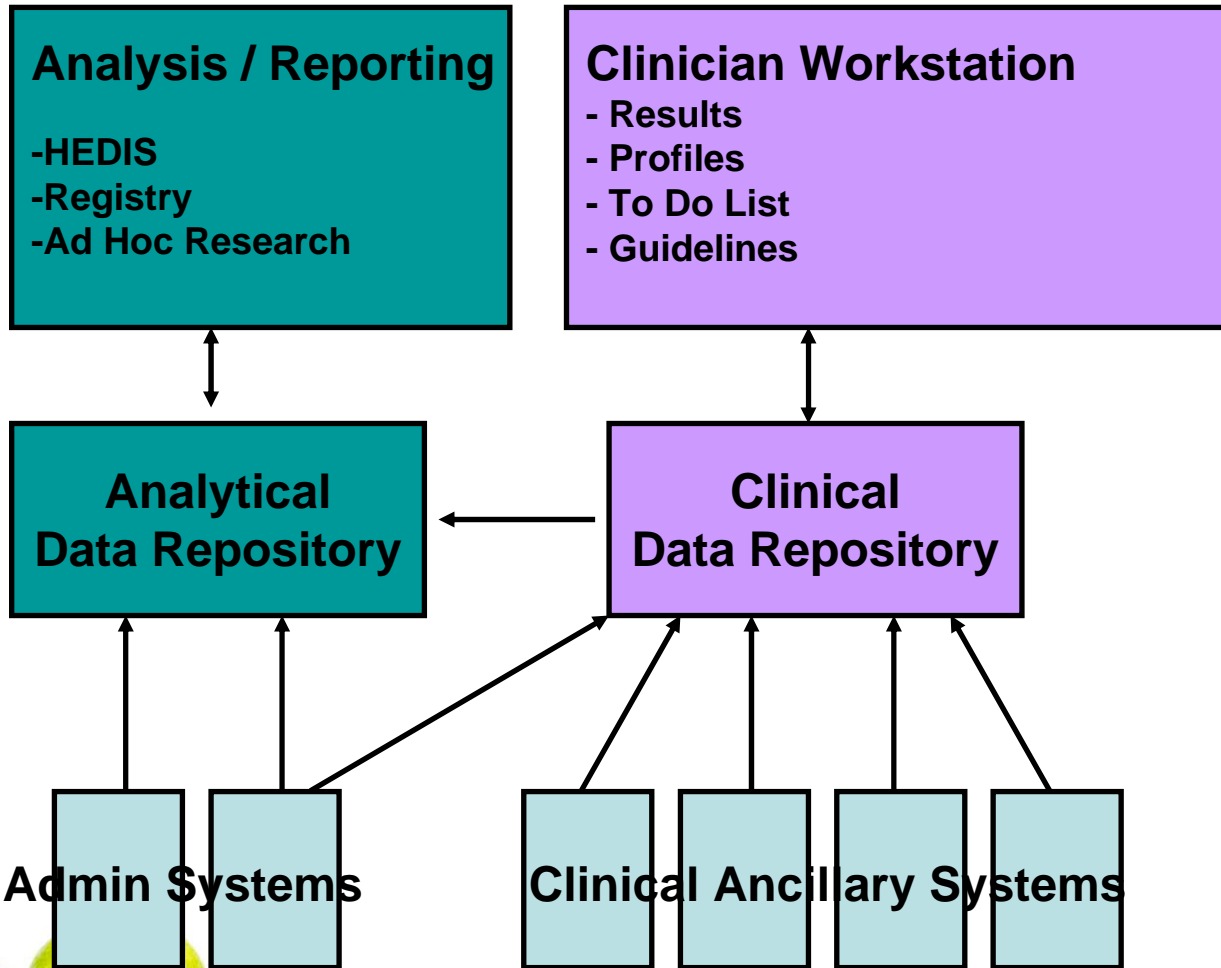
# Add Analysis Capability



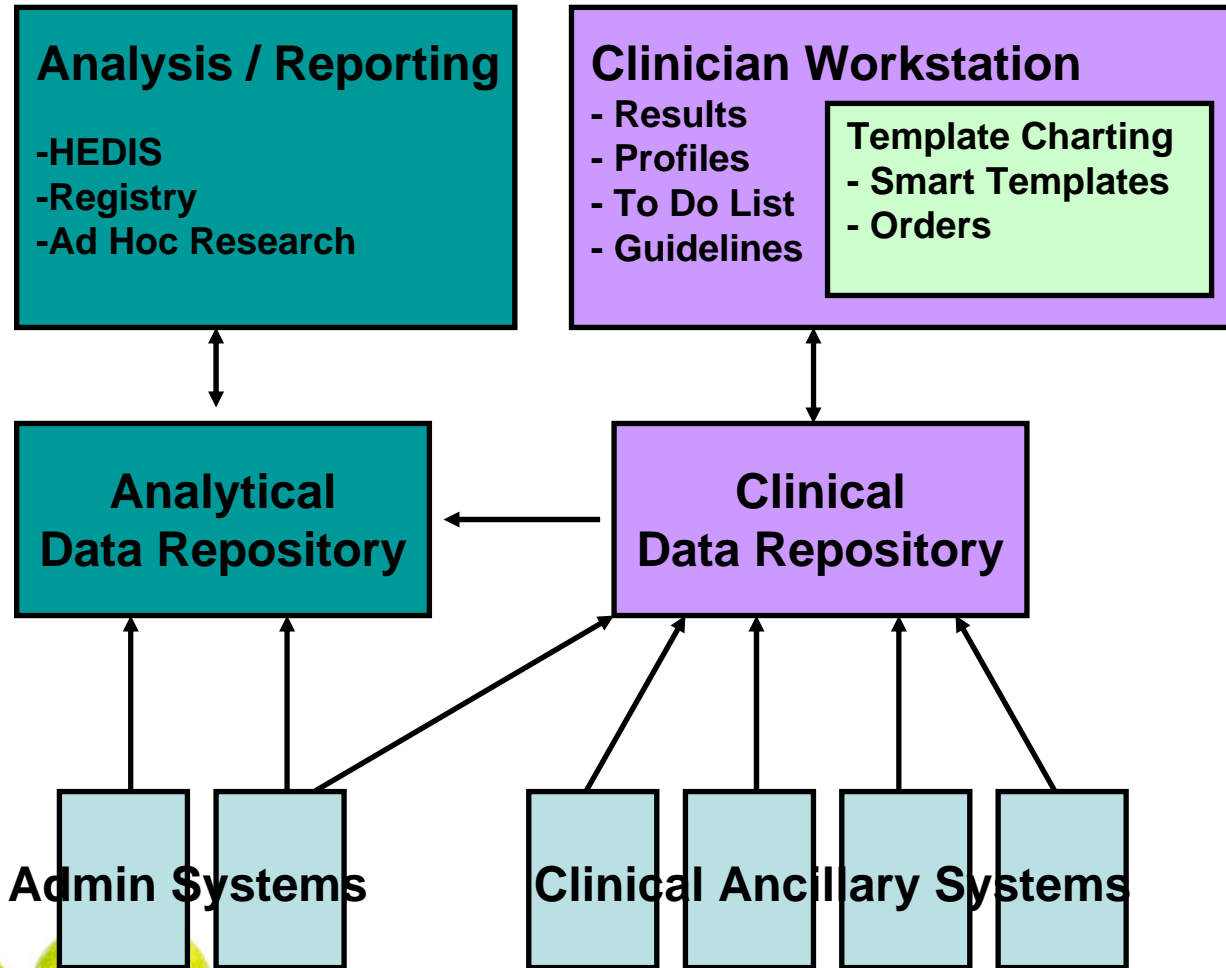
- Enterprise-Level Analytical Data Repository
- Risk / Severity Adjustment
- Primary Care Panel Assignment
- Robust Tools for Ad Hoc Analysis
- “E.I.S.” for Distribution of Routine Reports
- Process for Improvement of Coding



# Add Electronic Medical Records



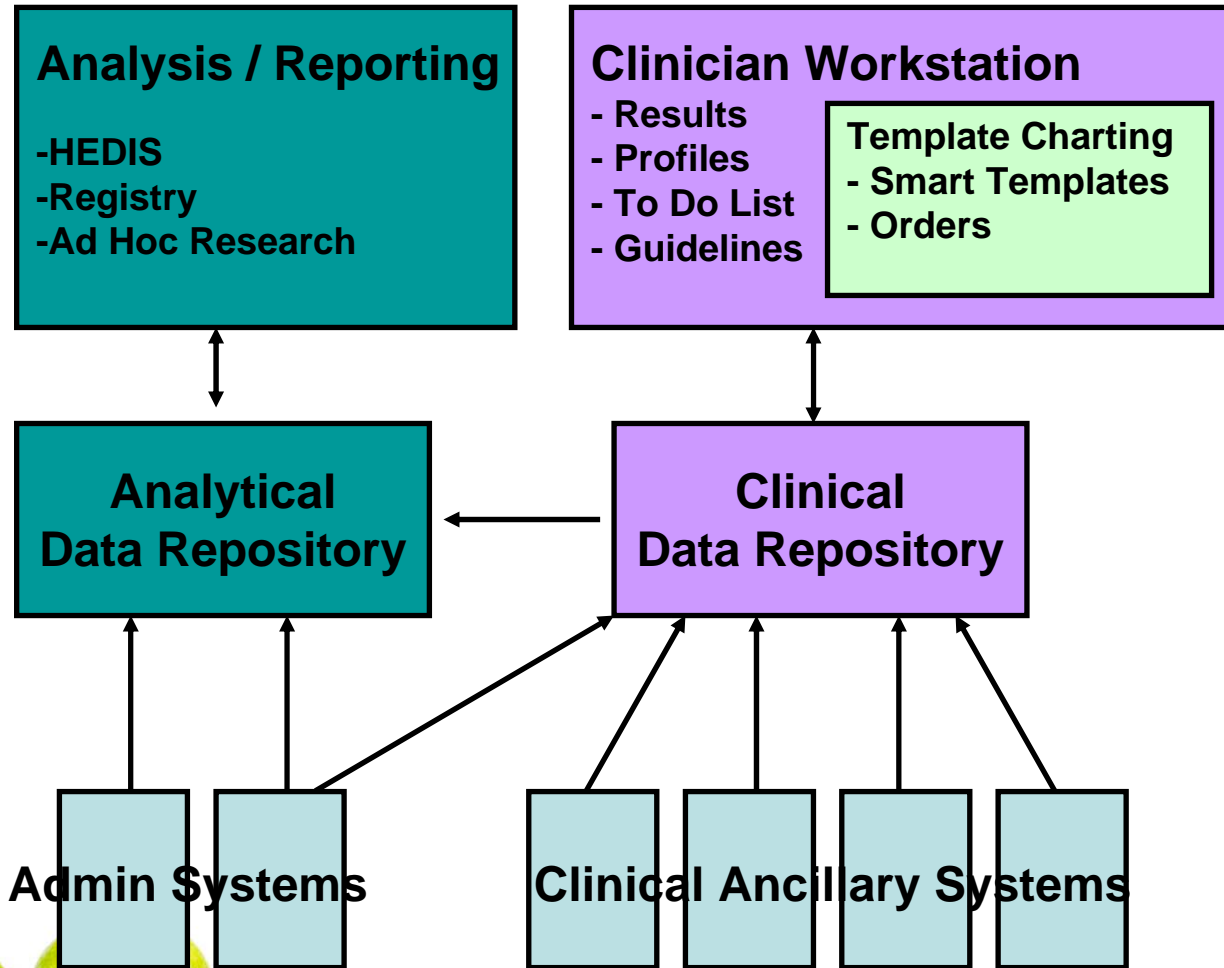
# Add Care Plan & Template Charting



## Collect Data Once For:

- Medical Records
- Orders, requisitions, referrals, prescriptions
- Billing / Claims
  - Including new HCFA Documentation Requirements
- Clinical Research
- Quality Assurance
- Outcomes Measurement

# Add Care Plan & Template Charting



## Types of Data:

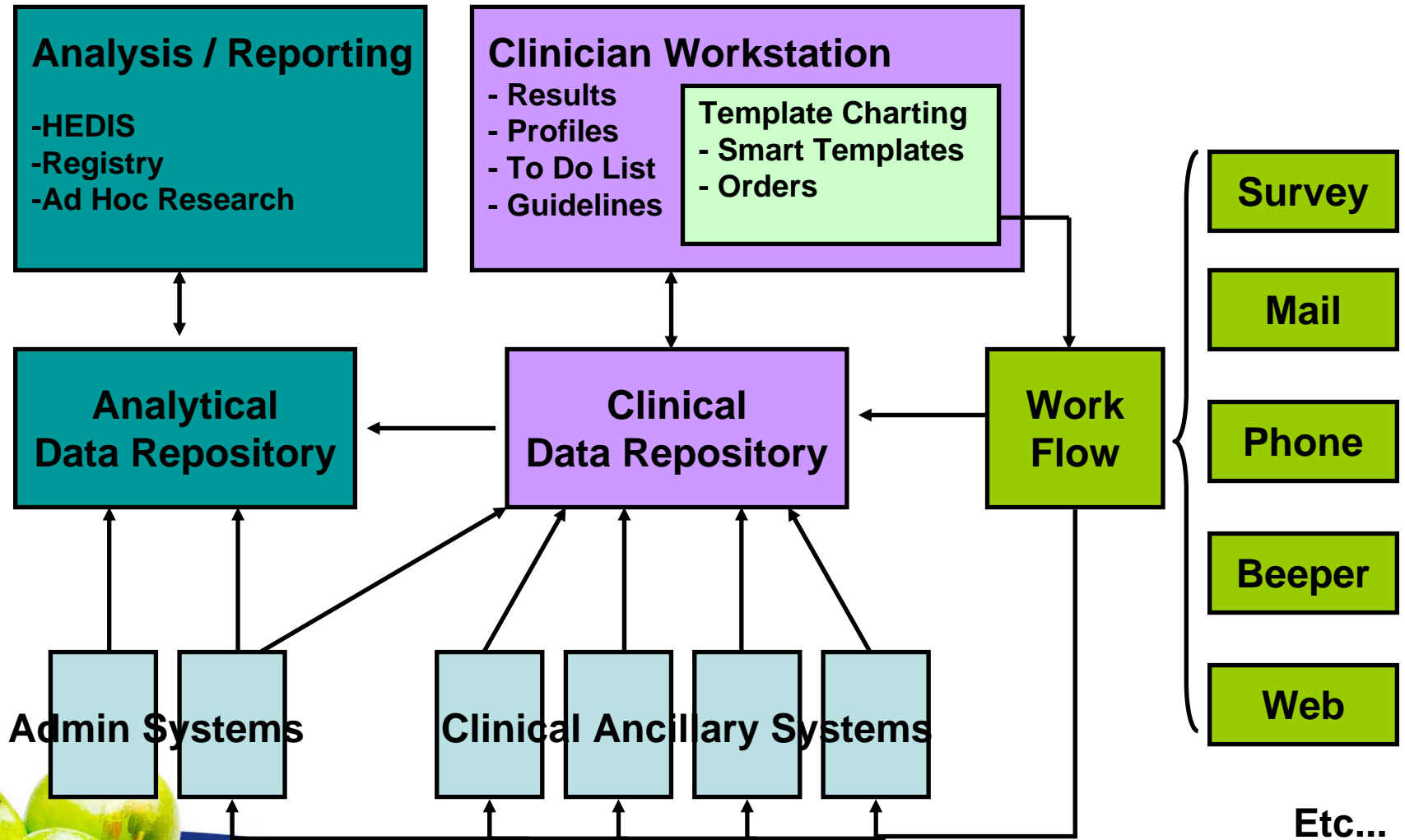
### Unstructured Data:

Text  
Diagrams (e.g. anatomic location)

### Structured Data:

Diagnosis and Procedure Codes  
Vital Signs  
Outcomes Survey  
Data

# Add Workflow Automation

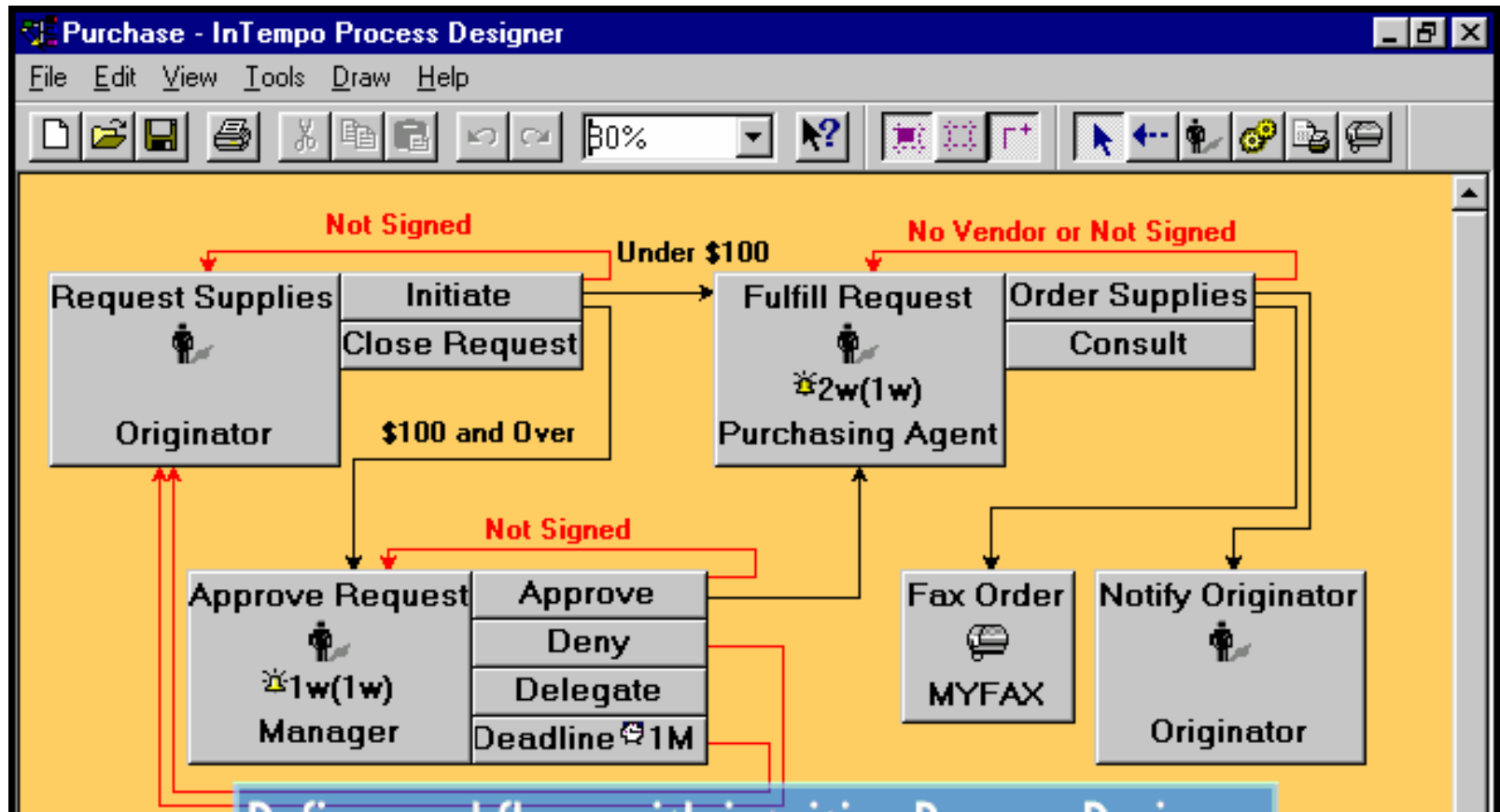


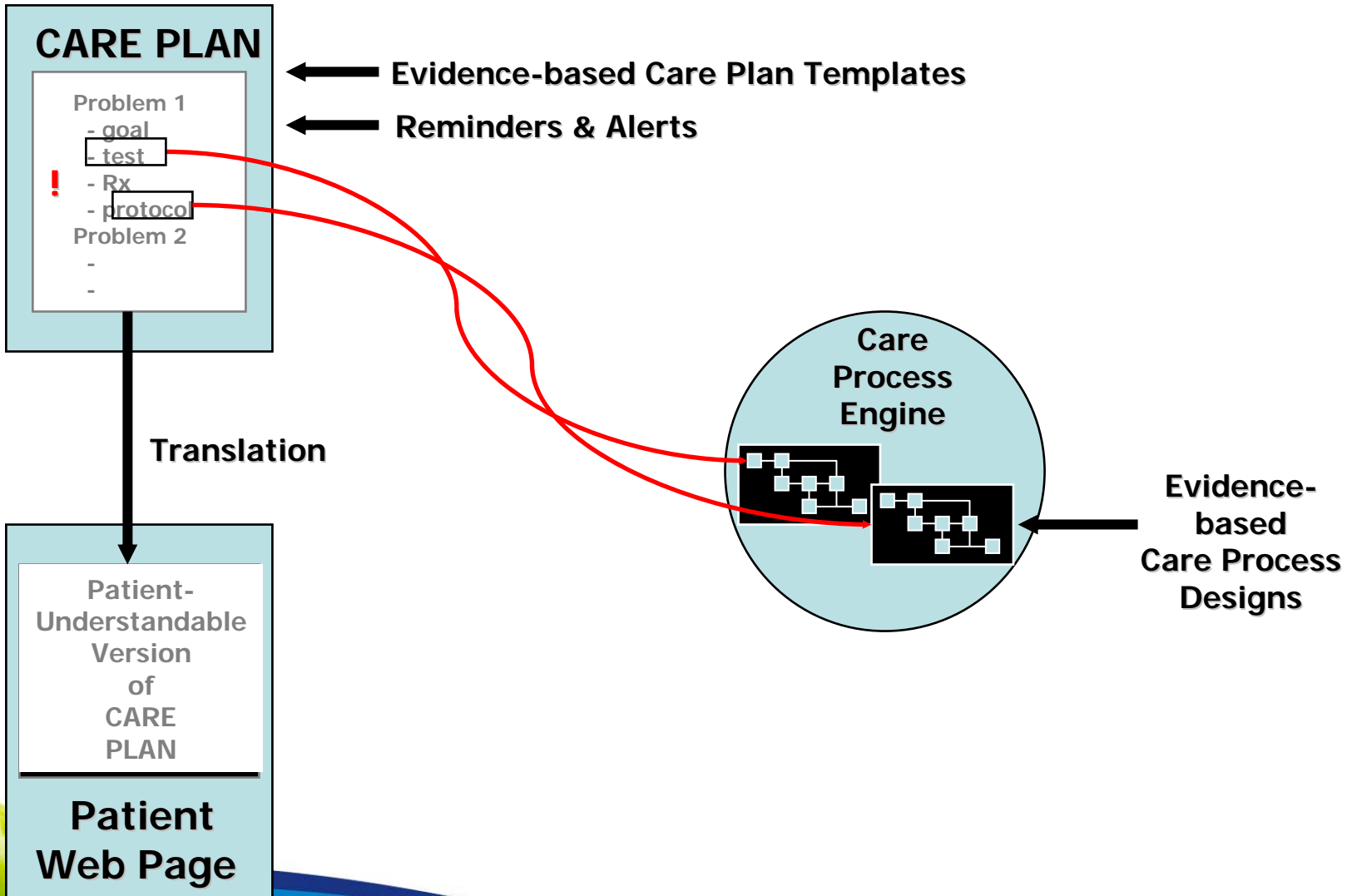
# Workflow Automation

- Generic technology gaining wide acceptance in manufacturing and service sectors.
- Goes beyond user “options” or “parameters”
- Gives operations staff the ability to directly make changes to the *sequence* of work and the *logic* which determines who does what when.



# Workflow Specification Tool





# CARE PLAN

Problem 1

- goal

- test

- Rx

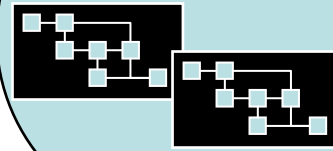
- protocol

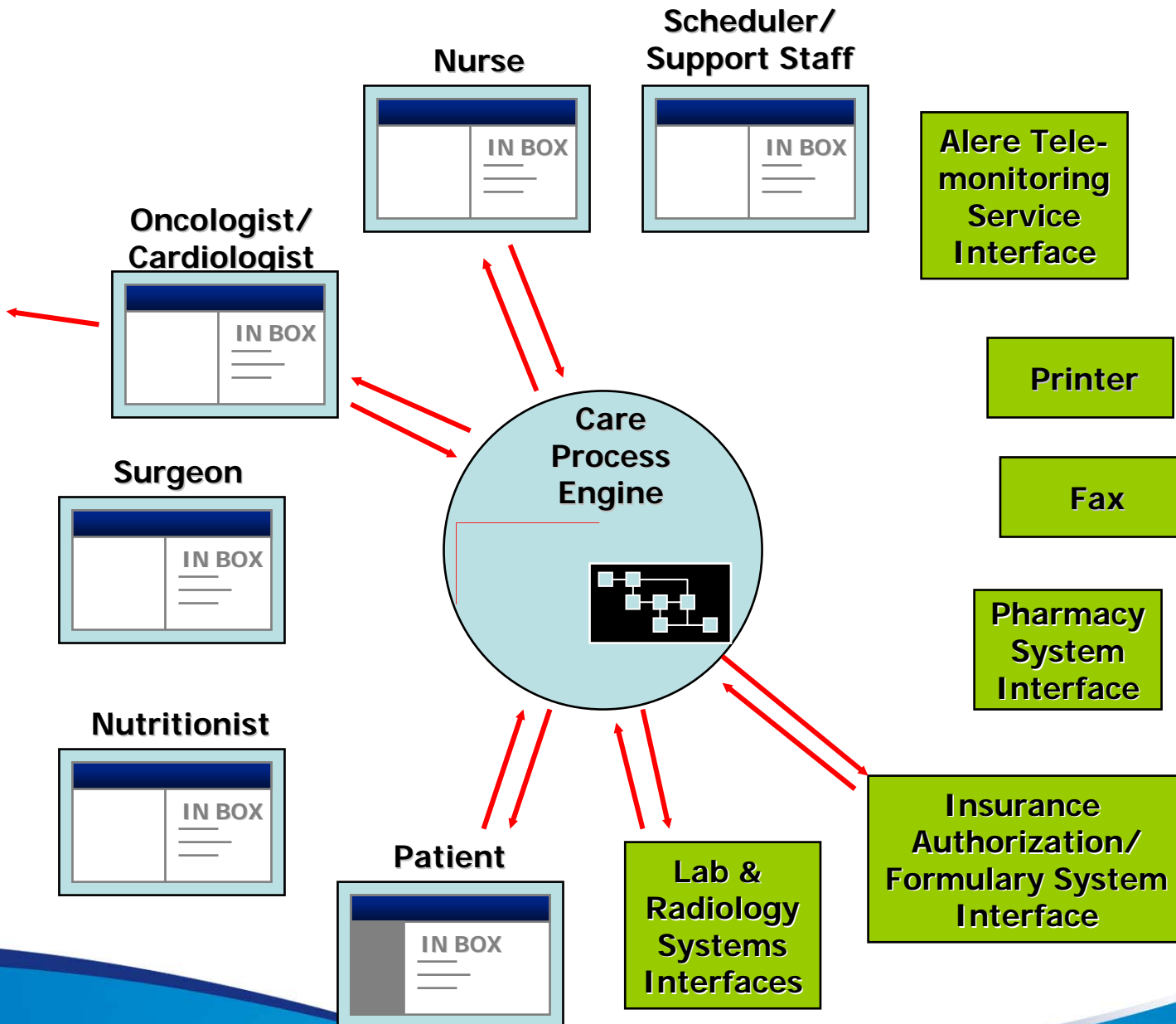
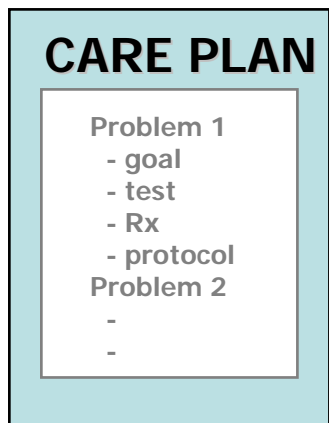
Problem 2

-

-

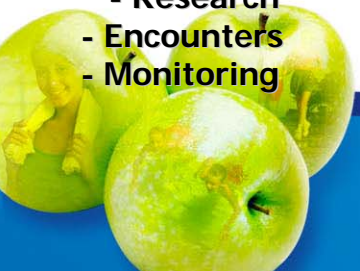
Care  
Process  
Engine





**Other Example Care Processes**

- Meds
- Lab
- Referrals
- Education
- Protocols
- Dx
- Treatment
- Research
- Encounters
- Monitoring



# Community-level initiatives to improve health care data

## WHY

### Data Access At Point of Care

- RHIO, HIE, CHIN
- “paperless”

### Care Management

Point of Care Decision Support & Care Process Tracking

- Gaps-in-care reminders/alerts
- Registries
- E-prescribing

### Consumer

- Personal Health Record

### Research & Public Health Analysis

### Accountability

- Report Cards
- Transparency

## HOW

Pool  
Clinical Data

Exchange  
Clinical  
Data

Pool or  
Exchange  
Responsibility  
Data  
(PCP, referral  
intension)

Pool De-ID  
Data

Pool  
Measures

## WHO

Single  
Provider  
Org

Provider  
Community,  
Multi-Payer

Single  
Payer  
Initiatives

Third Party  
Serving  
Consumers

# Barriers to Adoption of IT

- Consumer knowledge and culture
  - Consumers think they want choice and low out-of-pocket cost
  - Consumers never tasted truly integrated care
  - Current measures are constrained by widely-available data
- Too much government intrusion
  - Concern over fraud and abuse are stronger than desire to transform health care system
  - Stark laws inhibit care integration
- Too little government intrusion
  - Token “demonstration” or “evaluation”-level funding for AHRQ and other agencies
  - State budgets too tight to permit health care IT investments
- Too little investment by non-governmental payers
  - Many-to-many relationship between payers and providers adds complexity to value proposition



**End**

Thank you.

