



**2008** 年台灣國際醫學資訊聯合研討會

Joint Conference on Medical Informatics in Taiwan

MIST 2008 · NIST 2008 · MISAT 2008 · The 7th Asia-Pacific HL7 Conference



Journey to the Electronic  
Health Record:  
Enabling Seamless Care  
Delivery & Healthcare  
Transformation

*Judy Murphy, RN, BSN, FACMI, FHIMSS*

*Vice President, Information Services*

*Aurora Health Care*

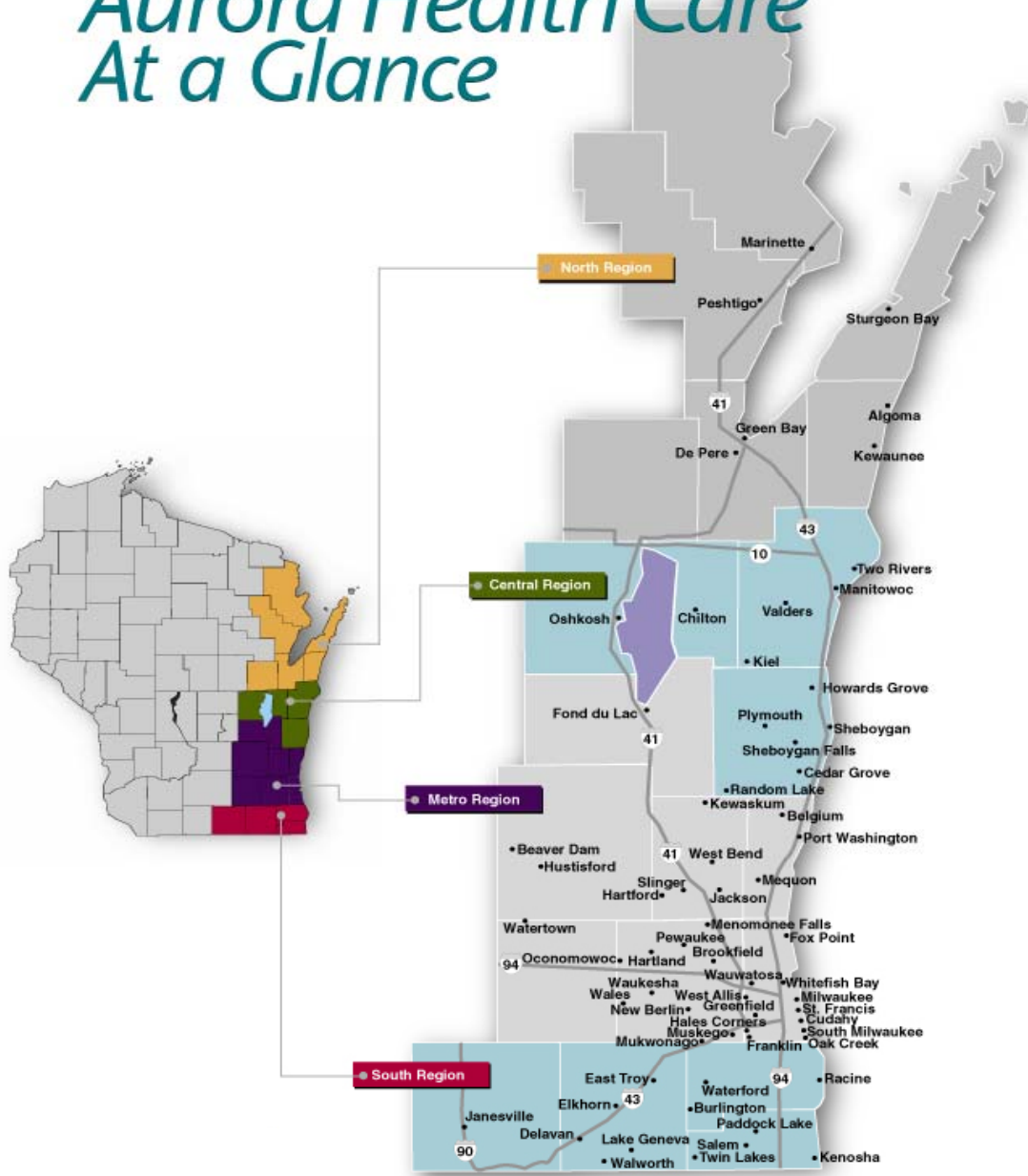
*Milwaukee, Wisconsin, USA*

## *We will cover ...*

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- A little bit about Aurora Health Care
- Aurora Health Care: An Electronic Health Record (EHR) Case Study
  - Use our experiences to exemplify key points about the EHR implementation process
  - Describe the benefits and challenges we've seen
  - Discuss where we've been; what we've learned
  - Elaborate on where we're going next and why
- Wrap-up
- Questions

# Aurora Health Care At a Glance



- Integrated Delivery Network
- Private, non-profit, teaching
- 14 Hospitals (60–900 beds)
- 120 Clinics
- 130 Retail Pharmacies
- 18 QuickCare Clinics
- Home Health Services
- Hospice Services
- Laboratory Services
  
- 26,000 employees
- 3,700 physicians on staff
- 950 employed physicians
  
- \$3.2 billion annual revenue
- 0.5 million IP days/year
- 1.1 million OP visits/year
- 250,000 ED visits/year
- 2.5 million clinic visits/year
- 284,000 Home visits/year
- 5.4 million prescriptions/year

# *Aurora Information Technology*

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- Average annual Capital budget - \$32m USD
- Average annual Operating budget - \$56m USD (about 3% of total)
  - 550 employees
  - 6 departments
- Electronic Health Record
  - \$200m+ USD investment over 10 years (hardware, software, labor)
  - 17,000 user logins with 6,500 concurrent users during prime shifts
  - 19,000 connected devices, including 5,000 mobile devices
- One of the nation's "Most Wired" hospitals - 2004, 2005, 2006, 2007 and 2008



The EHR is a  
Journey ...

Not a  
Destination

*The EHR is a  
Means to an  
End ...*

*Not an End  
Unto Itself*



UNDER  
CONSTRUCTION

Strategic Plan  
2007 to 2009



*Aurora Health Care*

Finding Better Ways



# *Aurora's Vision*

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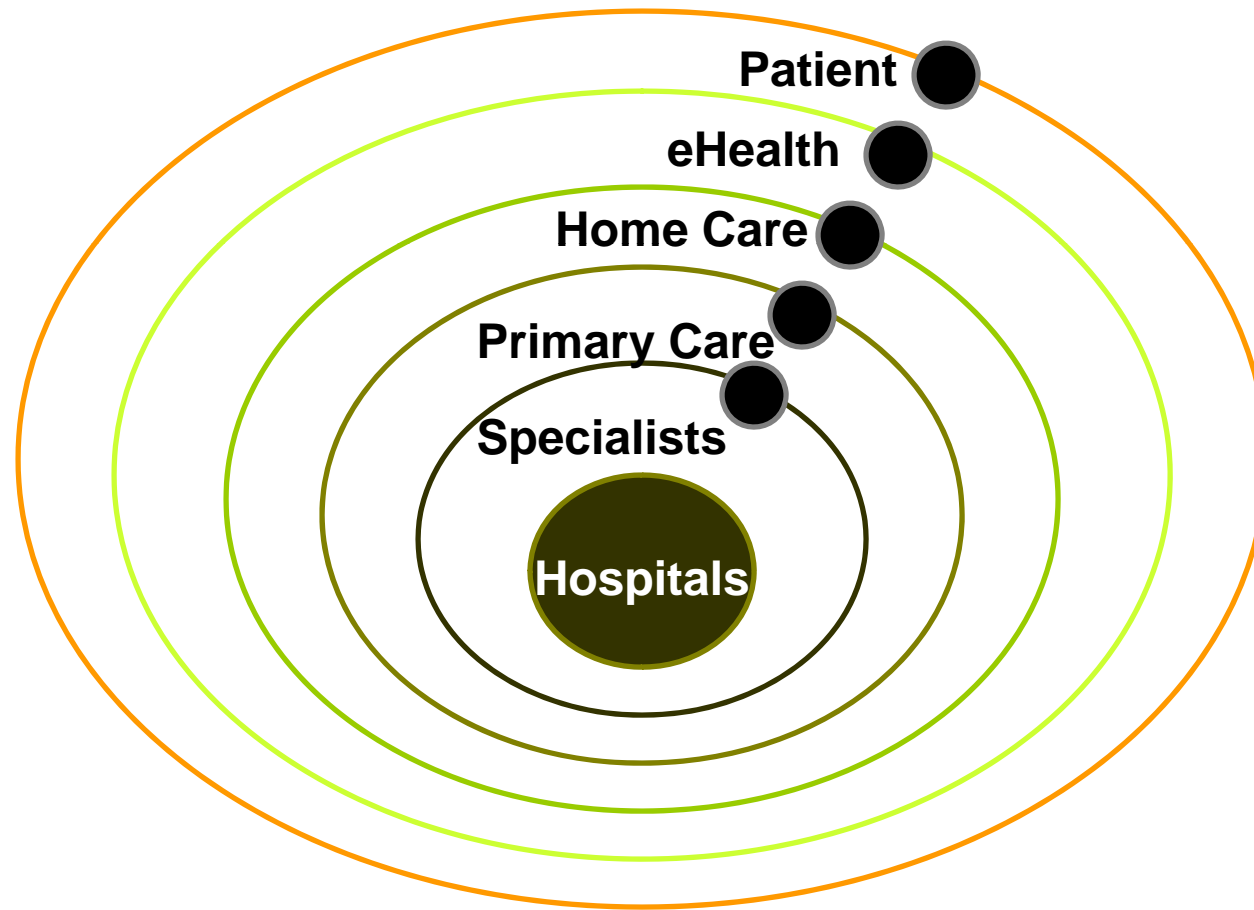
Aurora Health Care was created around a single idea:  
There is a better way to provide health care.

We will be satisfied only when Aurora gives people  
better access, better service, and better results  
than they can get anywhere else.

Working together, the people of Aurora  
will find a better way.

*OLD WAY:  
Hospital as Center of the Universe*

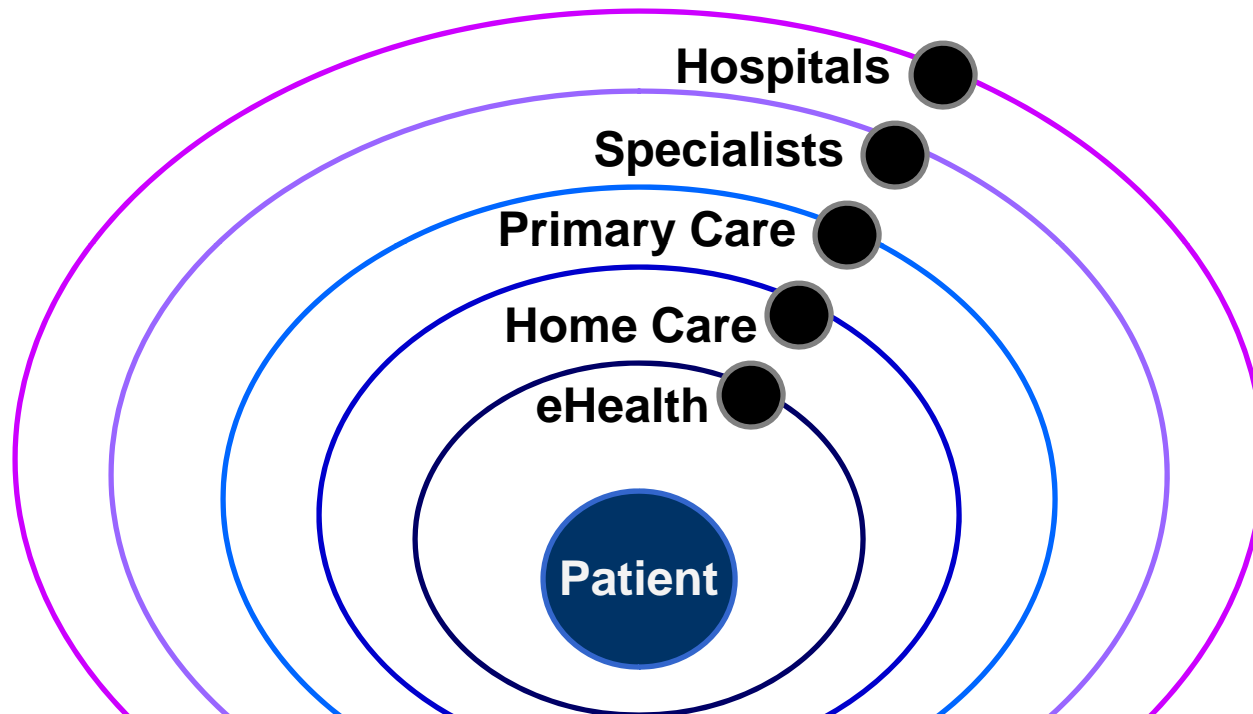
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*NEW WAY:  
Patient as Center of the Universe*

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*Murphy, J.* "The Center of the Universe: A Closer Look at a Patient-Centric Care Model". *Nursing Informatics Commentary*, *Journal of Healthcare Information Management*, 6-7 (Spring 2008).

# The ONC-Coordinated Federal Health Information Technology Strategic Plan: 2008 - 2012

Improving the health, safety and well-being of America

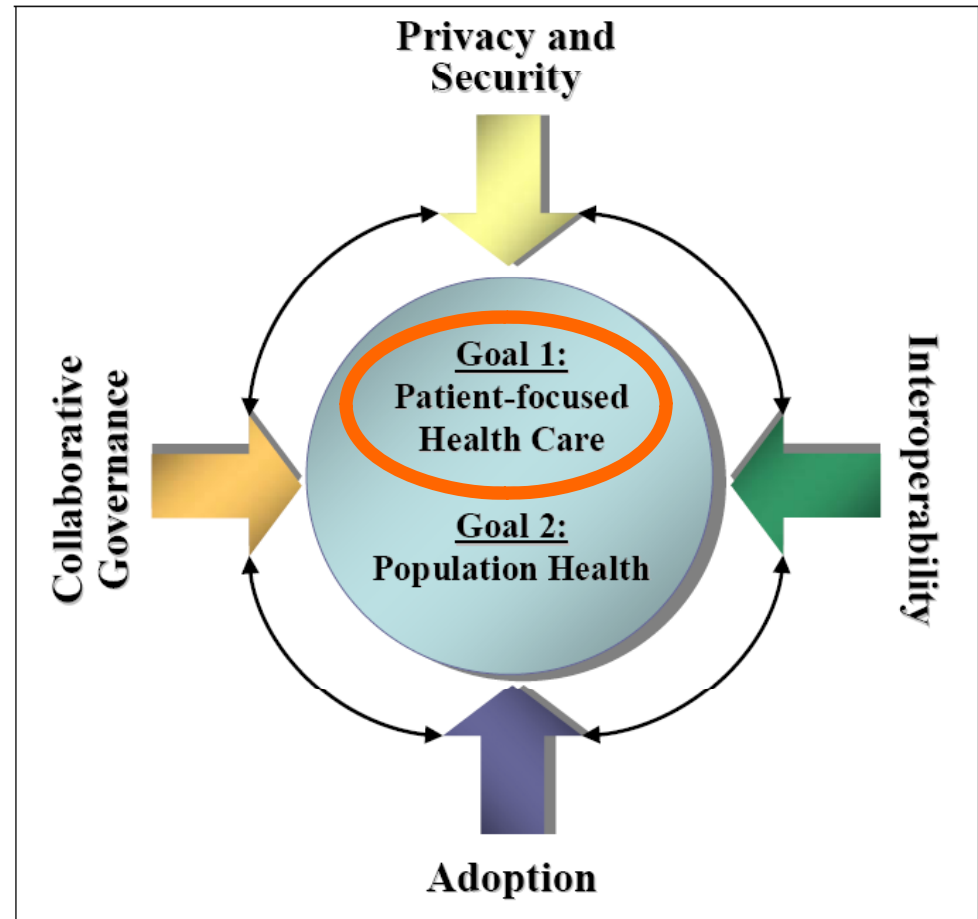


<http://www.hhs.gov/healthit/resources/HITStrategicPlanSummary.pdf>

The Plan has two goals,  
Patient-focused Health Care  
and Population Health.

Each goal has four objectives  
and the themes of **privacy  
and security**,  
**interoperability**, **adoption**,  
and **collaborative  
governance**.

(Published June 3, 2008)



### Aurora's key indicators of performance

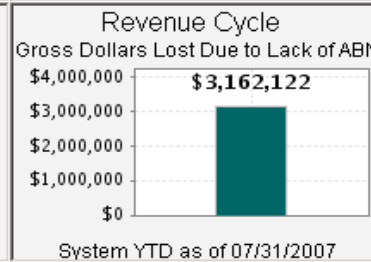
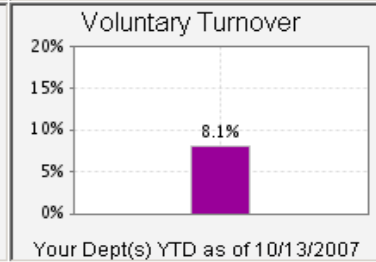
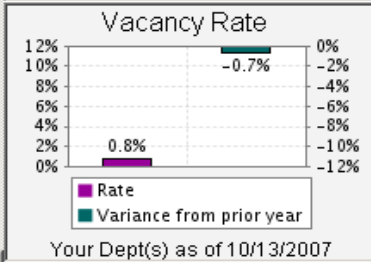
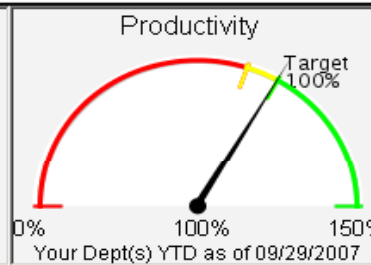
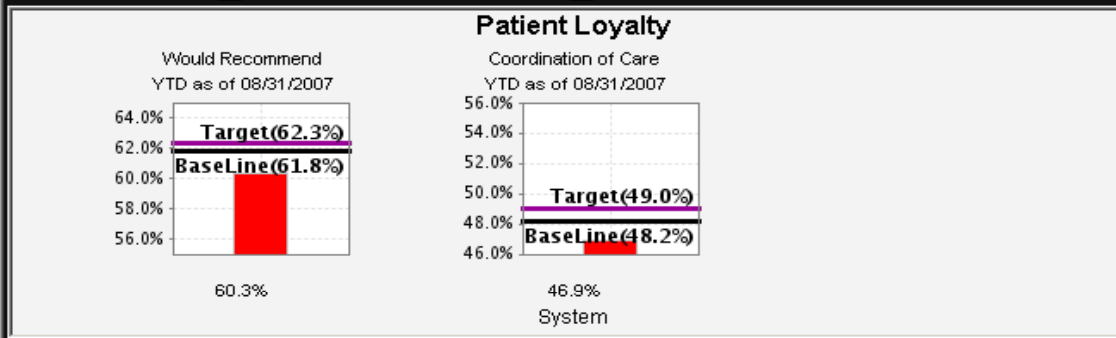
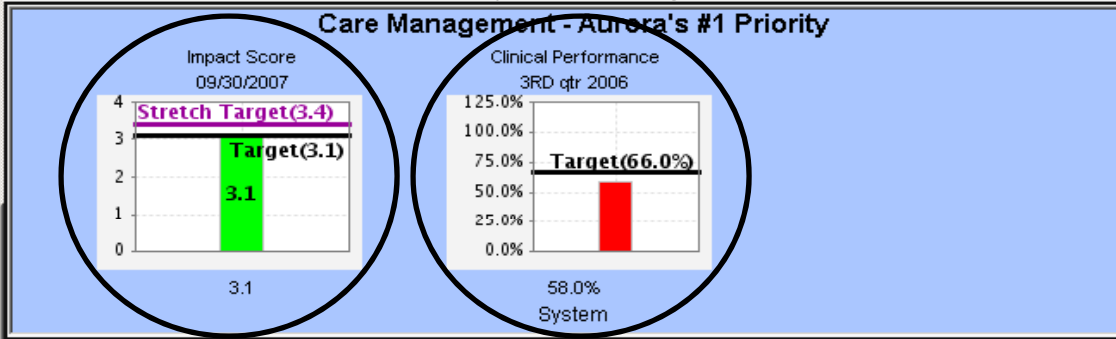
User Access

Having access to up-to-date data is the first key step in achieving Aurora's strategic goals.

[Click here](#) to learn more about Aurora's Leadership Dashboard and your role in its use.

[Preferences](#)

Print



# Clinical Performance Measures (Premier)

	AMI	CABG	PNEUMONIA (CAP)	CHF	HIP-KNEE	PREG	NECK	LUMBAR	STROKE
ASLMC	1	2	1	1	2	N/A	3	2	1
ASLSS	1	N/A	1	1 ↑	3 ↑	N/A	N/A	N/A	2 ↑
ASMC	1	3 ↓	1	1 *	1	1	N/A	N/A	3
WAMH	1	N/A	1	1 ↑	2	2	3 ↓	3 ↑	1
AMCWC	N/A	N/A	2	3 ↓	1	1	N/A	N/A	2
MHB	+ 1	N/A	1	+ 1	2	1	N/A	N/A	1 ↑
AMC-KEN	2 ↓	N/A	1	1	1	+ 1	N/A	N/A	1 ↑
ALMC	3 ↓	N/A	+ 1	1	4	1 *	N/A	N/A	3
ABMC	1 ↑	1	1	+ 1	1	2	2	2 ↑	1 ↑
AMCMC	1 ↑	N/A	2 ↓	1	1	1 ↑	N/A	N/A	2 ↑
ASMMC	1	N/A	1	+ 1	+ 1 *	+ 1	N/A	1	1
AMCO	1	N/A	1	1	2	1 ↑	N/A	N/A	2 ↓

\* Peer group best performer

+ Premier Award for Quality Winners



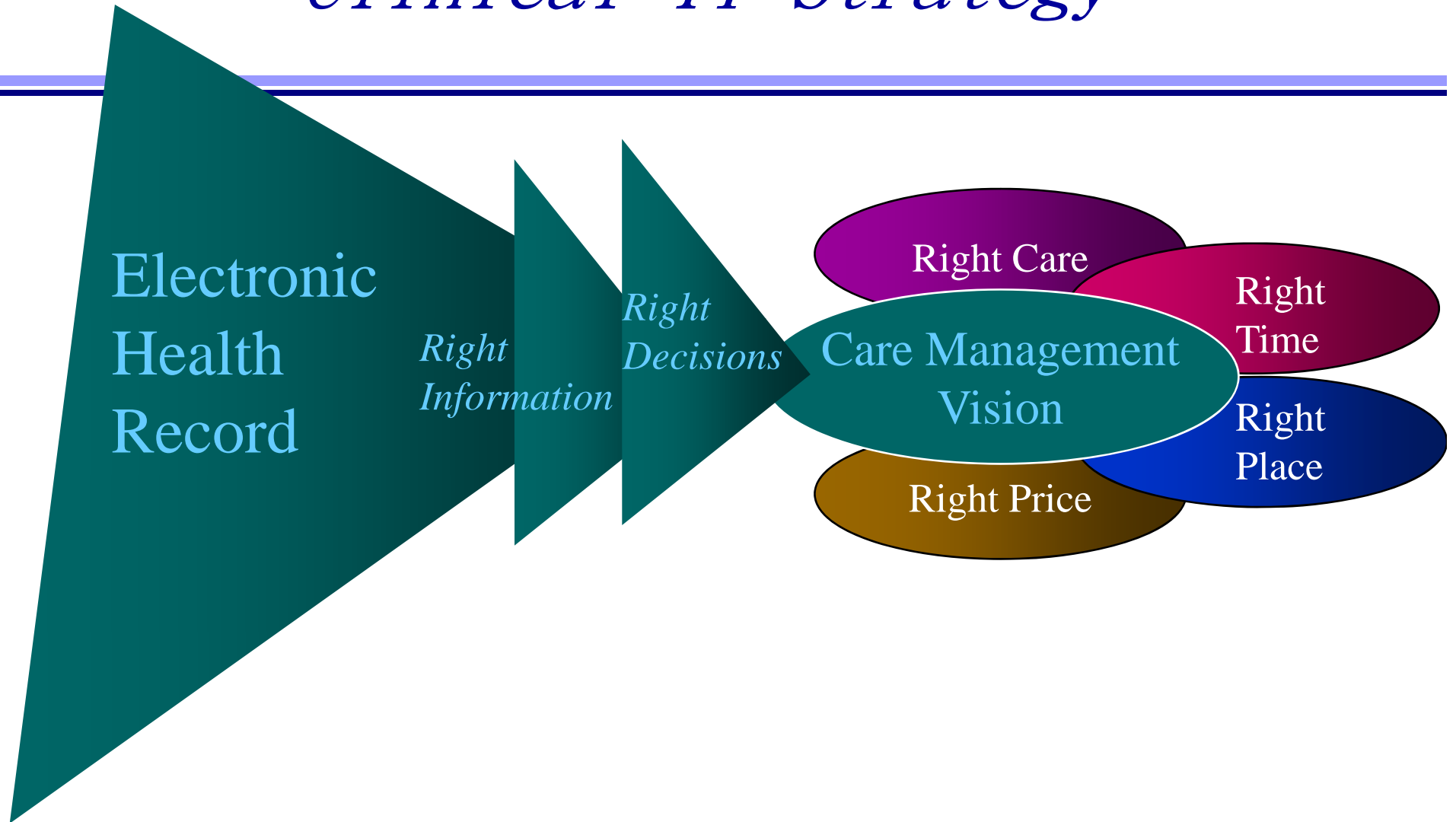
Updated 09/11/2007

Quartile Performance  
1 = Top Performer  
4 = Bottom Performer

87% in Upper Median  
66% in Top Quartile  
Based on 2<sup>nd</sup> Q 2006 -  
1<sup>st</sup> Q 2007 Data

Arrows indicate movement  
from prior quarter

# Clinical IT Strategy



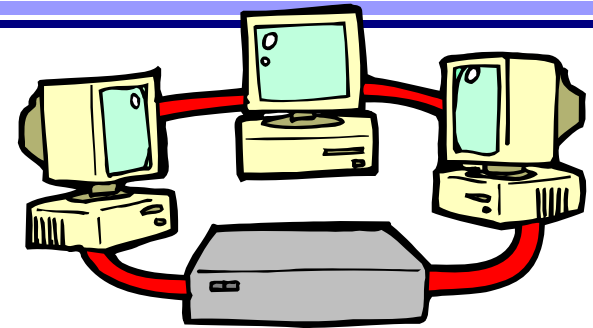
# *Key Strategic Technologies*

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- Electronic Health Record (EHR)
  - Clinical information integrated into a single, across-the-continuum patient record
  - Best practices incorporated to support care management
  - Personal Health Record included
- Mobile Technology
  - Access to the EHR with mobile/wireless devices
- Digital Imaging
  - Cardiology, Radiology, Mammography
- Web Technology
  - Patient, physician, workforce integration
  - eHealth/Personal Health Record

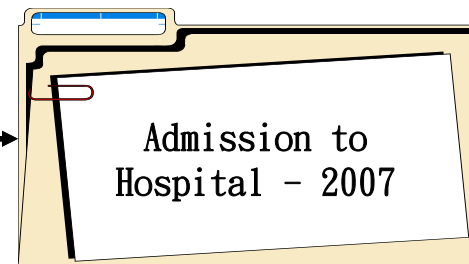
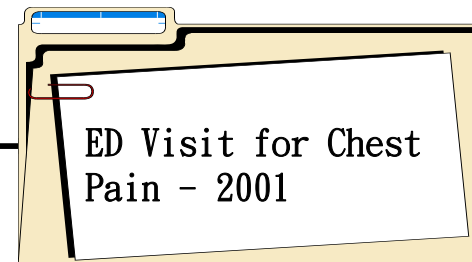
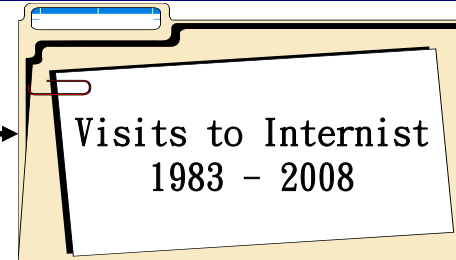
# *Electronic Health Record*

- *Patient-focused* electronic record
  - Enterprise Master Patient Index
  - Anytime, anywhere access
- Integrated Architecture for Core Systems
  - Allows different applications to interact with common patient data
- “Best of Breed” software for select systems
  - Interfaces from “feeder” systems
  - Examples: Lab, Dictation, Transcription, Coding, Billing



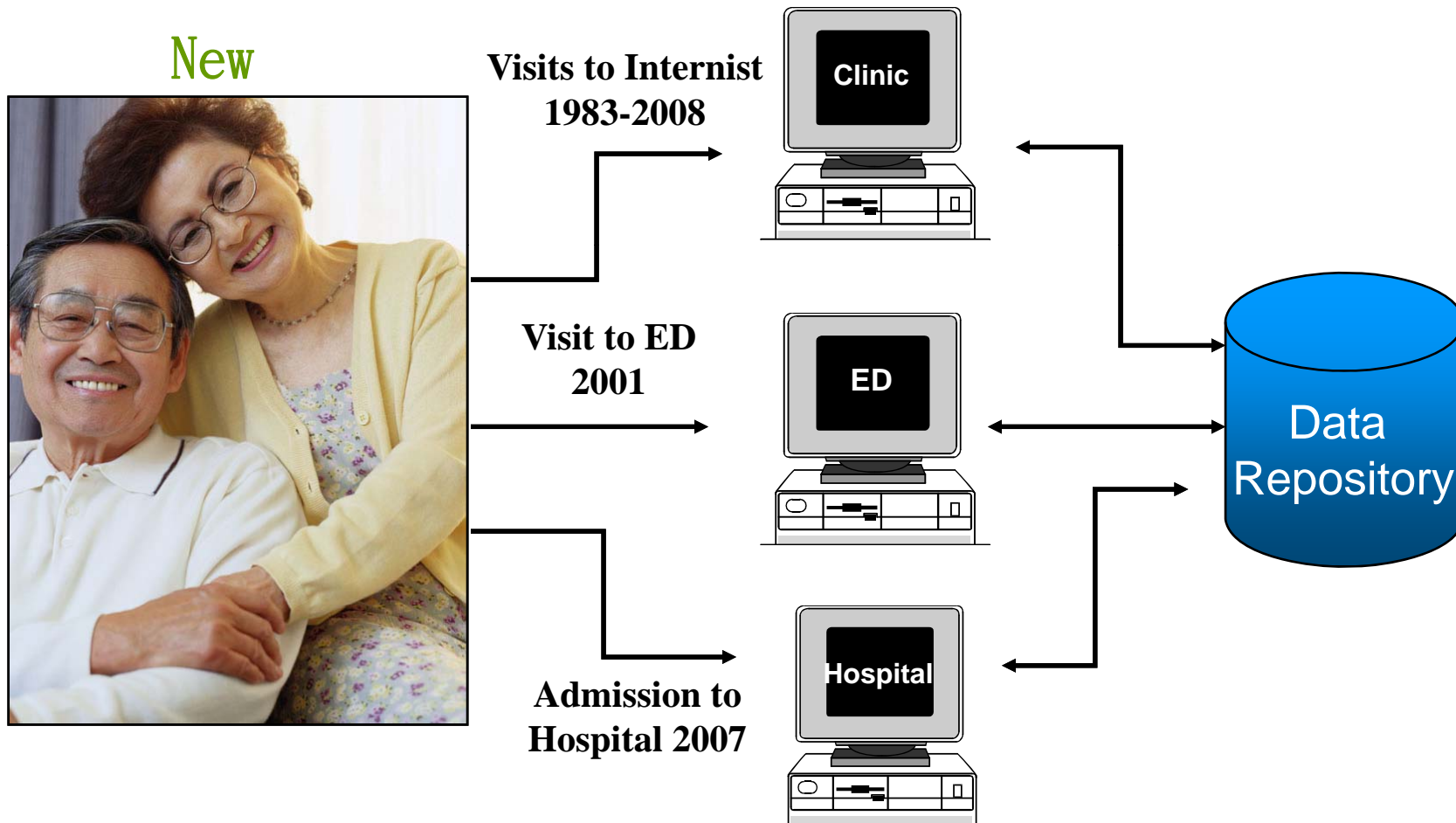
# Flow of Information

Old





# Flow of Information



# *EHR Repository as of Aug 2008*

Patients 3.6 m



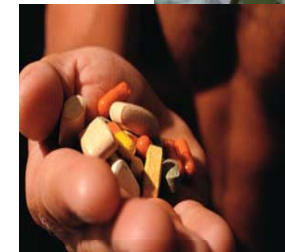
Documents 30 m



Laboratory Results 290 m



Pharmacy Orders 7 m



# Medication Profile

Summary Sheet - [ ]

File View Go Problem Chart Help

As Of 1:18 PM

Name: [REDACTED]      DOB: 1/5/1895      Age: 105 Years      Sex: Female      Chart Number: 1076202 (Enc Chartnum)

### Allergy Profile

Substance	Reaction Status	Severity	Onset Date	Created By
NO KNOWN DRUG ALLERGIES	Active		10/7/1996	Contributor_syst...

### Medication Profile

Medication View See Rx View

Name	SIG	C.	Provider	Date	Status
<b>Current Medications</b>					
aspirin (ASPIRIN TAB 81MG)	-- 1 active prescription				
Rx aspirin (ASPIRIN TAB 81MG)	01 qd	##0 NO Refills	Pfotenhauer, Joseph	03/17/1998 ...	Active
levothyroxine (Synthroid)	-- 1 active prescription				
Rx levothyroxine (Synthroid)	0.05mg 1 tab(s) qd	#30 0 Refills	Pfotenhauer, Joseph	06/01/1999 ...	Active
ranitidine (ZANTAC TAB 150MG)	-- 1 active prescription				
Rx ranitidine (ZANTAC TAB 150MG)	01 bid	#000 00 Refills	Pfotenhauer, Joseph	10/07/1996 ...	Discontinued
Rx ranitidine (ZANTAC TAB 75MG)	01 bid	##0 NO Refills	Pfotenhauer, Joseph	03/02/1998 ...	Active
<b>Past Medications</b>					
Rx acetaminophen-propoxyphene (Darvocet N)	650 mg-...	q4-6h prn	#0 0 Refills	Pfotenhauer, Joseph	12/14/1999 ... Discontinued
Rx amlodipine (Norvasc)	2.5mg 1 tab(s)	qd	#0 0 Refills	Pfotenhauer, Joseph	12/06/1999 ... Discontinued
Rx cephalixin (Keflex)	250mg 1 tab(s)	qid	##40 0 Refills	Zablotney, David	01/14/1999 ... Discontinued
furosemide (FUROSEMIDE TAB 20MG)	-- 3 past prescriptions				
Rx furosemide (FUROSEMIDE TAB 20MG)	01 qd	##60 1 Y Refills	Pfotenhauer, Joseph	03/02/1998 ...	Discontinued
Rx furosemide (FUROSEMIDE TAB 20MG)	01 qd	#050 06 Refills	Pfotenhauer, Joseph	08/14/1997 ...	Discontinued
Rx furosemide (FUROSEMIDE TAB 20MG)	01 qd	#000 00 Refills	Pfotenhauer, Joseph	10/07/1996 ...	Discontinued
Rx hydrochlorothiazide-losartan (Hyzaar)	12.5 mg-...	1 tab(s) qd	#30 PRN Re...	Pfotenhauer, Joseph	06/01/1999 ... Discontinued
Rx Misc Medication (MISCELLANEOUS DRUG)	01 qd	##60 PRN Re...	Pfotenhauer, Joseph	05/26/1998 ...	Discontinued
Rx nitroglycerin (NITRO-DUR PATCH .2MG)	01 qd	##0 NO Refills	Pfotenhauer, Joseph	03/17/1998 ...	Discontinued
Rx potassium chloride (POTASSIUM TAB 20MEQ)	01 qd	##60 1 Y Refills	Pfotenhauer, Joseph	03/02/1998 ...	Discontinued
Rx trimetrexate (Neutrexin)	25mg 30	tid	Zablotney, David	01/14/1999 ...	Discontinued

### Problem List

Name of Problem	Life Cycle Status	Co...	Onset Date	Responsible Provider	Recorded By
UNSPECIFIED ESSENTIAL HYPERTENSION	Active		5/7/1998		Contributor_system, HNA01M

# Abnormal value highlighting

Provide (Production Environment) - Citrix ICA Client

Flowsheet - [Redacted] J]

File View Go Time Scale Options Chart Help

As Of 12:38 PM

Name: [Redacted]      DOB: 3/29/34      Age: 65 Years      Sex: Male      Chart Number: <No Data>

Flowsheet: All Results Flowsheet      View Level: Chemistry      More

Saturday, January 10, 2000 12:37 PM (Posting Range)

	12/27/99 PM	12/27/99 9:00 AM	12/27/99 12:01 AM	12/26/99 9:59 PM	12/20/99 7:25 PM	12/8/99 10:35 PM	11/22 8:41
<b>Electrolytes</b>							
<input type="checkbox"/> Na				141	143	143	142
<input checked="" type="checkbox"/> K	3.9	4.0		4.1	3.7	4.1	4.2
<input type="checkbox"/> Cl	H 108	103		107	106	107	102
<input type="checkbox"/> CO2	26	26		27	27	27	26
<input type="checkbox"/> Anion Gap	10	12		9	10	12	14
<b>Chem Panel</b>							
<input checked="" type="checkbox"/> Glucose	H 192	H 394		H 232	H 174	H 154	84
<input type="checkbox"/> BUN	11	14		15	17	12	15
<input type="checkbox"/> Creatinine	0.9	0.9		1.0	1.1	1.0	1.0
<input type="checkbox"/> BUN/Creat Ratio	12	16		15	15	12	15
<input type="checkbox"/> Calcium				9.2			9.7
<input type="checkbox"/> Bilirubin, Total				1.0			0.7
<input type="checkbox"/> Protein, Total				6.6			6.7
<input type="checkbox"/> Albumin				L 3.1			L 3.2
<input type="checkbox"/> Globulin				3.5			3.5
<input type="checkbox"/> A/G Ratio				L 0.9			L 0.9
<input type="checkbox"/> CPK	L 37	L 34	L 35	63	71	L 41	100
<input type="checkbox"/> Alk Phos				112			86
<input type="checkbox"/> GOT/AST				16			L 11
<b>Cardiac/Isoenzymes</b>							
<input type="checkbox"/> CPK	L 37			63		L 41	100
<input type="checkbox"/> CK-MB	3.1			3.1		2.6	1.9
<input type="checkbox"/> S-Myoglobin	16	47	31	35		21	32
<input type="checkbox"/> Troponin	* <0.4	* <0.4	* <0.4	* H 0.4		* <0.4	* <0.4
<b>Drug Monitor/Toxicology/Metals</b>							
<input type="checkbox"/> Digoxin					L 0.6		

# Specialty Event Sets

Desktop - DevProd - Citrix ICA Client

Flowsheet - [RACINE, RACINE]

File View Go Time Scale Options Chart Help

As Of 10:28 AM

Name: RACINE, RACINE      DOB: 12/6/68      Age: 31 Years      Sex: Male      Chart Number: <No Data>

Flowsheet: Diabetes Mellitus Care Management      View Level: Diabetes Mellitus Care Management      More

Wednesday, February 09, 2000 10:25 AM - Thursday, February 10, 2000 10:25 AM (Clinical Range)

	2/9/00 10:28 AM	2/9/00 10:27 AM
<b>Physical</b>		
<input type="checkbox"/> Systolic BP	120	
<input type="checkbox"/> Diastolic BP	80	
Visual Inspection, left foot		Normal
Visual Inspection, right foot		Abnormal
Foot ulceration risk Category		Risk 1 Category
<b>Lab</b>		
Hgb A1C		
Cholesterol		
HDL		
LDL Direct		
Triglycerides		
U-Microalbumin 24 HR		
Creatinine		
<b>Management</b>		
Dilated Eye Exam		Yes
Currently Smoking		Yes
Advised to Quit Smoking		Yes
Dietitian Referral		No
Nurse Educator Referral		Yes
Foot Care Referral		Yes
Depression Screen		No
Flu Shot		Yes
Pneumoccal Vaccine		Yes
Preconception Counseling		No
Exercise		Yes

PROD A05SBLI Wednesday, February 09, 2000 10:15 AM

Start Cerner PowerChart Database Tools Flowsheet - [RACINE, ...] ProVide - Organizer 10:31 AM

Start Aurora Main Menu hnam.r2w - Reflection for ... Sandy Blixt - Inbox - Lotus ... Citrix Program Neighborho... Desktop - DevProd - ... 10:29 AM

# Graphing



**PowerChart Organizer for Gorczynski, Mike**  
 Task Edit View Patient List Help

As Of 9:19 AM

**Patient List** Multi-Patient Task

Surgery 2nd Floor-ABMC

**Emergency Department-ABMC**

All patients

Room	Bed	New Results
ED		
ED		
ED		
ED		
ED		
ED		
ED		
ED		
ED		
ED		
ED		
ED		
ED		
ED		
ED		
ED		
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ED		

**Aurora Libraries Intranet Site - ALIS - Microsoft Internet Explorer**  
 Address: http://library.aurora.org/ALIS/  
**ALIS** Aurora Libraries Intranet Site  
 Wednesday, November 7, 2001  
[Feedback](#) | [About the Aurora Libraries](#) | [Intranet Home](#) | [ALIS Home](#)

**Medical Databases**

- ALL Ovid Databases
  - MEDLINE (1998-present)
  - MEDLINE (1966-present)
  - CINAHL
  - Clinical Evidence
  - Books @ Ovid
  - Ovid Full Text Journals
- MD Consult (Books & News)
- Scientific American

**Library News**

- MedWeaver:** Differential diagnosis help using Enter symptoms, see likely diagnoses, disease p... to MEDLINE searching and related Web sites

**Find Articles & News**  
 Databases by subject & title, full text journals, art... general instructions for finding articles...

**MedWeaver - Microsoft Internet Explorer provided by Aurora HealthCare, Inc.**  
 Address: rboundmedicine.com/ovidmedweaver/diagnosis.jsp  
**MedWeaver**  
 Home Help Return to OVID Logoff OVID

**Differential Diagnosis** [Refine Case](#) | [New Case](#)  
 Current Case: Adult, Young (18 TO 40 YRS) Female with Chronic (> 4 weeks) course of Hypersomnia  
 Strongly suggested   
 Moderately suggested   
 Weakly suggested   
 Insufficient information

**COMMON DISEASES AND CONDITIONS**

Endogenous depression	<a href="#">Profile</a>   <a href="#">Medline</a>   <a href="#">Web</a>   <a href="#">Explain</a> <input checked="" type="checkbox"/>
Alcohol intoxication	<a href="#">Profile</a>   <a href="#">Medline</a>   <a href="#">Web</a>   <a href="#">Explain</a> <input type="checkbox"/>

**RARE DISEASES AND CONDITIONS**

Sleep apnea	<a href="#">Profile</a>   <a href="#">Medline</a>   <a href="#">Web</a>   <a href="#">Explain</a> <input checked="" type="checkbox"/>
Pickwickian syndrome	<a href="#">Profile</a>   <a href="#">Medline</a>   <a href="#">Web</a>   <a href="#">Explain</a> <input checked="" type="checkbox"/>
Hyperecalcemia of malignancy	<a href="#">Profile</a>   <a href="#">Medline</a>   <a href="#">Web</a>   <a href="#">Explain</a> <input checked="" type="checkbox"/>
Epilepsy, grand mal	<a href="#">Profile</a>   <a href="#">Medline</a>   <a href="#">Web</a>   <a href="#">Explain</a> <input type="checkbox"/>
Restless legs syndrome	<a href="#">Profile</a>   <a href="#">Medline</a>   <a href="#">Web</a>   <a href="#">Explain</a> <input type="checkbox"/>
Stokes-Adams attacks	<a href="#">Profile</a>   <a href="#">Medline</a>   <a href="#">Web</a>   <a href="#">Explain</a> <input type="checkbox"/>
Manic depressive disease, depressed phase	<a href="#">Profile</a>   <a href="#">Medline</a>   <a href="#">Web</a>   <a href="#">Explain</a> <input type="checkbox"/>
meningitis, aseptic	<a href="#">Profile</a>   <a href="#">Medline</a>   <a href="#">Web</a>   <a href="#">Explain</a> <input type="checkbox"/>
Salicilate toxicity	<a href="#">Profile</a>   <a href="#">Medline</a>   <a href="#">Web</a>   <a href="#">Explain</a> <input type="checkbox"/>
meningitis, bacterial	<a href="#">Profile</a>   <a href="#">Medline</a>   <a href="#">Web</a>   <a href="#">Explain</a> <input type="checkbox"/>
meningitis, meningococcal	<a href="#">Profile</a>   <a href="#">Medline</a>   <a href="#">Web</a>   <a href="#">Explain</a> <input type="checkbox"/>
Subarachnoid hemorrhage	<a href="#">Profile</a>   <a href="#">Medline</a>   <a href="#">Web</a>   <a href="#">Explain</a> <input type="checkbox"/>
Opioid intoxication	<a href="#">Profile</a>   <a href="#">Medline</a>   <a href="#">Web</a>   <a href="#">Explain</a> <input type="checkbox"/>

**VERY RARE DISEASES AND CONDITIONS**

meningitis, tuberculous	<a href="#">Profile</a>   <a href="#">Medline</a>   <a href="#">Web</a>   <a href="#">Explain</a> <input type="checkbox"/>
Trypanosomiasis, african	<a href="#">Profile</a>   <a href="#">Medline</a>   <a href="#">Web</a>   <a href="#">Explain</a> <input type="checkbox"/>

**Pediatrics-ABMC**

MRN	FIN
00102503	BC-00103196
00102580	BC-00103310
00102677	BC-00103442
00102675	BC-00103437
00102679	BC-00103445
00101128	BC-00101393
00102499	BC-00103189
00102549	BC-00103264
00100350	BC-00103194
00102671	BC-00103433
00102671	BC-00103447
00101174	BC-00101447
00102617	BC-00103357
00102672	BC-00103434
Years Female	BC-00101173 BC-00101446
Years Male	BC-00102627 BC-00103368
Years Female	BC-00101101 BC-00103235
Years Female	BC-00100086 BC-00103446
Years Female	BC-00101121 BC-00101383
Years Male	BC-00101180 BC-00101454
Years Female	BC-00102556 BC-00103276
Years Female	BC-00101107 BC-00101366
Months Male	BC-00101150 BC-00101418

**Reference data access**

Taskbar: Start Aurora Main Menu Mike Gorczynski - Inbox... MedWeaver - Micros... Cerner - Citrix ICA Client Microsoft Word - temp ALI... 9:26 AM

# CPOE

RED, NICOLEEIGHT - SMMC-00430033 Opened by Gorczynski, Mike

Task Edit View Options Current Add Help

As Of 14:16 Custom

**RED, NICOLEEIGHT**

Age: 45 years Sex: Female Location: 3K-ASMMC; 369; 01  
 DOB: 12/17/1958 MRN: SMMC-00430033 Fin Number: SMMC-0011000058  
 Inpatient [Admit 11/17/2003 9:25 AM Discharge <No - Discharge date>]

**\*\* Allergies \*\***

Hospital Docs Task List Pt Schedule MAR  
 Pt Info Flowsheet List Flowsheet Clinical Notes **Orders** Med Profile Vitals I/O Labs Imaging Assessments PM/R Resp Nutrition Forms Overview Teaching

**PowerOrders** Orders Queue

Start Date / Time: 6/23/2004 09:44 Stop Date / Time: None

Orders for Signature Rows Selected ( 0 )

**Asthma - Adult Admit Med/Surg (Initiated)**

- Vital Signs
  - Vital Signs Inpatient Ordered 06/23/04 9:44:00, Q8H
- Reminders
  - In patients with acute asthma, triage decisions should be made based upon the patient's severity of illness
  - Admission Height/ Weight Ordered 06/23/04 9:44:00
  - <sup>Zynx</sup> Pulse O<sub>x</sub> Ordered 06/23/04 9:44:00, Q8H
- Activity
  - Bedrest with BRP Ordered 06/23/04 9:44:00
- Nursing Orders
- Assessments
  - Communication Ordered 06/23/04 9:44:00, Measure peak expiratory flow twice a day, before and after bronchodilator
  - Communication Ordered 06/23/04 9:44:00, Smoking assessment, if not already done
  - <sup>Zynx</sup> Communication Ordered 06/23/04 9:44:00, Smoking cessation counseling, if appropriate
  - <sup>Zynx</sup> Teaching Ordered 06/23/04 9:44:00, PRINT a written asthma self-management plan
- Contingency Orders
  - Call MD Ordered 06/23/04 9:44:00, Notify provider if diastolic blood pressure > 100
  - Call MD Ordered 06/23/04 9:44:00, Notify provider if heart rate outside >120 beats per minute, or < 60 beats per minute
  - Call MD Ordered 06/23/04 9:44:00, Notify provider if oxygen saturation <92%

View: Orders for Signature, Plans, Other, Asthma - Adult Admit Med/Surg (Initiated), Standard pm's (Initiated), Labor and Delivery (Initiated), Orders Profile, Registration, Allergies, Vital Signs, Activity, Nursing Orders, Diets, Laboratory, Special/Treatments, Medications, Continuous Infusions, Consults, Diagnostic Tests, Order Sets, Related Results, Details



# Decision Support in CPOE (1): Enterprise-wide Order Sets

Careset - Uncomplicated-Community Acquired Pneumonia-CPOE

Component	Order Detail
<b>Nursing:</b>	
<input checked="" type="checkbox"/>	T;N, Intake and output Q8hrs while on IV's, Q8H
<input checked="" type="checkbox"/> Weigh	T;N, Daily wieghts while on IV's, qAM
<input checked="" type="checkbox"/>	T;N, Encourage fluids 660-800cc/shift while awake
<input checked="" type="checkbox"/> Bathroom Privileges (BRP)	T;N, BRP and advance per clinical pathway
<b>Laboratory:</b>	
<input checked="" type="checkbox"/> Carbon Dioxide (CO2)	Routine, T;N, Lab Collect, Venous
<input type="checkbox"/> Blood Culture	Routine, T;N, Lab Collect, Q5MIN 2 TIME/DOSE
<input type="checkbox"/> Respiratory Culture & Smear (Sputum Culture)	Routine, T;N, Nurse Collect, Sputum, Sputum, Do not delay antibiotic if unable to obtain
If from Nursing home:	
<input type="checkbox"/> Urinalysis Screen (Urine Screen)	Routine, T;N, Nurse Collect
<b>Pulmonary Consults:</b>	
<input checked="" type="checkbox"/> Oxygen Request	ASAP, T;N, Oxygen request _____ LPM/NC titrate to keep Sat>92%
<b>Consults:</b>	
<input type="checkbox"/> Nutrition Consult/Instruction (Dietitian Consult)	T;N
<input type="checkbox"/> Social Services Consult	Today, T;N
<input type="checkbox"/> Physical Therapy*	Today, T;N, Physical Therapy Consult
<b>Medications:</b>	

Order Details: \_\_\_\_\_ Detail Values: \_\_\_\_\_

Order Comments: \_\_\_\_\_

Details

# Decision Support in CPOE (2): Discern Alerts

**CERT, WOMAN**      Age: 39 Years      Sex: Female      Location: 4B MED-LMC; 446; 01  
 DOB: 4/16/1964      MRN: LMC-00242549      Fin Number: LMC-01611188  
 Inpatient [Admit 4/30/2003 09:25 Discharge<No - Discharge date>]      \*\*\* Allergies Not Recorded \*\*\*

**Discern**

## CT Order Alert

Remember to order **DX Abdomen AP (KUB)** when placing an order for a **CT Abd Pel WO LTD** exam.

If you would like to order the DX Abdomen AP at this time, select the order from the list below.

Add Order for:

- DX Abdominal Series**

<input type="checkbox"/>	CT Neck Soft Tissue W	Completed	Routine, 06/17/03 08:15:00, Foreign body in throat, Via: Ambulatory
<input type="checkbox"/>	CT Neck Soft Tissue W	Canceled (Exam F	Routine, 06/17/03 08:15:00, Foreign body in throat, Via: Ambulatory
<input type="checkbox"/>	DX C Spine 2 View	Completed	Routine, 06/17/03 08:15:00, Dislocation, Via: Ambulatory
<input type="checkbox"/>	MR C Spine WO Contr	Ordered (Exam Co	Routine, 06/17/03 08:15:00, Discitis, Via: Ambulatory
	Order Sets		
	Non-Categorized		

...d L, Sipes II, Donald R, General, I

# Decision Support in CPOE (3): Drug Alerts

**Name:** TEST, ONLY      **DOB:** 1/1/1901      **Age:** 100 Years      **Sex:** Male      **Chart Number:** <No Data>

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All     
 Allergy     
 Drug     
 Food     
 Dup. Therapy     
 Reference

My List   Search   Order Catalog

Search: amox

Generic  
 Product  
 Category

Name
amoxapine
amoxicillin
amoxicillin-clavulanate
amoxicillin/clarithromycin/lansoprazole
Amoxil 125 mg/5 mL Suspension (amoxicillin)
Amoxil 200 mg/5mL Suspension (amoxicillin)
Amoxil 250 mg/5mL Suspension (amoxicillin)
Amoxil 400 mg/5mL Suspension (amoxicillin)
Amoxil 50mg/mL Liquid (amoxicillin)
Amoxil Capsule (amoxicillin)
Amoxil Chewable Tab (amoxicillin)
Amoxil Pediatric Drops (amoxicillin)
Amoxil Tablet (amoxicillin)

**Rx: Amoxil Capsule**

Sig: 250 MG PO tid      <Duration>

Dispense: 30    Refill: 0    Rx date: 12/03/2001    Stop date: <None>  
Samples: <0>    Add'l refill: 0    Refill date: 12/03/2001

PRN: <None>

Instructions: <None>

Indications: <None>

Comment: <None>

Prescriber: Manne, Sridevi      Leaflet: No leaflet       DAW  
Address: Aurora Health Center 8348 Washington Avenue Racine, (7358)WI-2 53406       Print DEA  
Routing: Print Rx      Other       Historical

Action	Name	SIG	C.	L.	I.	Provider	Date
Rx Order	Amoxil Caps...	250 MG PO tid #30 0 Refills				Manne, Sridevi	12/3/01 9:20:15 AM

Drug-Drug interaction checking  
Drug-Allergy checking  
Dose-Range checking

Med Profile   Allergies

Display: Current Allergies (only)      Perform Reverse Allergy Check

D/A	Substance	Category	Reactions	Severity	Type	C...	Est. Onset	Reaction S...	Updated
✓	Advil	Drug	RASH		Allerg...			Active	10/2/01
✓	amoxicillin	Drug			Allerg...			Active	10/1/01
✓	amoxicillin-clavulanate	Drug	rash	Mild	Allerg...	U	About 7/18...	Active	10/1/01
	bandaid							Active	11/20/0

Typical Orders/Prescriptions

Amoxil Capsule : 250 mg Cap, 30, PO, tid, 0

Amoxil Capsule : 500 mg Cap, 30, PO, tid, 0

# Links to Evidence on internet from patient chart

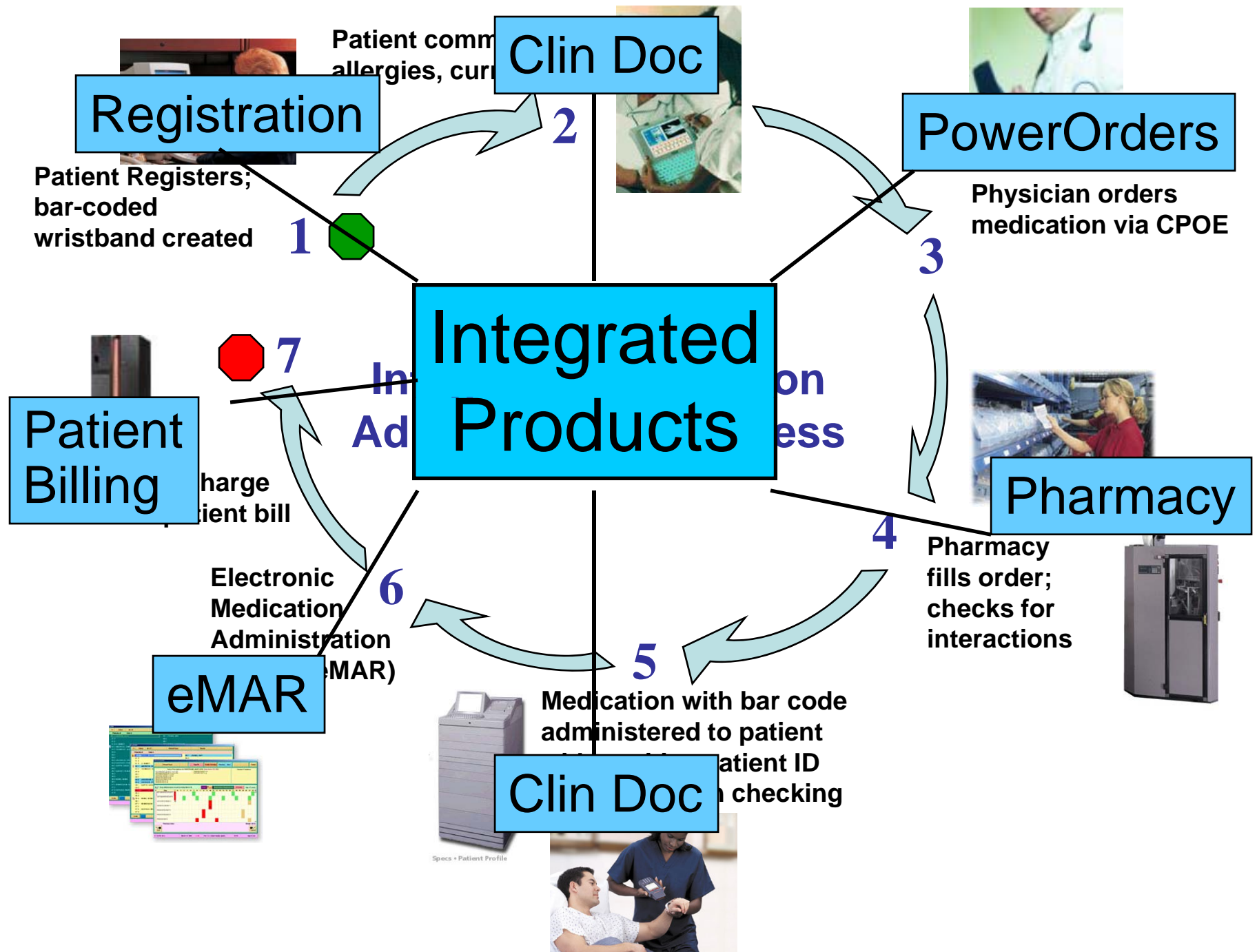
The screenshot shows a window titled "Cerner-Blue - Citrix ICA Client" with a sub-window "Careset - Pneumonia - CAP, Adult: Admission to Med/Surg". The main area is a list of components for treatment, including:

- Component (ceftriaxone IV and clarithromycin oral) OR (azithromycin IV, if unable to take oral med... OR (levofloxacin, if allergy to penicillin or ceftriaxone presents as hives or respirato... distress/anaphylaxis)
- Antibacterial Agents: Cephalosporins, 3rd-Generation
  - ceftriaxone
- Antibacterial Agents: Fluoroquinolones
  - levofloxacin
  - levofloxacin 750 mg, PO, as needed, may give IV if patient is unable to take oral meds.
- Antibacterial Agents: Macrolides
  - azithromycin 500 mg, Tablet, PO, ONCE, Step 1 of 2
  - azithromycin 250 mg, Tablet, PO, Q24H, Step 2 of 2
  - azithromycin 500 mg, powder inj, IV, QD
  - clarithromycin 500 mg, Tablet, PO, Q12H
- Immunizations: Influenza
- Immunizations: Pneumococcal
  - Administer pneumococcal vaccine once if not received within past 5 years
- Ancillary Medications
  - acetaminophen 650 mg, Tablet, PO, Q4H, as needed for pain or fever
- Laboratory
  - Hematology
    - CBC (CBCA) Today/Routine, T,N
  - Microbiology
    - At least two sets of blood cultures should be collected prior to initiation of antimicrobial therapy
    - Do not delay administration of antibiotics to obtain sputum sample
    - Blood Culture Timed, T,N, Lab Collect, Draw From 2 Different Sites, Q15MIN 2 TIME or DOSE

A red oval with the text "Links to evidence a click away" is positioned over the list, with red arrows pointing to the "Antibacterial Agents" categories and specific drug entries like ceftriaxone, levofloxacin, and azithromycin.

At the bottom of the window, there are tabs for "Details" and "Order Comments", and fields for "Order details" and "Detail values". The "OK" and "Cancel" buttons are visible at the bottom right.

The taskbar at the bottom shows several open applications: CPR, PowerChart Organizer for..., Power, CPOEMike G..., and various Microsoft Office and Citrix applications. The system clock shows 14:08 on 2:08 PM.



# Key Successes

- Decision Support – Evidence-Based Medicine (easy to do the right thing)
- Inbox, Result Review, Electronic signature
- Timeliness of result availability
- Completeness of record - longitudinal, cross site
- Medication Profile
- Remote access to data (75% of physicians have access from home or office)
- Access to data without chart pull - for returning phone calls or prescription refills
- Ease of concurrent reminders and retrospective reporting for drug recalls or care management data retrieval

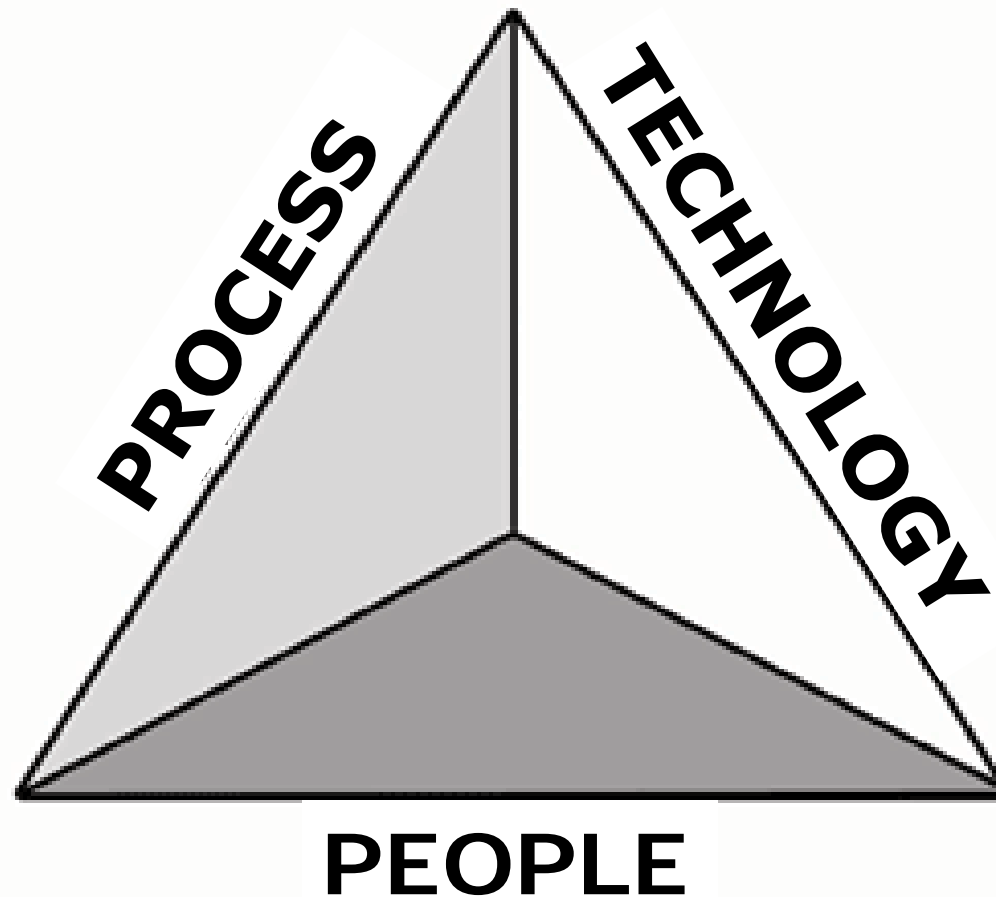
# Key Challenges

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- Care Team Workflow Redesign and how computer is used at POC (mobile computing devices)
- Training and Support
- Availability of System - aka, NO DOWNTIME (back-up data access strategy)
- Response Time
  - Response Time
  - Response Time
- Support ... maintaining the gains ...

*The “Triple Constraint” to Manage  
in IT Implementations with  
Clinicians*

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# Electronic Health Record Adoption

EMR Adoption Model <sup>SM</sup>			
Stage	Cumulative Capabilities	2007 Final	Q 2 2008
Stage 7	Medical record fully electronic; HCO able to contribute CCD as byproduct of EMR; Data warehousing in use	0.0%	0.0%
Stage 6	Physician documentation (structured templates), full CDSS (variance & compliance), full R-PACS	0.8%	0.9%
Stage 5	Closed loop medication administration	1.4%	1.0%
Stage 4	CPOE, CDSS (clinical protocols)	2.2%	1.8%
Stage 3	Clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology	25.1%	32.0%
Stage 2	Clinical Data Repository, Controlled Medical Vocabulary, Clinical Decision Support, may have Document Imaging	37.2%	33.9%
Stage 1	Ancillaries – Lab, Rad, Pharmacy – All Installed	14.0%	12.6%
Stage 0	All Three Ancillaries Not Installed	19.3%	17.7%

Data from HIMSS Analytics<sup>TM</sup> Database N = 5073/5071 ©2008 HIMSS Analytics

# *Ubiquitous Computerization in Healthcare?*

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*“That it will ever come into general use, notwithstanding its value, is extremely doubtful because its beneficial application requires much time and gives a good bit of trouble, both to the patient and to the practitioner because its hue and character are foreign and opposed to all our habits and associations.”*



**- The London Times, 1834**  
*Commenting on the “stethoscope”*



# 2008 年台灣國際醫學資訊聯合研討會

Joint Conference on Medical Informatics in Taiwan

MIST 2008 · NIST 2008 · MISAT 2008 · The 7th Asia-Pacific HL7 Conference



Thank You,  
Judy

*[judy.murphy@aurora.org](mailto:judy.murphy@aurora.org)*