

Leveraging Technology to Improve Performance

Presented To

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M Northwestern Memorial
Hospital

Agenda

- Who we are
- State of Electronic Health Record (EHR) at Northwestern Memorial Hospital
- Examples of Leveraging Technology to Improve Performance
- Question and Answer

Northwestern Memorial Hospital Chicago, Illinois



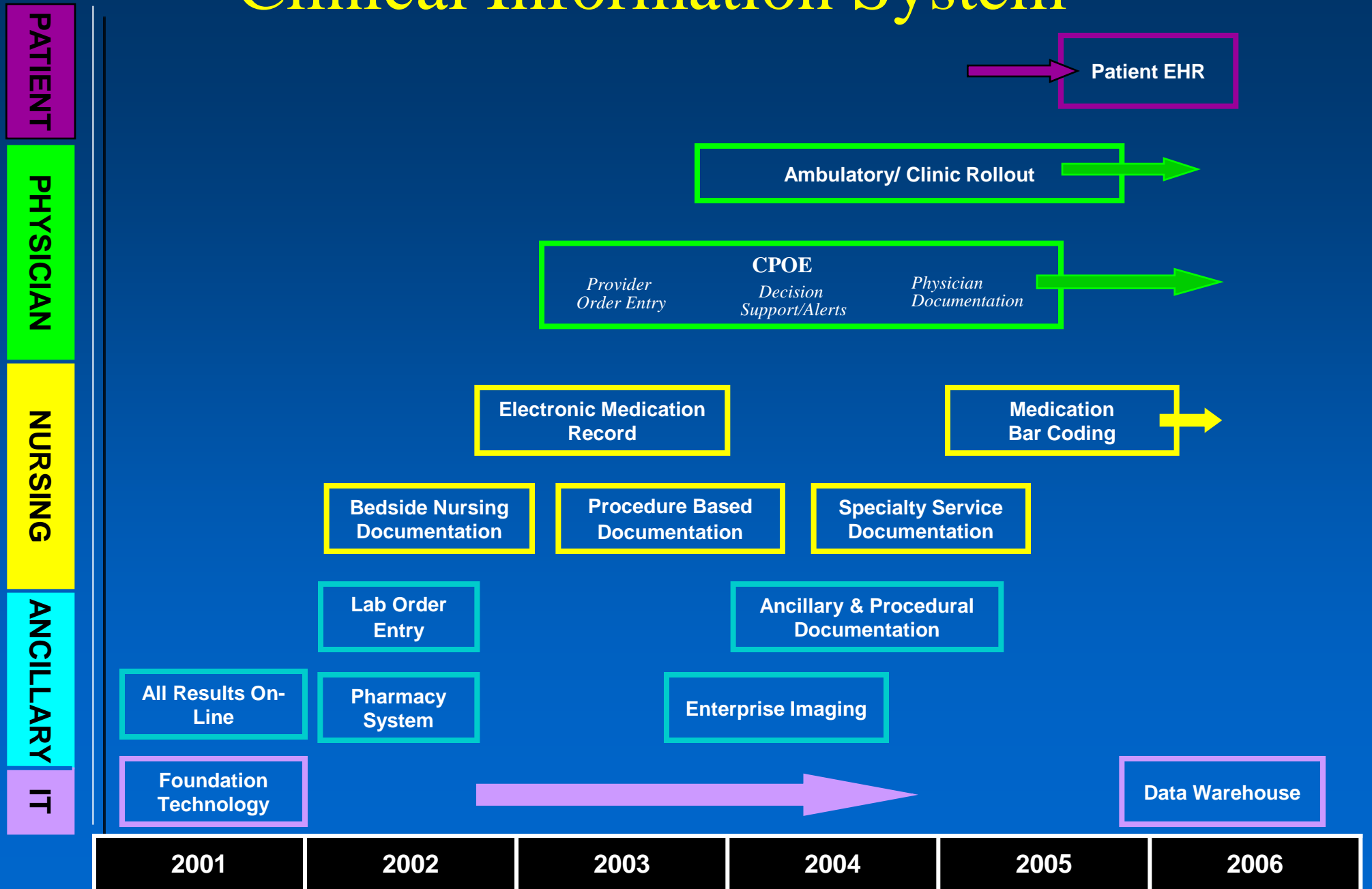
- 750-Bed Tertiary Care Academic Medical Center
- 42,202 Admissions
- 9,841 Births
- 70,058 Emergency Department Visits
- 403,299 Outpatient Registrations
- 6,464 Employees
- 1,424 Affiliated Physicians

Northwestern Memorial Hospital Chicago, Illinois



- New Women's Hospital Planned to Open in Fall, 2007
- Strategic Goals
 - Best Patient Experience
 - Best People
 - Exceptional Financial Performance

Clinical Information System

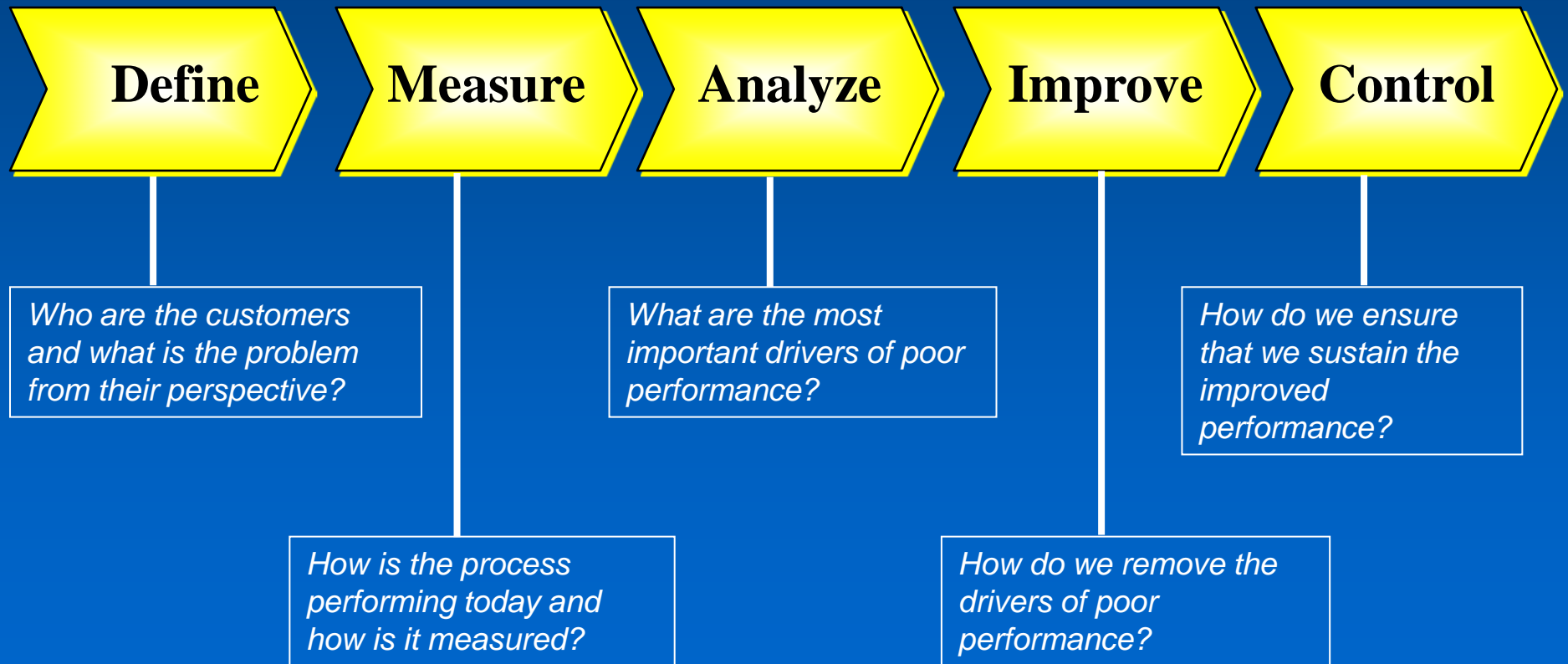


On Any Given Day...

- Approximately **1,500** concurrent active users on-line
- Clinicians access patient records approximately **62,000** times
- Physicians document over **1,600** clinical notes on-line
- Clinicians initiate **140,000** order transactions
- There are over **13,000** medication events processed on-line

Process Improvement Methodology (DMAIC)

DMAIC provides an easily managed systematic process to deliver measurable results
55% of completed projects In FY05 use IT as part of the improvement and control plans.



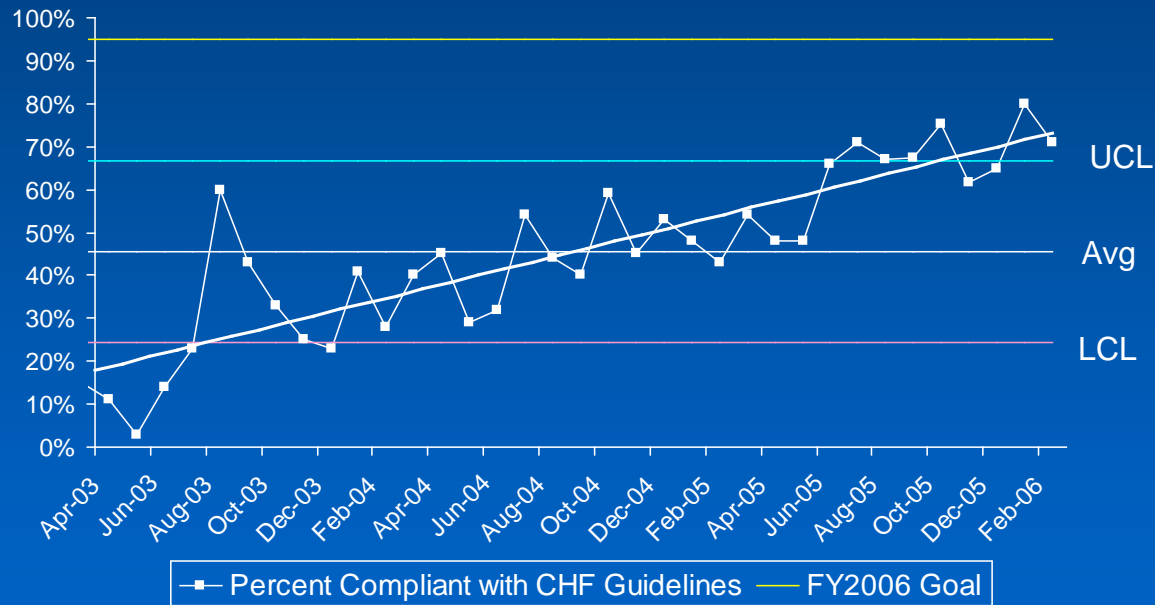
Leveraging Technology to Improve Performance

- Congestive Heart Failure (CHF)
- Pneumonia
- Pressure Ulcer Assessment & Prevention
- Medication Safety

Congestive Heart Failure: Aggregate Measure

Need rules and alerts to drive standardized care.

Compliance with CHF Guidelines



Compliance with CHF Guidelines:

- LVF assessment performed
- Smoking counseling for patients with smoking history
- Discharge instructions: Medications, Diet, Activity, Follow-up, Weight Management, and Symptom Management
- ACE Inhibitor prescribed at discharge

Congestive Heart Failure: Rules and Alerts

IT interventions included identifying CHF patients on admission and creating logic to drive performance.

If CHF is indicated in the History and Physical Problem List or BNP level is ≥ 300

ACE-I Prescribed at Discharge

Then alert the prescriber if an ACE-I or ARB has not been prescribed at discharge.

LVF Assessment Performed

Then alert the prescriber if LVF Assessment has not been completed in the last 12 months.

Congestive Heart Failure Project

Used same logic to trigger patient education. An alert is generated to educate patient and provide written instructions on heart failure.

General Disease

Person Taught

Patient
 Other: WIFE, ...

Education Topic	Barriers	Method of Teaching	Response	Follow-Up
Disease process/ recovery	Cognitive limitations	Heart Failure handouts	<MultiAlpha>	Reinforce teaching
<Alpha>	<MultiAlpha>	<MultiAlpha>	<MultiAlpha>	<MultiAlpha>
<Alpha>	<MultiAlpha>	<MultiAlpha>	<MultiAlpha>	<MultiAlpha>

General MPET Form

02/16/06 12:51
PersonTaught: Patient, Other: wife
02/16/06 12:51
Education Topic: swallow assessment
Barriers: Cognitive limitations, Other: none for wife
Teaching Method: Verbal
Response: States essential concepts
Follow-Up: Reinforce teaching

Cardiac MPET Form

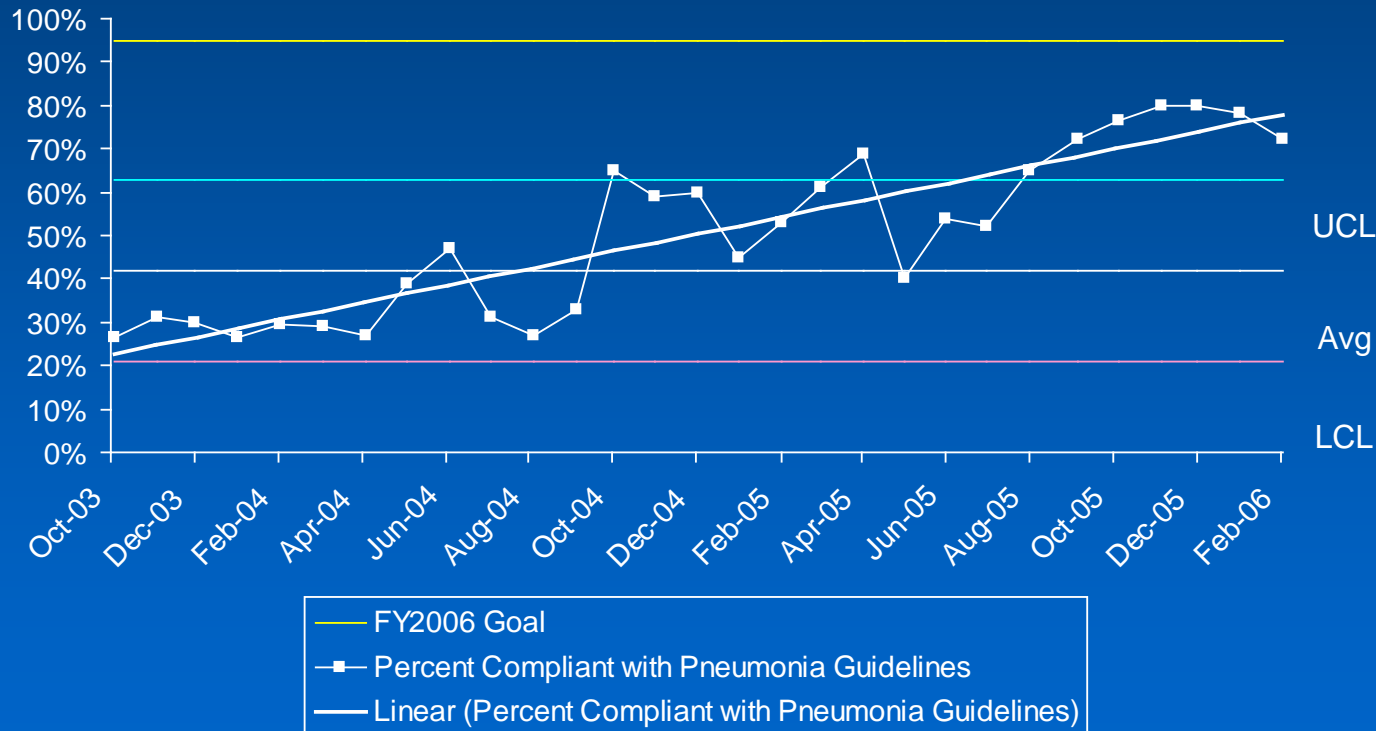
02/16/06 08:16
PersonTaught: Patient, Other: WIFE, CAREGIVER
02/16/06 08:16
Education Topic: Disease process/ recovery
Barriers: Cognitive limitations
Teaching Method: Heart Failure handouts
Follow-Up: Reinforce teaching

Medicine MPET Form

Pneumonia: Aggregate Measure

Gains achieved through nursing evaluation and technology prompts.

Compliance with Pneumonia Guidelines



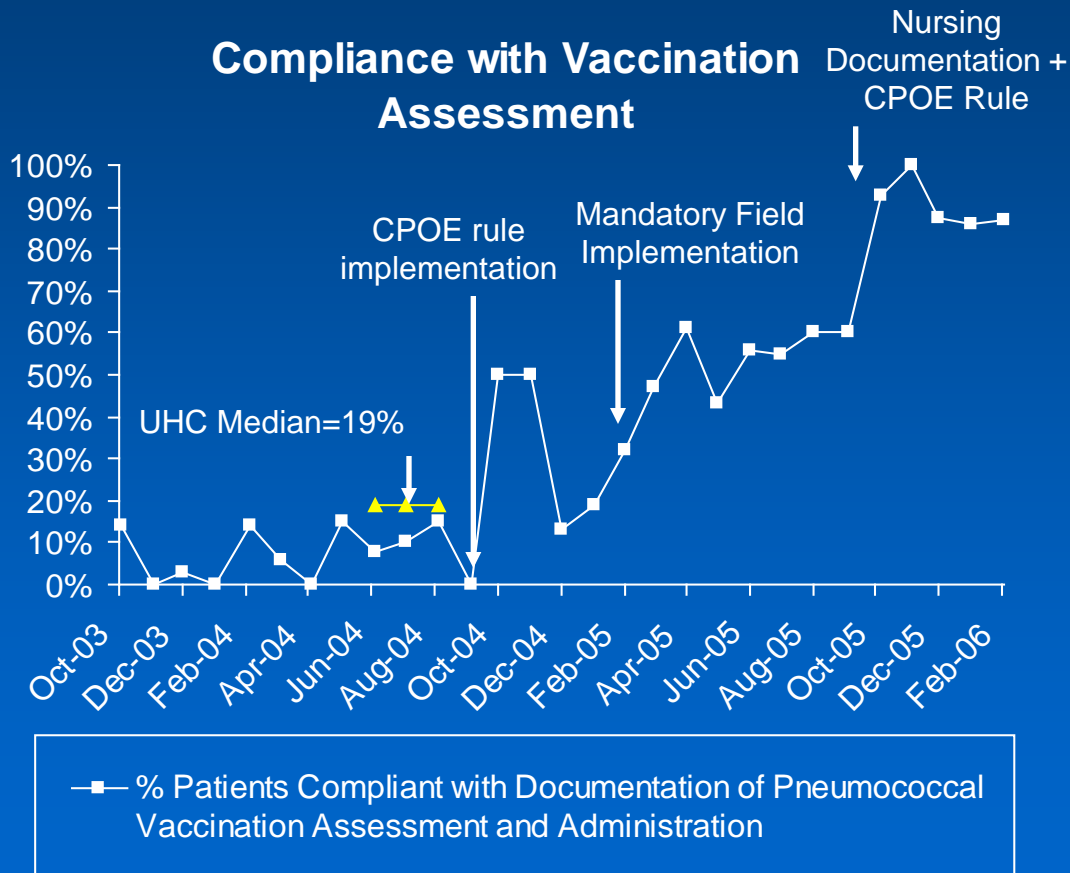
Compliance with Pneumonia Guidelines:

- Antibiotics received within 4 hours of admission.
- Arterial oxygenation assessed by ABG or pulse oximetry within 24 hours prior to or after hospital arrival
- Eligible patients 65 and older screened for pneumococcal vaccine status and vaccinated prior to discharge, if indicated
- Smoking counseling for patients with smoking history

Pneumonia: Primary Prevention

Documentation of Pneumococcal Vaccination

Prescribers receive alert to order vaccination if patient age 65 and older. Nurses screen for patients that have already received vaccination.



Numerator: Patients with pneumonia, age 65 and older, who were screened for pneumococcal vaccine status and were vaccinated prior to discharge, if indicated.

Denominator: All pneumonia patients age 65 and older

Included Population: A principal diagnosis of pneumonia or a principal diagnosis of septicemia or respiratory failure and a secondary diagnosis of pneumonia, patients who were age 65 years or older

Excluded Population:

- Patients transferred from another acute care hospital
- Patients with no working diagnosis of pneumonia at admission
- Patients who received comfort measures only
- Patients who expired, left AMA, discharged to hospice
- Patients < 65 years of age

Pneumonia: Primary Prevention

Question on patient profile required for patients 65 years and older.
Prescriber is sent alert for order when applicable.

The screenshot shows a patient profile form for 'CHEMO, PATIENT4'. The form includes various fields for patient information and clinical data. Two red circles highlight specific questions:

- Circle 1:** "Have you received the pneumonia vaccination in the last 5 years?" with radio buttons for "No" and "Yes".
- Circle 2:** "Have you received the Flu vaccination this Flu season? (November to March)" with radio buttons for "No", "Yes", and "N/A".

Other visible fields and sections include:

- Header:** "Performed on: 11/14/2005", "By: Sacks, Steve", "40 Weight > 400# (181.4 Kg), Width is 'Bariatric'".
- Left Sidebar:** "Current Health", "Social History", "Communication", "Self Care and Ac", "Nutrition", "Role/Relationship", "Spiritual", "Discharge Plan".
- Dependency Level:** "Patient moves/transfers independently", "Patient requires assistance of 1 to move", "Patient requires 2 or more to assist".
- Width:** "Standard", "Bariatric".
- Is Patient Pregnant:** "Not Applicable", "LMP", "EDC".
- Health Status:** "None", "Nasal CPAP".
- Information Obtained From:** "Patient", "Caregiver".

Pneumococcal Vaccine Alert to Prescriber

Discern

Pneumovax Reminder

Based on age criteria, this patient appears eligible for the pneumococcal vaccination and should receive one before discharge if there are no contraindications.

There are three options available for treatment of this patient.

1. Place and sign the pneumococcal vaccination order.
2. Choose to have the system remind you again in 48 hours
3. Document a contraindication to Pneumovax

Potential pneumococcal vaccination contraindications:

- a. Previously immunized after age 65
- b. Previously immunized before age 65, but
- c. Active Infection
- d. Recent intensive chemotherapy and/or radiation
- e. Severe immunosuppression

Add Order for:

- pneumococcal 7-valent vaccine
- Evaluate Pneumovax Necessity at a Later Date
- Document Pneumovax Contraindication

Reference

Pneumovax Contraindication Form - OVER65, TEST1

Performed on: 12/16/2004 1622 By: Christensen, Ker

Pneumovax Contraindication

Pneumovax Contraindication

- Previous vaccination within the last 5 years
- Patient refused
- Patient allergic
- Febrile illness
- Compromised Cardiac or Pulmonary Condition
- Currently inappropriate - Remind me later
- Other reversible condition
- Other irreversible condition

Pneumovax Contraindication Detail

CHF & Pneumonia: Compliance with Documentation of Smoking Cessation Counseling

Question on patient profile assesses smoking history and orders smoking cessation counseling when applicable.

The screenshot displays a 'Patient Profile - POWERCHART, POWEREVEN' window. The 'Social History' section is active, showing a form with several sub-sections. A red oval highlights the 'Tobacco Use' section, which includes the following questions and options:

- Tobacco Use:**
 - Never
 - Yes, within the past 12 months
 - Yes, but more than 12 months ago
- Would You Want Treatment to Stop Tobacco Use? If Yes, a Wellness Center Consult will be ordered automatically.**
 - Yes
 - No
- Would You Want a Tobacco Substitute While in the Hospital?**
 - Yes
 - No

Other sections visible in the form include:

- Alcohol Use:** None, Current, Past
- Drinks Per Week:** <1, 1-3, 4-10, >10, N/A
- Employment Status:** Employed, Not employed, Retired
- Highest Level of Education:** Grade 1-12, Some college, College, Graduate school
- Recreational Drug Use:** None, Current, Past
- Please Describe Current Recreational Drug Use:** (Text input field)
- Social History Comments:** (Text input field)

The form also includes a navigation pane on the left with options like 'Current Health', 'Social History', 'Communication', 'Self Care and Ac', 'Nutrition', 'Role/Relationshi', 'Spiritual', and 'Discharge Plann'. The top of the window shows 'Performed on: 06/12/2006' and 'By: Stemmerman, Jill'. The bottom of the window shows a Windows taskbar with various open applications and the system clock at 5:23 PM on 12 June 2006.

Pressure Ulcer Assessment & Prevention

On-line Braden Scale risk assessment implemented June 2005.
Electronic triggers for prevention & intervention protocols.

The screenshot shows a web-based application window titled "Braden Scale - POWERCHART, POWEREVEN". The interface includes a navigation menu on the left with items like "Sensory, Activity", "Friction and Shear", "Nutrition Screening", and "Moisture Screening". The main content area is titled "Braden Scale Scoring and Interventions" and contains the following sections:

- Activity, Sensory Perception, and Mobility**: A sub-section header.
- Degree of Physical Activity**: A form with radio buttons for "Bedfast = 1", "Chairfast = 2", "Walks Occasionally = 3", and "Walks Frequently = 4".
- Ability to respond meaningfully to pressure related discomfort**: A sub-section header.
- Sensory Perception**: A form with radio buttons for "Completely Limited = 1", "Very Limited = 2", "Slightly Limited = 3", and "No Impairment = 4".
- Ability to change and control body position**: A sub-section header.
- Mobility**: A form with radio buttons for "Completely Immobile = 1", "Very Limited = 2", "Slightly Limited = 3", and "No Limitation = 4".
- Interventions to Consider: Score of 2 or less on any Subscale**: A section listing interventions: "Reposition patient every 2 hours", "Relieve heel pressure", and "Avoid positioning on trochanter".
- Reference turning schedule**: A text box with the instruction "Right click here and select reference text to view turning schedule".
- Images**: Two images illustrating interventions: a photograph of a heel being relieved of pressure and a diagram of a patient in bed with a trochanter being avoided.

The bottom of the window shows a Windows taskbar with various open applications and the system clock at 5:36 PM.

Medication Safety

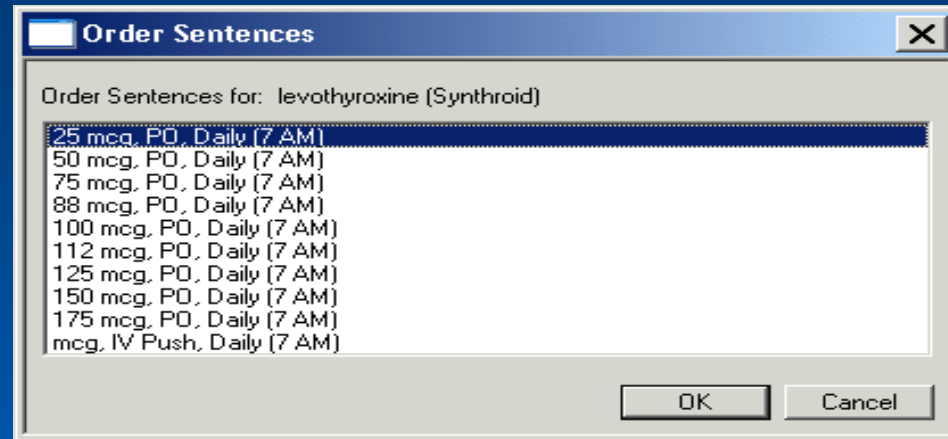
IT enabled improvements

- Order Sentences
- Prescriber alerts
- Efficiency
- Easy access to reference information

Order Sentences

Developed order sentences based on literature and review of our own practice.

Order sentences created
for medications



Physician to RN
Communications

<input checked="" type="checkbox"/>	<input type="checkbox"/>	Physician to RN Communication	Ordered	06/15/06 8:23:00 please hold PO meds, thanks
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Physician to RN Communication	Ordered	06/07/06 11:03:00 can give tylenol x 1 now that pt has spiked
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Physician to RN Communication	Ordered	06/03/06 11:56:00 please remove foley
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Physician to RN Communication	Ordered	12 hr chart audit done with Anita RN/ Cathy RN, 06/01/06 20:06:00
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Physician to RN Communication	Ordered	06/01/06 11:04:00 pls have pt sit up in chair, prior to sitting up have pt take several deep breaths
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Physician to RN Communication	Ordered	05/22/06 18:00:00 okay to hold multivitamin, calcium and senna while pt nauseas and not tolerating PO (5/22/06)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Physician to RN Communication	Ordered	05/22/06 17:58:00
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Physician to RN Communication (MD to Nurse)	Ordered	06/11/06 10:55:00 okay to massage pt

New order sentence

<input type="checkbox"/>	<input type="checkbox"/>	Medications		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	.Hold Medication x 1 Dose (Digoxin)	Ordered	Medication to Hold: Digoxin, When to Hold: Hold 6/15, Once, Start: 06/15/06 11:00:00

Safe Warfarin Prescribing

Built order set then forced order entry through the order set with a rule.

The screenshot displays a medical software interface with two main components: a 'Careset - Warfarin (Coumadin) Order Set' window and a 'Discern' alert dialog.

Careset - Warfarin (Coumadin) Order Set

Component	Order Details
Orders for DAILY dose of Warfarin (Coumadin) at Bedtime	
Please verify first dose start date & time	
<input type="checkbox"/> warfarin (Coumadin)	1 mg, PO, Daily (HS)
<input type="checkbox"/> warfarin (Coumadin)	2 mg, PO, Daily (HS)
<input type="checkbox"/> warfarin (Coumadin)	2.5 mg, PO, Daily (HS)
<input type="checkbox"/> warfarin (Coumadin)	3 mg, PO, Daily (HS)
<input type="checkbox"/> warfarin (Coumadin)	4 mg, PO, Daily (HS)
<input type="checkbox"/> warfarin (Coumadin)	5 mg, PO, Daily (HS)
<input type="checkbox"/> warfarin (Coumadin)	6 mg, PO, Daily (HS)
<input type="checkbox"/> warfarin (Coumadin)	7.5 mg, PO, Daily (HS)
<input type="checkbox"/> warfarin (Coumadin)	10 mg, PO, Daily (HS)
<input type="checkbox"/> warfarin (Coumadin)	mg, PO, Daily (HS)
Orders for CUSTOMIZED Warfarin (Coumadin) doses at Bedtime MAY NEED TO CHOOSE MORE THAN ONE ORDER	
Please verify first dose start date & time FOR EACH ORDER	
For Monday, Weds, Friday dose at Bedtime:	
<input type="checkbox"/> warfarin (Coumadin)	mg, PO, Every Monday (HS)
For Tuesday, Thursday, Saturday, Sunday dose at Bedtime:	
<input type="checkbox"/> warfarin (Coumadin)	mg, PO, Every Tuesday (HS)
For Monday, Weds, Friday, Sat, Sunday dose at Bedtime:	
<input type="checkbox"/> warfarin (Coumadin)	mg, PO, Every Monday (HS)
For Tuesday, Thursday dose at Bedtime:	
<input type="checkbox"/> warfarin (Coumadin)	mg, PO, Every Tuesday (HS)
Every other day dose, FIRST DOSE TONIGHT:	
<input type="checkbox"/> warfarin (Coumadin)	mg, PO, Every Other Day (HS)
Every other day dose, FIRST DOSE TOMORROW NIGHT:	
<input type="checkbox"/> warfarin (Coumadin)	mg, PO, Every Other Day (HS), Start: T+1, 2200
Orders for a different dose each day of the week:	
<input type="checkbox"/> warfarin (Coumadin)	mg, PO, Every Monday (HS)
<input type="checkbox"/> warfarin (Coumadin)	mg, PO, Every Tuesday (HS)
<input type="checkbox"/> warfarin (Coumadin)	mg, PO, Every Wednesday (HS)

Discern

ORDER ALERT

To ensure safe order entry, please use the coumadin/warfarin order set.

Alert Action

CANCEL

Add Order for:

Warfarin (Coumadin) Order Set

OK

Medication Safety: Lessons to Share

- New errors result from the use of complex technology in a very complex work environment
- Clinicians need to use critical thinking skills when caring for patients
- Anticipate the unintended and actively look for problems
- End users must be encouraged to report problems found in EHR

Summary

- Using the EHR in conjunction with robust process improvement provides an innovative approach to quality improvement
- Processes to drive standardized care and patient safety supported through forcing functions and rules and alerts
- Technology may introduce new risk – look at process thoroughly