

# Customizations of the EHR that Ensure Quality and Safety

Barry Aaronson MD FACP SFHM

Hospitalist and Associate Medical Director for Clinical Informatics  
Virginia Mason Medical Center

Clinical Associate Professor  
of Medicine and of Biomedical Health Informatics  
University of Washington

BHI Colloquium Apr 2011

# The Impact of eHealth on the Quality and Safety of Health Care: A Systematic Overview

Aditya D. Black<sup>1</sup>, Josep Car<sup>2</sup>, Claudia Paglieri<sup>3</sup>, Charisette Arundon<sup>4</sup>, Kathleen Crosswell<sup>5</sup>, Tomislav Boban<sup>6</sup>, Brian McKinstry<sup>7</sup>, Rob Procter<sup>8</sup>, Assem Hajeed<sup>9</sup>, Aziz Sheikh<sup>10</sup>

<sup>1</sup>Health Unit, Department of Primary Care and Public Health, Imperial College London, London, United Kingdom; <sup>2</sup>Health Services Group, Centre for Population Health Sciences, The University of Edinburgh, Edinburgh, United Kingdom; <sup>3</sup>Research Centre for a Social Science, University of Warwick, Coventry, United Kingdom; <sup>4</sup>Department of Primary Care and Public Health, Imperial College London, London, United Kingdom

## Abstract

**Background:** There is considerable international interest in exploring the potential of digital solutions to enhance the quality and safety of health care. Implementations of transformative health technologies are underway globally, often at very considerable cost. In order to assess the impact of eHealth solutions on the quality and safety of health care, and to inform policy decisions on eHealth deployments, we undertook a systematic review of systematic reviews assessing the effectiveness and consequences of various eHealth technologies on the quality and safety of care.

**Method and findings:** We developed novel search strategies, conceptual maps of health care quality, safety, and eHealth interventions, and then systematically identified, screened, and synthesised the systematic review literature. Major biomedical databases were searched to identify systematic reviews published between 1997 and 2010. Related theoretical, methodological, and technical material was also reviewed. We identified 23 systematic reviews that focused on assessing the impact of eHealth interventions on the quality and/or safety of health care and 20 supplementary systematic reviews providing relevant supportive information. This systematic review literature was found to be generally of substandard quality with regards to methodologies, reporting, and utility. We thematically categorised eHealth technologies into three main areas: (1) storing, managing, and transmission of data; (2) clinical decision support; and (3) facilitating care from a distance. We found that despite support from policymakers, there was relatively little empirical evidence to substantiate many of the claims made in relation to these technologies. Whether the success of these relatively few solutions identified to improve quality and safety would continue if these were deployed beyond the contexts in which they were originally developed, has yet to be established. Importantly, best practice guidelines to effective development and deployment strategies are lacking.

# The Benefits Of Health Information Technology: A Review Of The Recent Literature Shows Predominantly Positive Results

**Background:** Health information technology (HIT) is being implemented in many countries around the world. The purpose of this review was to assess the impact of HIT on patient safety, quality of care, and cost. We searched the literature for systematic reviews published between 2000 and 2010. We identified 11 systematic reviews that focused on assessing the impact of HIT on patient safety, quality of care, and cost. The majority of these reviews found positive results, with HIT being associated with improved patient safety, quality of care, and cost. However, the quality of the evidence was generally low, and there were some limitations to the data. Further research is needed to confirm the benefits of HIT and to address the challenges of implementation.

**Conclusion:** An unprecedented global effort is under way to boost the adoption of electronic health records and other innovations in health care delivery. We reviewed the recent literature on health information technology to determine its effect on outcomes, including quality, efficiency, and provider satisfaction. We found that 71 percent of the recent studies on health information technology showed conclusions that were positive overall. We also found that the benefits of the technology are beginning to emerge in smaller practices and organizations, as well as in large organizations that were early adopters. However, dissemination with electronic health records among other providers remains a problem and a barrier to achieving the potential of health information technology. These results highlight the need for studies that document the challenging aspects of implementing health information technology more specifically and how these challenges might be addressed.

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Case report

## Early cost and safety benefits of an inpatient electronic health record

Jonathan A Zabek,<sup>1</sup> Jared W Wickus,<sup>2</sup> Michele A Mathison<sup>3</sup>

**Additional material is published online only. To view this please visit the journal online (http://dx.doi.org/10.1136/bmj.e1072).**  
 Department of Internal Medicine, Southern California Health System, La Jolla, California, USA  
 Department of Internal Medicine, Southern California Health System, La Jolla, California, USA  
 Department of Global Research, Southern California Medical Foundation, La Jolla, California, USA  
**Correspondence to:** Jonathan A Zabek, MSc, MD, MPH, Southern California Health System, 1000 South Avenida, La Jolla, CA 92037, USA; jzabek@scphd.org  
 Received 11 Jan 2010  
 Accepted 10 December 2010

**ABSTRACT**  
 There is controversy over the impact of electronic health record (EHR) systems on cost of care and safety. The authors studied the effects of an inpatient EHR system with computerized provider order entry on selected measures of cost of care and safety. Laboratory tests per week per hospitalization decreased from 11.9 to 11.4 (3%, p<0.007). Radiology examinations per hospitalization decreased from 2.86 to 1.91 (33%, p<0.000). Monthly prescription costs declined from \$74506 to \$70500 (5.4%, p<0.001). Number of copy paper orders per month decreased from 1688 to 1224 (28.1%, p<0.001). Medication errors per 1000 hospital days decreased from 17.9 to 15.4 (13.4%, p<0.000), while new orders per 1000 hospital days increased from 8.0 to 12.5 (56.2%, p<0.001), and the percentage of medication errors that were medication errors decreased from 66.2% to 55.2% (p<0.001). In this manuscript, we demonstrate that the implementation of an inpatient EHR with computerized provider order entry (CPOE) resulted in rapid improvement in measures of cost of care and safety.

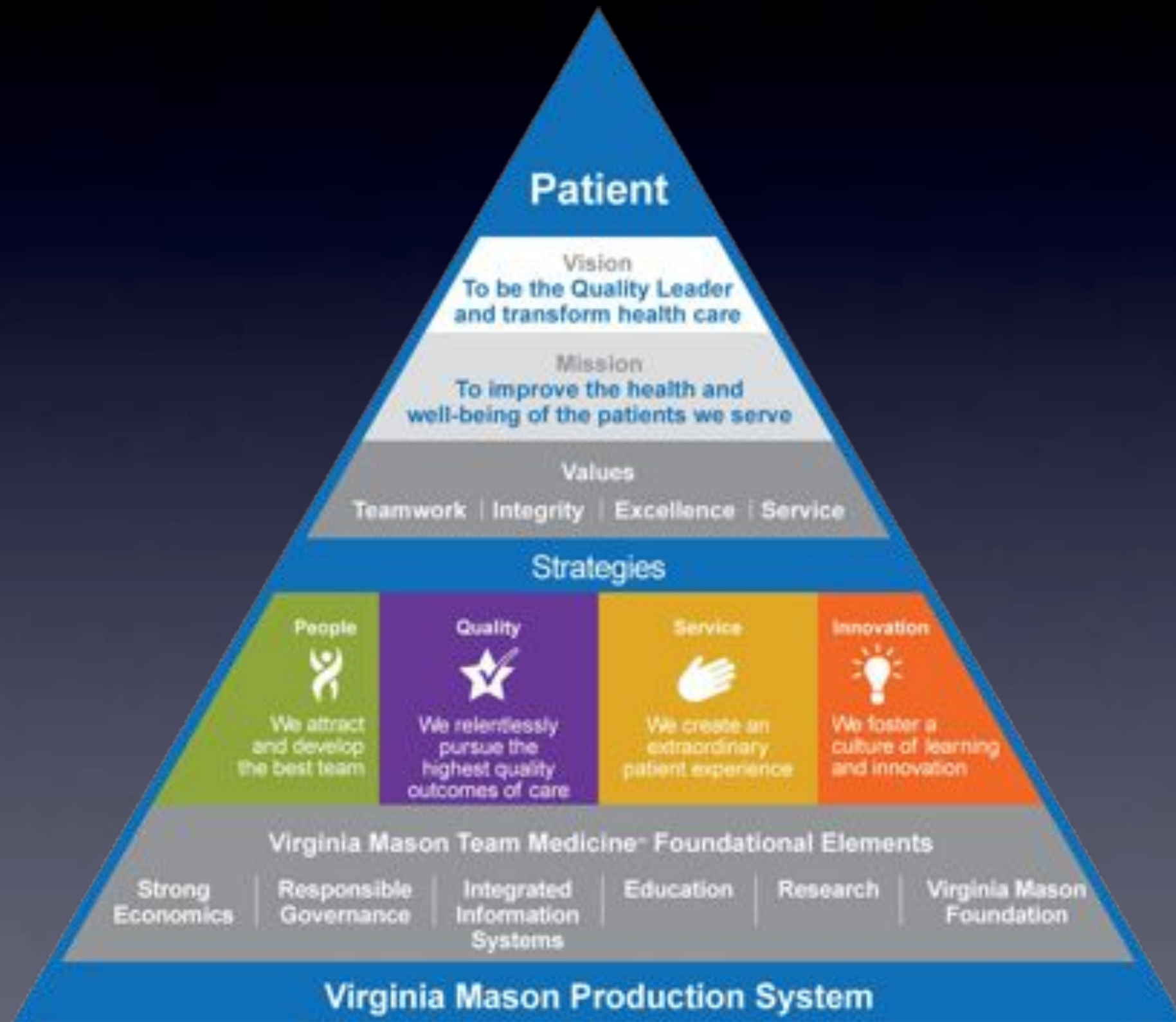
These hospitals showed a positive correlation between certain quality measures and CPOE implementation.<sup>10</sup>  
 Cost of care varies widely across the country, suggesting that cost savings due to EHR implementation might be substantially higher in some areas than others. The Dartmouth Atlas has reported an inflation-adjusted total Medicare spending per resident at 2000 ranging from a low of \$5000 in the Honolulu, Hawaii hospital referral region to a high of \$10331 in the Miami, Florida region.<sup>11</sup>  
 With HIT/ICH, the demand for evidence of system effectiveness is growing. Although there are studies showing a reduction in medication errors,<sup>12–15</sup> there are also reports of increased mortality<sup>16</sup> and the introduction of new types of medication errors.<sup>17</sup> Additionally, there are questions regarding real return on investment from the upfront purchase and implementation costs. The Congressional Budget Office has suggested that the investments used by CPTA and RANE to prevent cost savings may be overly optimistic.<sup>18</sup> However,







# Using Health Information Technology to Ensure Quality and Safety



# Patient

## Vision

To be the Quality Leader  
and transform health care

## Mission

To improve the health and  
well-being of the patients we serve



We relentlessly  
pursue the  
highest quality  
outcomes of care

We create an  
extraordinary  
patient experience

We foster a  
culture of learning  
and innovation

## Team Medicine - Foundational Elements

Integrated  
Information  
Systems

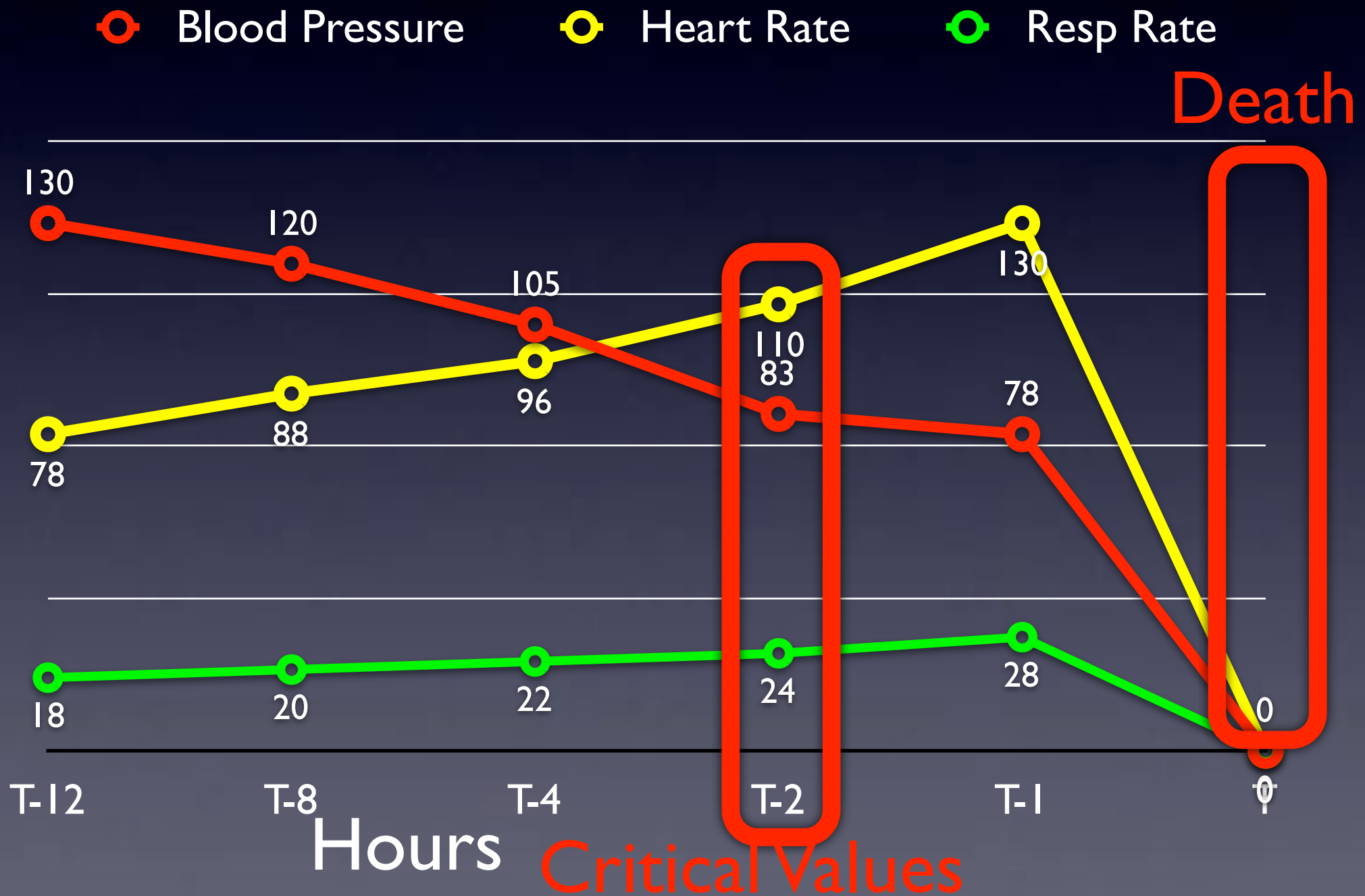
Education

Research

V

# a Mason Production System

# Preventing Potentially Avoidable Deaths



# Sepsis





# Society of Critical Care Medicine



The Intensive Care Professionals



- 750,000 cases per year
- 200,000 deaths per year

# Rapid Response Team

- SBP < 90
- HR > 130
- RR > 24
- SaO<sub>2</sub> < 90%



3,000 Hospitals



# Fire Station Model



# Institute of Medicine 1999





# Reason for Failure?



There are 2 teams of players, one wearing white shirts and one wearing black shirts. Try to count the number of times the team wearing white passes the ball.

# Reason for Failure?



There are 2 teams of players, one wearing white shirts and one wearing black shirts. Try to count the number of times the team wearing white passes the ball.



# Fire Station Model



# Air Traffic Control Surveillance Model

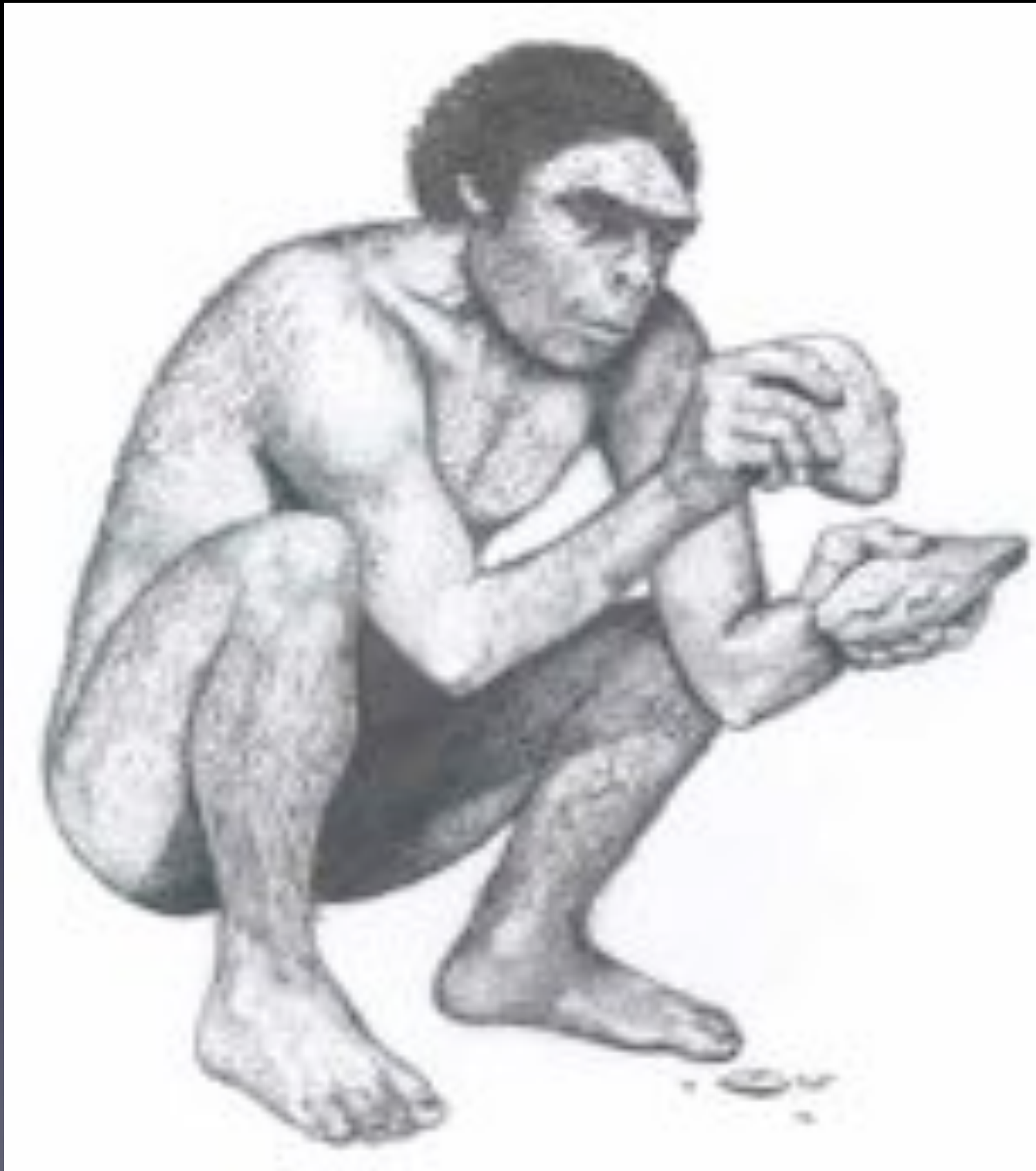






Friday, April 15, 2011

# Cerner Command Language- CCL





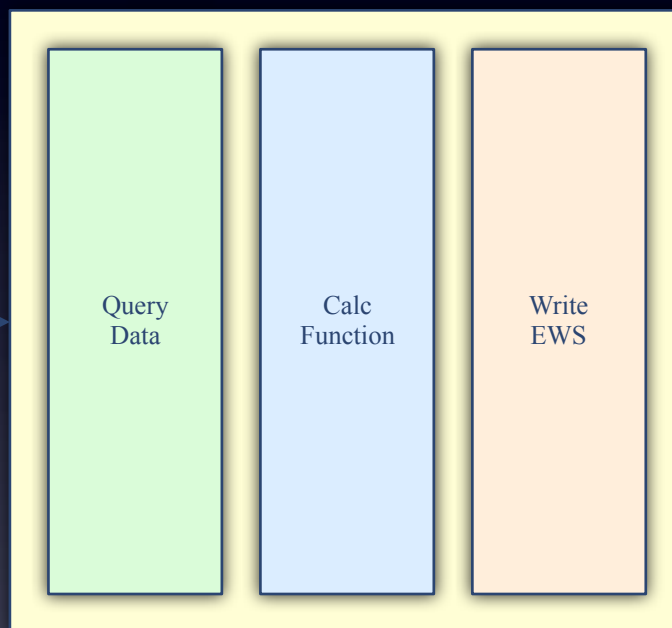
# MPages

RN Charts Routine Data

|                                       | 11:04  | 08:00           |
|---------------------------------------|--------|-----------------|
| <b>Vital Signs</b>                    |        |                 |
| Temperature - C                       | degC   | 36.4            |
| Temperature Source                    |        | Temporal Artery |
| Heart Rate                            | tpm    | 74              |
| Respiratory Rate                      | br/min | 16              |
| MAP                                   | mmHg   | 112/80          |
| MAP - Noninvasive                     | mmHg   |                 |
| BP Method                             |        | Automatic       |
| BP Extends                            |        | LEFT, Arm, U.   |
| Vital Sign Reason                     |        | Routine         |
| <b>Respiratory Data</b>               |        |                 |
| SpO2                                  | %      | 95              |
| O2 Percent - Administered             |        |                 |
| O2 Flow (O2 Flow Rate) - Administered | L/min  |                 |
| O2 Delivery Device                    |        | Face mask       |

Clinical Data

CCL Script - runs every 5 minutes



CCL Script



Discern Desktop - CCL Script

| Patient ID | Name          | Room | Unit | Admission Date | Discharge Date |
|------------|---------------|------|------|----------------|----------------|
| 10001      | John Doe      | 101  | ICU  | 2011-04-01     | 2011-04-15     |
| 10002      | Jane Smith    | 102  | ICU  | 2011-04-02     | 2011-04-16     |
| 10003      | Bob Johnson   | 103  | ICU  | 2011-04-03     | 2011-04-17     |
| 10004      | Alice Brown   | 104  | ICU  | 2011-04-04     | 2011-04-18     |
| 10005      | Charlie White | 105  | ICU  | 2011-04-05     | 2011-04-19     |

Web Page



# Early Warning System

Report Output - 1\_ews\_detailsummary\_dms

RRT (Last 10 for 24 hrs.)

| Result Value | Date From : | Date Until :                        |
|--------------|-------------|-------------------------------------|
| RRT          | 2           | 02/04/2009 16:23 - 02/05/2009 16:01 |
| RRT          | 1           | 02/04/2009 14:18 - 02/04/2009 16:23 |
| RRT          | 1           | 02/04/2009 13:48 - 02/04/2009 14:18 |
| RRT          | 1           | 02/04/2009 12:53 - 02/04/2009 13:48 |
| RRT          | 1           | 02/04/2009 08:23 - 02/04/2009 12:53 |
| RRT          | 1           | 02/04/2009 08:13 - 02/04/2009 08:23 |
| RRT          | 1           | 02/04/2009 03:44 - 02/04/2009 08:13 |
| RRT          | 1           | 02/04/2009 02:14 - 02/04/2009 03:44 |
| RRT          | 2           | 02/04/2009 00:08 - 02/04/2009 02:14 |
| RRT          | 1           | 02/03/2009 23:38 - 02/04/2009 00:08 |
| RRT          | 1           | 02/03/2009 23:34 - 02/03/2009 23:38 |

SBP (Last 24 hrs.)

Heart Rate (Last 24 hrs.)

Respiratory Rate (Last 24 hrs.)

SpO2 (Last 24 hrs.)

Links and Reports

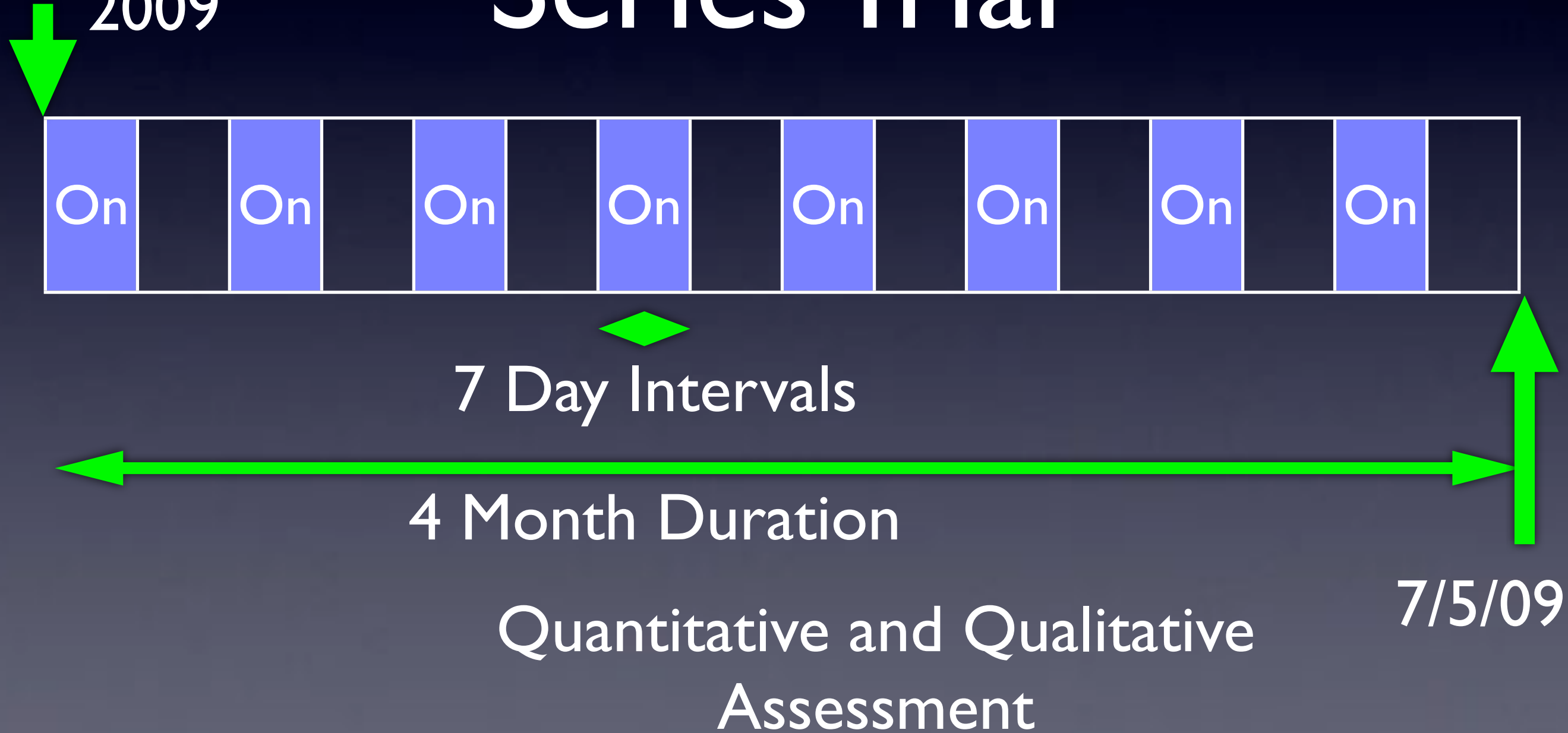
Print -- go --Select a Patient List-- go

|           | Comfort Care             | Snooze               | Notes  |
|-----------|--------------------------|----------------------|--|
| 009 09:47 | <input type="checkbox"/> | <input type="text"/> | HR 132   |
| 009 17:29 | <input type="checkbox"/> | <input type="text"/> | + Add Note   |
| 009 09:47 | <input type="checkbox"/> | <input type="text"/> | + Add Note   |
| 008 18:57 | <input type="checkbox"/> | <input type="text"/> | Watch list, RLL cellulitis --> weeping open bliste |
| 009 08:14 | <input type="checkbox"/> | <input type="text"/> | fresh move from ICU                                |
| 009 18:00 | <input type="checkbox"/> | <input type="text"/> | CM-EF 19%, infected AICD lead removed 12/10 b/p lo |
| 008 23:15 | <input type="checkbox"/> | <input type="text"/> | 1/17 SBP 84, Remodulin, diuresing, fluid restrict, |
| 009 11:49 | <input type="checkbox"/> | <input type="text"/> | BP better now 99                                   |
| 009 09:25 | <input type="checkbox"/> | <input type="text"/> | + Add Note   |
| 008 21:36 | <input type="checkbox"/> | <input type="text"/> | + Add Note   |
| 009 08:00 | <input type="checkbox"/> | <input type="text"/> | AME, hr up on postural b/p,                        |
| 009 06:30 | <input type="checkbox"/> | <input type="text"/> | HR 124   |
| 009 10:04 | <input type="checkbox"/> | <input type="text"/> |  |



# Single Blind Randomized Controlled Interrupted Time Series Trial

Feb 9,  
2009



# Clinical Outcomes

- Potentially avoidable death rate
- Cardiopulmonary arrest rate outside ICU
- Unexpected transfer to ICU rate
- RRT Activation Rate

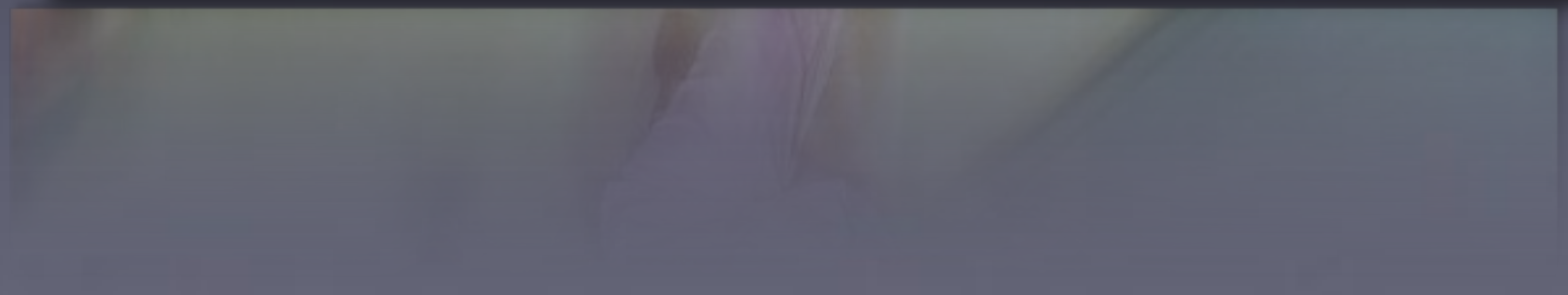


# EWS Results

|                 | On  | Off | p     |
|-----------------|-----|-----|-------|
| Codes           | 21  | 12  | 0.3   |
| RRT Activations | 509 | 403 | 0.007 |
| Deaths          | 34  | 31  | 0.51  |
| Transfer to ICU | 330 | 247 | 0.005 |



# iPhone





# Safety

Quality



# What is Quality?

U.S. Department of Health & Human Services  
**HHS.gov** [Sign In to MyMedicare.gov](#)

Search Medicare.gov

[Email](#) | [Print](#) | [Bookmark & Share](#) | [RSS](#) | [Español \(Spanish\)](#) | [A A A](#)

[Medicare.gov](#) | [Manage Your Health](#) | [Medicare Basics](#) | [Resource Locator](#) | [Help & Support](#)

[Help](#) | [For Consumers](#) | [For Professionals](#)

[Medicare.gov](#) - [Hospital Compare Home](#) - [Hospital Results](#) - [Hospital Profile](#)

## Hospital Profile

[Return to Previous Page](#) [Print Hospital Profile](#)

### VIRGINIA MASON MEDICAL CENTER

|                                 |   |   |
|---------------------------------|---|---|
| <b>Process of Care Measures</b> | <b>VIRGINIA MASON MEDICAL CENTER</b><br>925 SENeca STREET<br>SEATTLE, WA 98101<br>(206) 223-6600<br>Type of Hospital: Acute Care<br>Provides Emergency Services: Yes<br>Participates in:<br>Cardiac Surgery Registry<br>Stroke Care Registry<br>Nursing Care Registry | <b>Surgical Care Improvement Project<br/>Process of Care Measures</b><br><br>Hospitals can reduce the risk of infection after surgery by making sure they provide care that's known to get the best results for most patients. Here are some examples:<br><ul style="list-style-type: none"><li>- Giving the recommended antibiotics at the right time before surgery</li><li>- Stopping the antibiotics within the right timeframe after surgery</li><li>- Maintaining the patient's temperature and blood</li></ul> |
|---------------------------------|---|---|

# Hospital Profile

[Return to previous page](#)

Process of Care

Measures

Outcome of Care

Measures

Use of Medical

Imaging

Survey of Patients'

Hospital

Experiences

## VIRGINIA MASON MEDICAL CENTER

**VIRGINIA MASON**

**MEDICAL CENTER**

925 SENeca STREET

SEATTLE, WA 98101

(206) 223-6600

Type of Hospital: Acute Care

Provides Emergency Services:

Yes

Participates in:

Cardiac Surgery Registry

Stroke Care Registry

Nursing Care Registry



# Clinical Areas


**Why Not The BEST?**  
 A health care quality improvement resource

Returning Users Log-In your saved reports. Forgot  
 Email Address Password

[Compare Hospitals](#) [Maps](#) [Improvement Tools & Resources](#) [Methods](#)



Report 110407-022(Untitled) [Rename]

Quality-Overall Recommended Care

This report has not been saved. Save Now.

|  | Overall Recommended Care            | Overall Heart Attack Care           | Overall Heart Failure Care          | Overall Pneumonia Care              | Overall Surgical Care               |
|--|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
|  | <a href="#">In-Depth Report</a>     | <a href="#">In-Depth Report</a>     | <a href="#">In-Depth Report</a>     | <a href="#">In-Depth Report</a>     | <a href="#">In-Depth Report</a>     |
| Select <input checked="" type="checkbox"/> All Name <input type="checkbox"/> Hide Deselected | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| NATIONAL TOP 10%   | 98.30 %                             | 99.81 %                             | 99.17 %                             | 98.22 %                             | 98.50 %                             |
| VIRGINIA MASON MEDICAL CENTER  | 97.60 %                             | 97.42 %                             | 99.48 %                             | 95.88 %                             | 97.48 %                             |



# Outcomes of Care

Death Rate for Heart Attack Patients

Death Rate for Heart Failure Patients

Death Rate for Pneumonia Patients

Rate of Readmission for Heart Attack Patients

Rate of Readmission for Heart Failure Patients

Rate of Readmission for Pneumonia Patients

Patients

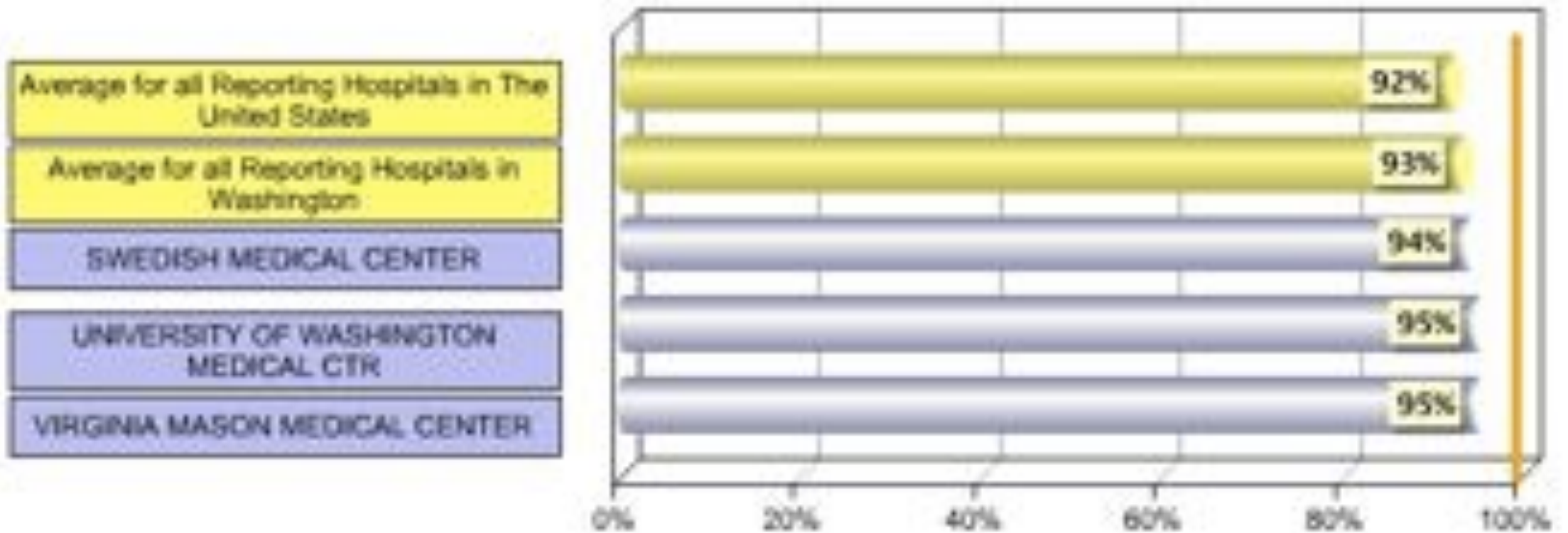
Death Rate for Pneumonia

Pneumonia Patients

Rate of Readmission for

# Processes of Care

Pneumonia Patients Assessed and Given Pneumococcal Vaccination



Also see [whynotthebest.org](http://whynotthebest.org)

# VM Quality Now

**MI with LV Dysfunction given ACE**

97<sup>3</sup>

**Pneumonvax**

95<sup>5</sup>

**Blood Culture Prior to Antibiotics**

93<sup>7</sup>

**Influenza Vaccine**

99<sup>1</sup>

**Heart Failure Discharge Instructions**

99<sup>1</sup>

**CHF with LV Dysfunction given ACE**

99<sup>1</sup>

0 25 50 75 100



## So what's good enough?

Imagine **96%** quality at VM...

600 defective surgeries/year

501 defective transfusions/year

40,000 defective medication administrations/year

10,800 wrong meals served/year

68,000 defective bills sent/year

5,000 defective paychecks/year

Slide Courtesy of Virginia Mason Institute



# So what's good enough?

Imagine **99.9%** quality at VM...

15 defective surgeries/year

17 defective transfusions/year

1,000 defective medication administrations/year

182 wrong meals served/year

17,000 defective bills sent/year

125 defective paychecks/year

Slide Courtesy of Virginia Mason Institute



Defects are mistakes that  
go uncorrected

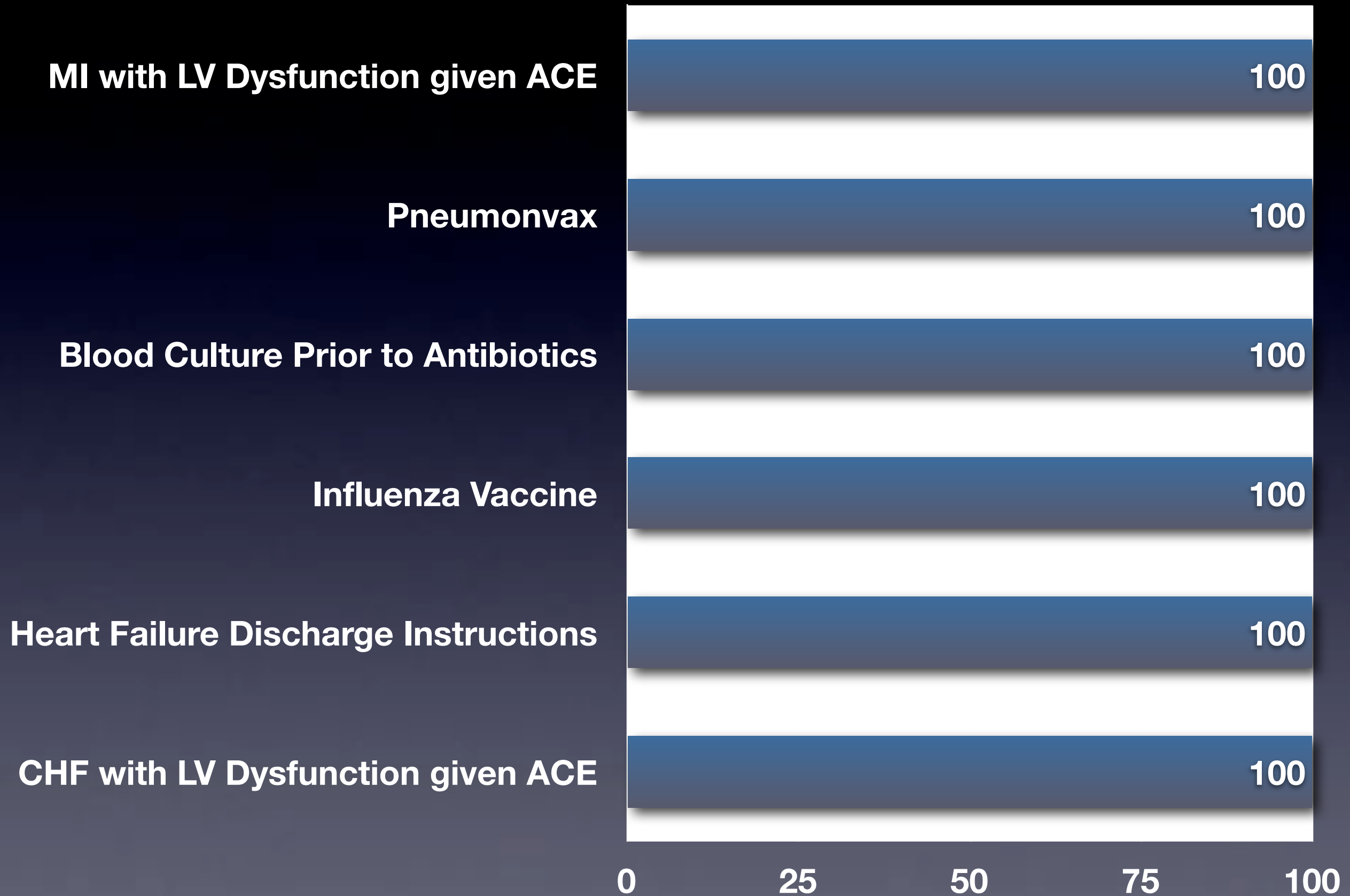
The purpose of VMPS is to ensure  
zero defects



Slide Courtesy of Virginia Mason Institute



# Quality Goal



# Improving Outcomes in Elderly Patients With Community-Acquired Pneumonia by Adhering to National Guidelines

## Community-Acquired Pneumonia Organization International Cohort Study Results

Forest W. Arnold, DO; A. Scott Lajoie, PhD; Guy N. Brock, PhD; Paula Peyrani, MD; Jordi Rello, MD; Rosario Menéndez, MD; Gustavo Lopardo, MD; Antoni Torres, MD; Paolo Rossi, MD; Julio A. Ramirez, MD; for the Community-Acquired Pneumonia Organization (CAPO) Investigators

**Background:** To define whether elderly patients hospitalized with community-acquired pneumonia (CAP) had better outcomes if they were treated with empirical antimicrobial therapy adherent to the 2007 Infectious Diseases Society of America (IDSA)/American Thoracic Society (ATS) guidelines for CAP.

**Methods:** This was a secondary analysis of the CAPO International Cohort Study database, which contained data from a total of 1725 patients aged 65 years or older who were hospitalized with CAP. Data from June 1, 2001, until January 1, 2007, were analyzed from 43 centers in 12 countries including North America (n=2), South America (n=4), Europe (n=4), Africa (n=1), and Southeast Asia (n=1). Initial empirical therapy for CAP was evaluated for guideline compliance according to the 2007 IDSA/ATS guidelines for CAP. Time to clinical stability, length of stay (LOS), total in-hospital mortality, and CAP-related mortality for each group were calculated. Comparisons between groups were made using cumulative incidence curves and competing risks regression.

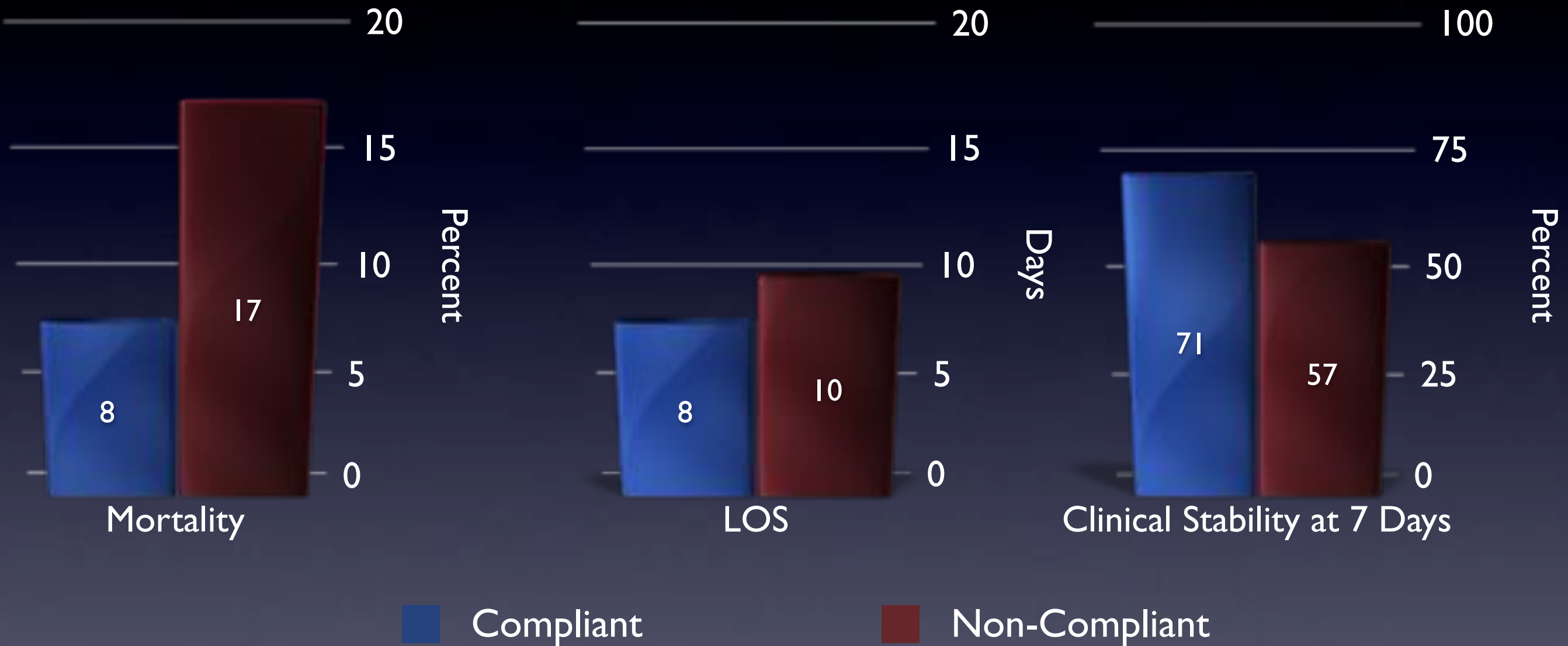
**Results:** Among the 1649 patients with CAP, aged 65

years or older, 975 patients were given antimicrobial regimens adherent to the IDSA/ATS for CAP guidelines, while 660 patients were treated with nonadherent regimens (465 patients were "undertreated"; 195 were "overtreated"). Adherence to guidelines was associated with a statistically significant decreased time to achieve clinical stability compared with nonadherence: the proportion of patients who reached clinical stability by 7 days was 71% (95% confidence interval [CI], 68%-74%) and 57% (95% CI, 53%-61%) ( $P < .01$ ), respectively. Guideline adherence was also associated with shorter LOS (median adherence LOS, 8 days; interquartile range [IQR], 5-15 days; median nonadherence LOS, 10 days; IQR, 6-24 days) ( $P < .01$ ) and decreased overall in-hospital mortality (8%; 95% CI, 7%-10% vs 17%; 95% CI, 14%-20%) ( $P < .01$ ).

**Conclusion:** Implementation of national guidelines at the local hospital level will improve not only mortality and LOS of elderly patients hospitalized with CAP but also time to clinical stability.

*Arch Intern Med.* 2009;169(16):1515-1524

# Guideline Adherence

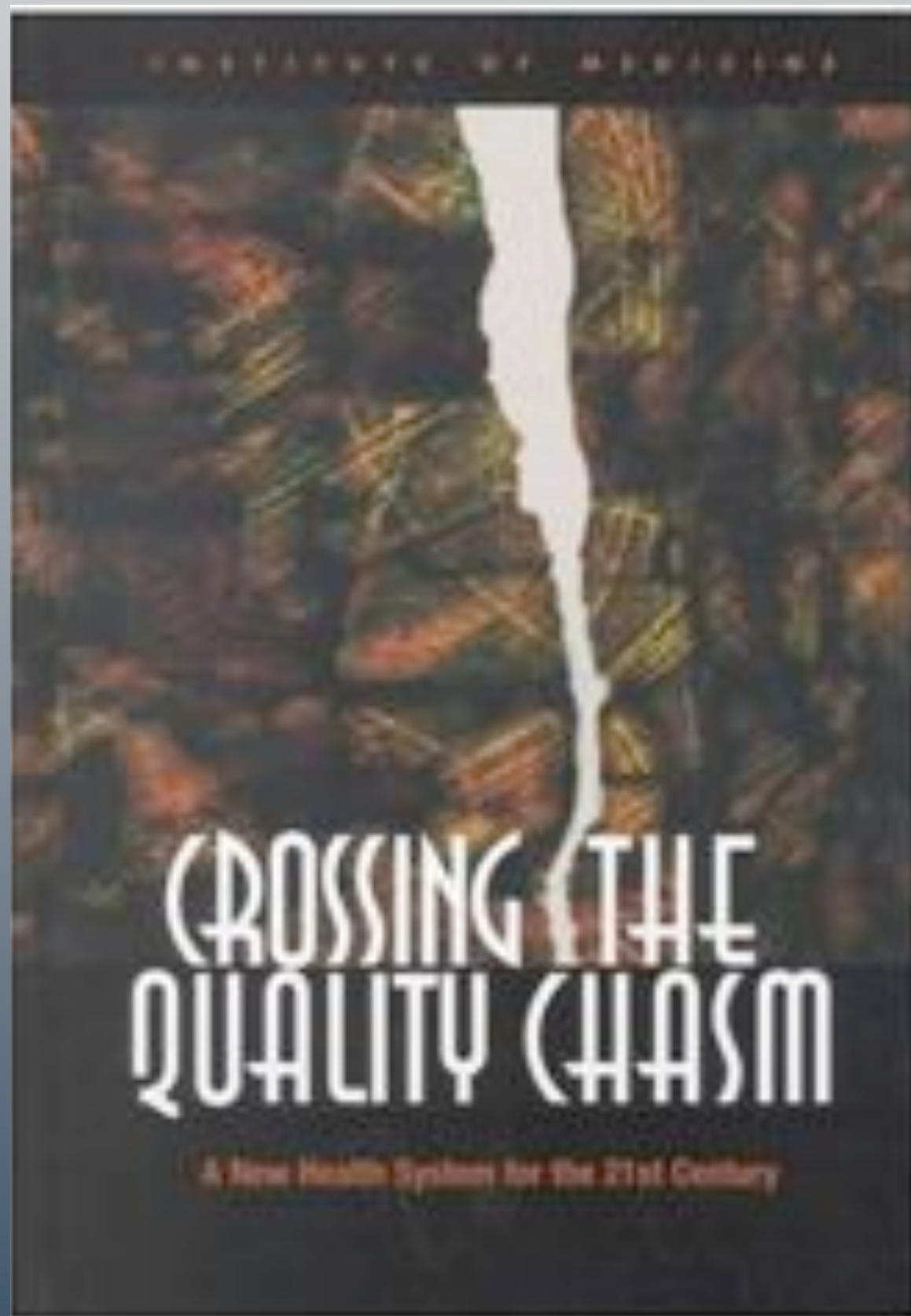




# Rate Hospitals with 1-5 Stars Based on Quality



“If all hospitals performed at the level of a 5-star rated hospital ... 20,688 Medicare deaths could have been avoided while saving the US nearly \$1.8 billion from 2007 through 2009.”



“... information technology must play a central role in the redesign of the health care system if a substantial improvement in quality is to be achieved over the coming decade.”

“... the elimination of most handwritten clinical data by the end of the decade.”

2001



# Clinical Information Technologies and Inpatient Outcomes

## A Multiple Hospital Study

Ruben Amarasingham, MD, MBA; Laura Plantinga, ScM; Marie Diener-West, PhD; Darrell J. Gaskin, PhD; Neil R. Powe, MD, MPH, MBA

**Background:** Despite speculation that clinical information technologies will improve clinical and financial outcomes, few studies have examined this relationship in a large number of hospitals.

**Methods:** We conducted a cross-sectional study of urban hospitals in Texas using the Clinical Information Technology Assessment Tool, which measures a hospital's level of automation based on physician interactions with the information system. After adjustment for potential confounders, we examined whether greater automation of hospital information was associated with reduced rates of inpatient mortality, complications, costs, and length of stay for 167 233 patients older than 50 years admitted to responding hospitals between December 1, 2005, and May 30, 2006.

**Results:** We received a sufficient number of responses from 41 of 72 hospitals (58%). For all medical conditions stud-

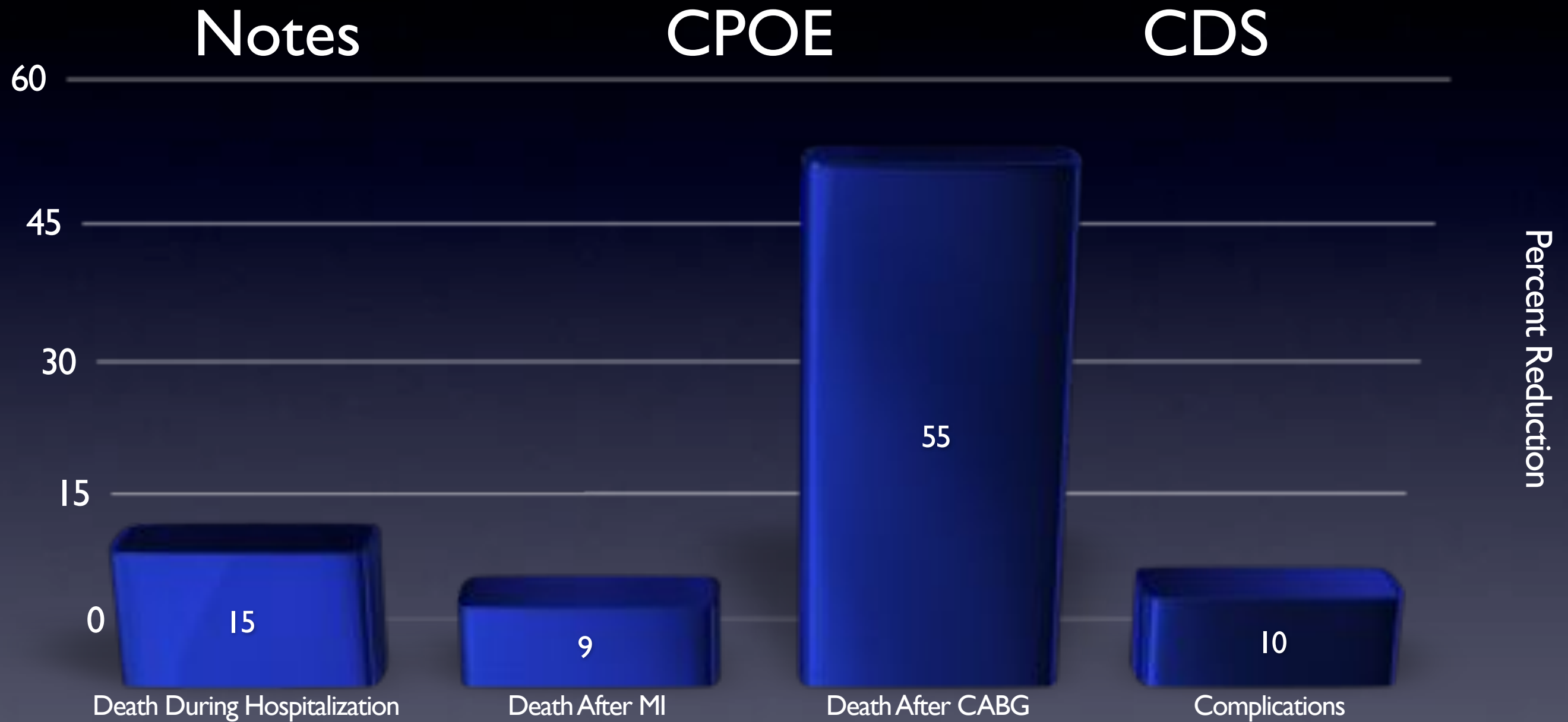
ied, a 10-point increase in the automation of notes and records was associated with a 15% decrease in the adjusted odds of fatal hospitalizations (0.85; 95% confidence interval, 0.74-0.97). Higher scores in order entry were associated with 9% and 55% decreases in the adjusted odds of death for myocardial infarction and coronary artery bypass graft procedures, respectively. For all causes of hospitalization, higher scores in decision support were associated with a 16% decrease in the adjusted odds of complications (0.84; 95% confidence interval, 0.79-0.90). Higher scores on test results, order entry, and decision support were associated with lower costs for all hospital admissions (-\$110, -\$132, and -\$538, respectively;  $P < .05$ ).

**Conclusion:** Hospitals with automated notes and records, order entry, and clinical decision support had fewer complications, lower mortality rates, and lower costs.

*Arch Intern Med.* 2009;169(2):108-114



# IT and Inpatient Outcomes



Survey of 41 Hospitals in Texas

# Critical HIT Components Needed to Ensure Quality

- Computer System
- Discrete Data
- Right Software/Programming
- Realtime Provider Feedback
- Group (Team) Situational Awareness

# Critical HIT Components Needed to Ensure Quality

- Computer System
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- Group Situational Awareness



# VM Record Storage in Georgetown



# UW Record Storage Sand Point Naval Hanger





# Server Cabinet



\$40M of Computer Equipment



# 30 Terabytes of Disk



7,500,000 Songs or 60 Years of Listening!

# Tape Backup





# Electronic Health Record

- \$17,616 per bed in 2006
  - \$12,060 for operating costs
  - \$5,556 for capital costs
- 400 Bed Hosp-> \$10 Million



American Hospital Assn.  
study, "Continued  
Progress: Hospital Use of  
Information Technology,"  
Feb. 27, 2007



# Critical HIT Components Needed to Ensure Quality

## ✓ Computer System

- Discrete Data
- Right Software/Programming
- Realtime Provider Feedback
- Group Situational Awareness

# Handwritten Note

VIRGINIA MASON MEDICAL CENTER  
SEATTLE, WA

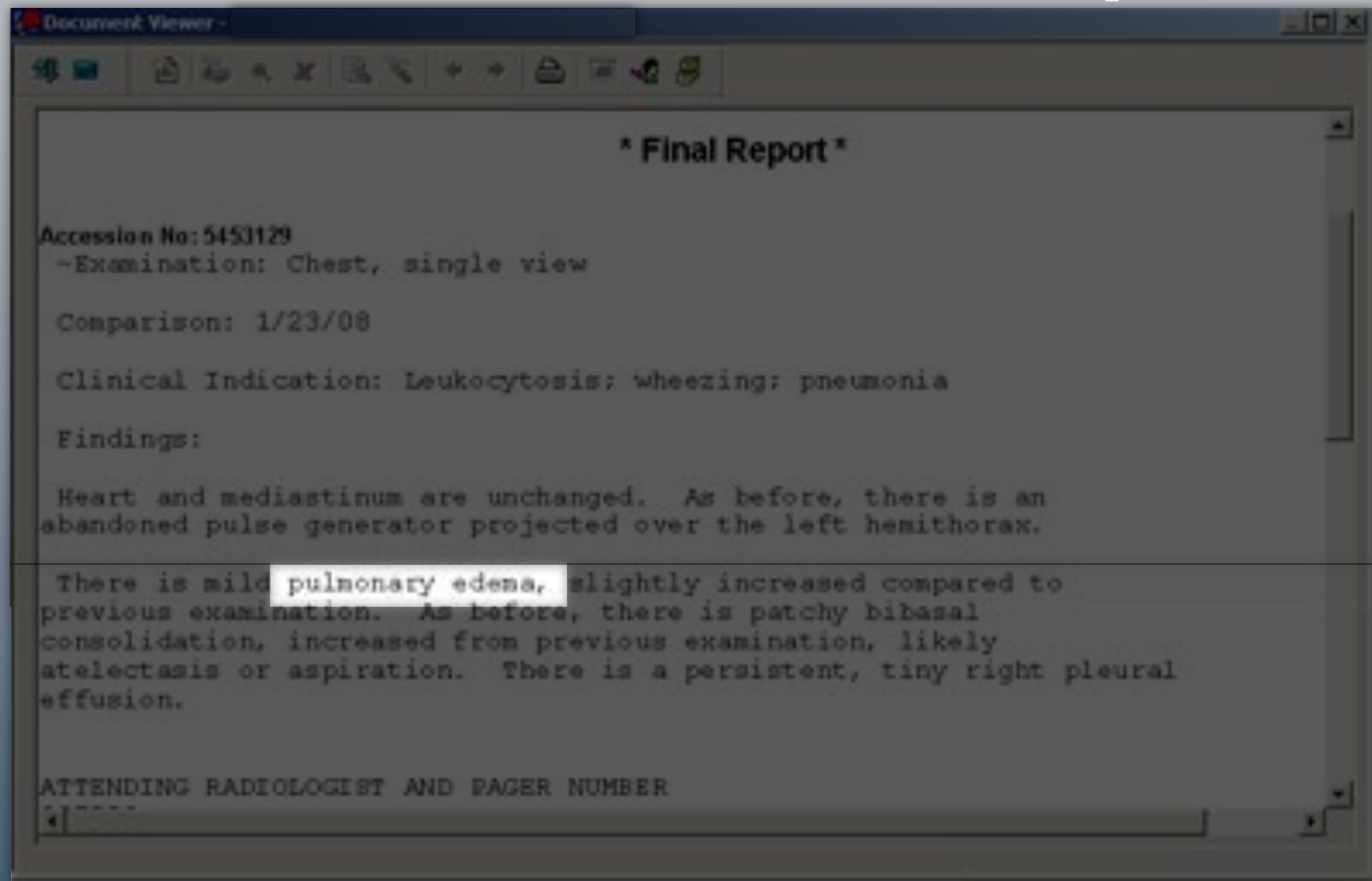
BAILEY-BOUSHAY HOUSE  
SEATTLE, WA

## PROGRESS RECORD

| DATE AND HOUR          | NOTE PROGRESS OF CASE - COMPLICATIONS - CONSULTATIONS - CHANGE IN DIAGNOSIS - CONDITIONS ON DISCHARGE - INSTRUCTIONS TO PATIENT - AND FINAL SUMMARY. |
|------------------------|--|
| 4/12/11<br>(cont)      | C - PPT<br>A/P<br>P26  |
| 4/15/11 2:30           | COPD - <u>Aspirin</u><br>- Prob. Anxiety episode again<br>- On 10-ford? (1) copd 3 ok  |
| 4/17/11 1:30<br>Ca 9.0 | ?) COPD case<br>- mild ? chronic   |
|                        | <ul style="list-style-type: none"> <li>- Skin - Adv. diet</li> <li>- + steroids 10 mg qd</li> <li>- to med. floor</li> <li>- Aspirin</li> </ul>      |



# Free Text Rads Report



Clinical Notes, Pathology Reports



# Discrete Data- Meds

| MAE Summary 48H  |                           |   |   |                           |
|--|---------------------------|---|---|---------------------------|
| 09 August 2009 0700 - 13 August 2009 0659  |                           |   |   |                           |
| Time View  | 08/09/2009<br>0700 - 0659 | 08/10/2009<br>0700 - 0659   | 08/11/2009<br>0700 - 0659   | 08/12/2009<br>0700 - 0659 |
| <b>Scheduled</b>   |                           |   |   |                           |
| <b>aspirin</b><br>325 mg. ec tablet, PO, Daily, NOW, Start: 08/10/09 15:18:00  |                           | Not Given: doc per MD order @1626   |   |                           |
| <b>aspirin</b><br>325 mg. tab, PO, Daily With Breakfast, NOW, Start: 08/10/09 20:26:00   |                           | 325 mg @1807<br>325 mg @2030<br>Pain Intensity: 8<br>Pain Location: Head Frontal      | 325 mg @0900  | @0900                     |
| <b>docusate</b><br>200 mg. cap, PO, Daily, Routine, Start: 08/10/09 14:41:00   |                           | 200 mg @2100  | 200 mg @0900  | @0900                     |
| <b>docusate</b><br>100 mg. cap, PO, Q12 HR, Routine, Start: 08/10/09 21:00:00  |                           |   |   |                           |
| <b>lisinopril</b><br>10 mg. tab, PO, Daily, NOW, Start: 08/11/09 9:55:00   |                           |   | 10 mg @0955   | @0900                     |
| <b>metoprolol (metoprolol oral tablet)</b><br>25 mg. tab, PO, Q12 HR, Routine, Start: 08/10/09 21:00:00  |                           | 25 mg @1807<br>25 mg @2100<br>Systolic Blood Pressure: 143 mmHg<br>Heart Rate: 60 bpm | 25 mg @0900<br>Systolic Blood Pressure: 152 mmHg<br>Heart Rate: 66 bpm<br>25 mg @2107 | @0900<br>@2100            |
| <b>sodium chloride (saline lock flush peripheral line)</b><br>2 mL, inj, IV, Q12 HR, Routine, Start: 08/10/09 9:46:00, for 4 hr, Stop: 08/10/09 9:46:00, Note: Flush every 12 hours r... |                           | 2 mL @0946  |   |                           |
| <b>sodium chloride (saline lock flush peripheral line)</b><br>2 mL, inj, IV, Q12 HR, Routine, Start: 08/10/09 9:49:00,   |                           | 2 mL @0949  | Not Given: Not Appropriate at this Time @0900   | @0900                     |

# Discrete Data- Orders

Caneset - CHF orderset

| Component   | Order Details   |
|---|---|
| <b>STATUS</b>   |   |
| <input checked="" type="checkbox"/> Diagnosis   | Stat: T,N, Diagnosis: CHF                                 |
| <input type="checkbox"/> Transfer to  | on T,N, Note: CHF Diagnosis after admission               |
| <input type="checkbox"/> Consulting Physician   | Stat: T,N   |
| <input type="checkbox"/> Infection Control Precautions  | Stat: T,N   |
| <b>VITAL SIGNS / VITAL MEASURES</b>   |   |
| <input type="checkbox"/> VS - CCU   | Stat: T,N, Note: Vital Signs Q 1HR or as needed           |
| If patient on telemetry or CCU, do not re-order<br>Cardiac Monitor and Arrhythmia Management. |   |
| <input type="checkbox"/> Cardiac Monitor  | Stat: T,N, Note: with arrhythmia management               |
| <input type="checkbox"/> Arrhythmia Management  | Stat: T,N   |
| <input type="checkbox"/> Hemodynamic Monitoring Order set                                     |   |
| <input type="checkbox"/> Oxygen order   | Stat: T,N, O2 per Nasal Cannula, 2 L/Min, Titrate to keep |
| <input type="checkbox"/> SpO2 Checks  | Stat: T,N, Q4 HR, Note: titrate Oxygen to keep SpO2 at    |
| <input checked="" type="checkbox"/> Weight  | Stat T+1:0600, Every Morning                              |

OK Cancel



# Discrete Data- Labs

| Lab and Rad Results                             | 10/26/2009   | 10/19/2009 | 10/13/2009 | 10/19/2009 | 10/19/2009   | 10/18/2009 | 10/18/2009 | 10/18/2009 | 10/18/2009   |
|---|--------------|------------|------------|------------|--------------|------------|------------|------------|--------------|
|   | 6:10         | 3:30       | 0:50       | 5:05       | 5:00         | 21:22      | 10:00      | 6:55       | 5:00         |
| <b>Hemogram</b>                                 |              |            |            |            |              |            |            |            |              |
| White Blood Cell Count                          | 6.91K/cmm    |            |            |            | 7.7K/cmm     |            |            |            | 9.1K/cmm     |
| Red Blood Cell Count                            | L 3.52 M/cmm |            |            |            | L 3.32 M/cmm |            |            |            | L 3.08 M/cmm |
| Hemoglobin                                      | L 8.6 g/dL   |            |            |            | L 8.0 g/dL   |            |            |            | L 7.5 g/dL   |
| Hematocrit                                      | L 27 %       |            |            |            | L 25 %       |            | L 23 %     |            | L 23 %       |
| Mean Corpuscular Volume                         | L 76 fL      |            |            |            | L 76 fL      |            |            |            | L 76 fL      |
| Mean Corpuscular HGB                            | L 24 pg      |            |            |            | L 24 pg      |            |            |            | L 24 pg      |
| Mean Corpuscular HGB Concentrn                  | L 32 g/dL    |            |            |            | L 32 g/dL    |            |            |            | L 32 g/dL    |
| RBC Distribution Width                          | H 19.5 %     |            |            |            | H 18.5 %     |            |            |            | H 19.0 %     |
| Platelet Count                                  | 371 K/cmm    |            |            |            | 251 K/cmm    |            |            |            | 162 K/cmm    |
| Reticulocyte Count                              |              |            |            |            |              |            |            |            |              |
| <b>Differential: Percent (Automated)</b>        |              |            |            |            |              |            |            |            |              |
| Lymphocytes, Percent                            | 25.4 %       |            |            |            | 19.7 %       |            |            |            |              |
| Monocytes, Percent                              | 8.7 %        |            |            |            | 8.2 %        |            |            |            |              |
| Granulocytes, Percent                           | 60.8 %       |            |            |            | 70.5 %       |            |            |            |              |
| Eosinophils, Percent                            | 3.4 %        |            |            |            | 1.3 %        |            |            |            |              |
| Basophils, Percent                              | 0.7 %        |            |            |            | 0.3 %        |            |            |            |              |
| <b>Differential: Absolute Count (Automated)</b> |              |            |            |            |              |            |            |            |              |
| Lymphocytes, Absolute Count                     | 1.8 K/cmm    |            |            |            | 1.5 K/cmm    |            |            |            |              |
| Monocytes, Absolute Count                       | 0.6 K/cmm    |            |            |            | 0.6 K/cmm    |            |            |            |              |
| Granulocytes, Absolute Count                    | 4.2 K/cmm    |            |            |            | 5.4 K/cmm    |            |            |            |              |
| Eosinophils, Absolute Count                     | 0.2 K/cmm    |            |            |            | 0.1 K/cmm    |            |            |            |              |
| Basophils, Absolute Count                       | 0.1 K/cmm    |            |            |            | 0.0 K/cmm    |            |            |            |              |
| <b>Differential: Percent (Manual)</b>           |              |            |            |            |              |            |            |            |              |
| Lymphocytes Percent                             |              |            |            |            |              |            |            |            | L 11 %       |
| Monocytes Percent                               |              |            |            |            |              |            |            |            | L 1 %        |
| Polymorphonuclear Leukocytes Percent            |              |            |            |            |              |            |            |            | 78 %         |
| Bands Percent                                   |              |            |            |            |              |            |            |            | H 12 %       |



# Discrete Data- Forms



# Discrete Data- Note

PowerNotes Print 0 minutes ago

Progress Note X | List

Basic Information  Subjective  **Review of Systems**  Health Status  Objective  Review / Management  Impression and Plan

Author: Aaronson MD, Barry A

**Basic Information <Hide Structure>**

Admit information Admission Day +++ / Today's information +++ / OTHER

**Subjective <Show Structure>**

**Review of Systems <Hide Structure>**

|   |  |
|---|--|
| <b>Constitutional</b> <input checked="" type="checkbox"/>   | Negative / Fever / Chills / Sweats / Weakness / Fatigue / Decreased activity / OTHER   |
| <b>Eye</b> <input checked="" type="checkbox"/>              | Negative / Recent visual problem / Itching / Discharge / Blurring / Double vision / Visual disturbances / OTHER  |
| <b>ENT</b> <input checked="" type="checkbox"/>              | Negative / Ear pain+ / Nasal congestion / Sore throat / OTHER  |
| <b>Respiratory</b> <input checked="" type="checkbox"/>      | Negative / SOB <input checked="" type="checkbox"/> / Cough <input checked="" type="checkbox"/> / Sputum production / Hemoptysis / Wheezing / Cynosis / Apnea / OTHER |
| <b>Cardiovascular</b> <input checked="" type="checkbox"/>   | Negative / Chest pain+ / Palpitations / Bradycardia / Tachycardia / Peripheral edema / Syncope / OTHER   |
| <b>Breast</b>   | Negative / Left / Right / Both / Lump/mass / Nipple discharge / Engorgement / Pain+ / Redness / OTHER  |
| <b>Gastrointestinal</b> <input checked="" type="checkbox"/> | Negative / Nausea / Vomiting / Diarrhea / Constipation / Heartburn / Abdominal pain+ / Hematemesis / OTHER   |
| <b>Genitourinary</b> <input checked="" type="checkbox"/>    | Negative / Dysuria / Hematuria / Change in urine stream / Urinary discharge / Lesions / OTHER  |
| <b>Gynecologic</b> <input checked="" type="checkbox"/>      | Negative / Menstrual cycle+ / LMP +++ / Age at menarche +++ years / Dysmenorrhea / Hot flashes / Intermenstrual bleeding / OTHER                                     |
| <b>Head/Neck</b> <input checked="" type="checkbox"/>        | Negative / Drooping tendency / Bleeding tendency / Swollen lymph glands / OTHER  |
| <b>Endocrine</b> <input checked="" type="checkbox"/>        | Negative / Excessive thirst / Polyuria / Cold intolerance / Heat intolerance / Excessive hunger / OTHER  |
| <b>Immunologic</b> <input checked="" type="checkbox"/>      | Negative / Immunocompromised / Recurrent fevers / Recurrent infections / Malaise / OTHER   |
| <b>Musculoskeletal</b> <input checked="" type="checkbox"/>  | Negative / Back pain+ / Neck pain / Joint pain / Muscle pain / Claudication / Decreased ROM / Trauma / OTHER   |
| <b>Neurological</b> <input checked="" type="checkbox"/>     | Negative / Rash / Pruritus / Alopecia / Breakdown / Burns / Dryness / Petechiae / Skin lesion / OTHER  |

Note Details: Aaronson MD, Barry A, 10/20/2009 17:45, Progress Note

Sign Save Save & Close Cancel

# Discrete Data

SDU, Fourteen - 9114041014 Opened by Aarman MD, Barry A

File Edit View Patient Chart Links Help

Test Off Attach Suspend Charges Charge Item Edit Calculator Adhoc EndHook Queue Patient List Patient Access List Home In-Box Schedule Mail Clinical Apps Phlo: 014

SDU, Fourteen X

SDU, Fourteen DOB: 12/16/1955 Age: 53 years Sex: Female MFN: 9114041014 Loc: Test/Unit

Allergies: penicillin, etanolol, Contrast Dye, heparin, io... IOHealth: No Fin# EP200904282 Inpatient Medical: [04/27/2009 17:09 - (No - Discharge date)]

### Diagnosis & Problems

Classification View: Active & Inactive Problems Change View

| Name of Problem                  | Abbreviated Display       | Code   | Start Date | Responsible Provider | Life Cycle Date | Classification |
|----------------------------------|---------------------------|--------|------------|----------------------|-----------------|----------------|
| Medical                          |                           |        |            |                      |                 |                |
| ASTHMA                           | ASTHMA                    | 433    | 2005       |                      | 09/27/2005      | Medical        |
| MALIGNANT NEOPLASM...            | breast cancer bilate      | 174.9  | About 2009 |                      | 08/22/2007      | Medical        |
| Intestinal infection due to a... | Intestinal infection d... | 038    |            | Test MD, Man Liu     |                 | Medical        |
| Diabetes mellitus type II        | Diabetes mellitus typ...  | 250.00 | 2009       |                      | 12/05/2009      | Medical        |
| Concept - Diabetes               | Concept - Diabetes        |        |            |                      | 04/29/2009      | Medical        |
| ACUTE ON CHRONIC SY...           | ACUTE ON CHRON...         | 430.23 |            |                      | 01/05/2009      | Medical        |
| HEART FAILURE                    | HEART FAILURE             | 430    |            |                      | 02/04/2009      | Medical        |
| Obstructive sleep apnea          | Obstructive sleep ap...   | 327.23 | 2009       |                      | 02/17/2009      | Medical        |
| ACUTE SYSTEMIC HEAR...           | ACUTE SYSTEMIC ...        | 430.23 |            |                      | 03/05/2009      | Medical        |
| Concept - High-Risk Vascu...     | Concept - High-Risk ...   |        |            |                      | 04/29/2009      | Medical        |
| DIABETES MELLITUS                | DIABETES MELLIT...        | 250    | 04/29/2009 |                      | 04/29/2009      | Medical        |
| ACUTE MYOCARDIAL INF...          | ACUTE MYOCARDI...         | 410    | 2009       |                      | 04/29/2009      | Medical        |
| Breast cancer, female            | Breast cancer, femal...   | 174.9  | 2009       |                      | 04/29/2009      | Medical        |

Problem List



# Critical HIT Components Needed to Ensure Quality

✓ Computer System

✓ Discrete Data

- Right Software/Programming
- Realtime Provider Feedback
- Group Situational Awareness



# Critical HIT Components Needed to Ensure Quality

- ✓ Computer System
- ✓ Discrete Data
- ✓ Right Software/Programming
- Realtime Provider Feedback aka Clinical Decision Support
- Group Situational Awareness



# Retrospective Improvement Efforts

- Conferences
- Journal Clubs
- Section Meetings
- Housestaff Orientations
- M&M



# Quality Safety Dashboard

Quality Safety Dashboard

Data Last Updated 09/18/09 10:46:00

ICU Dashboard **RRE Dashboard** User Options

Patient Filter: UNIT - U-SE UWMC U-SE --Select a List--

Refreshes q5min

| Patient Info | Encounter Info                               | Patient Status   | DVT Prophyl    | GI Prophyl    | Glucose       | Oral Care | IBOB       | Sedation      | SBT     |
|--------------|--|------------------|----------------|---------------|---------------|-----------|------------|---------------|---------|
|              | U-SE 94504-1<br>Gentry, MD, Fobb William     | 09/15/2009 13:45 | heparin        | rantidine     | 105/140 Yes   | 4/1/2     | Normal     | OK            | Missed  |
|              | U-SE 94513-1<br>Gentry, MD, Fobb William     | 09/14/2009 05:16 | heparin        | No Vent       | 93/178 Yes    | No Vent   | No Vent    | Low           | No Vent |
|              | U-SE 94516-1<br>Flum, MD, David Reed         | 09/17/2009 06:10 | heparin        | No GI Prophyl | 95/153 No     | 4/1/0     | Normal     | OK            | Missed  |
|              | U-SE 94518-1<br>Nevet, MD, Susan Eva         | 09/17/2009 03:54 | heparin        | No Vent       | 108/111 No    | No Vent   | No Vent    | No Assessment | No Vent |
|              | U-SE 94519-2<br>Nevet, MD, Susan Eva         | 09/16/2009 04:06 | heparin        | No Vent       | 111/127 No    | No Vent   | No Vent    | OK            | No Vent |
|              | U-SE 94520-2<br>Tonell, MD, Mark Raymond     | 09/17/2009 07:02 | No DVT Prophyl | No Vent       | 102/102 No    | No Vent   | No Vent    | No Assessment | No Vent |
|              | U-SE EE502-1<br>Nuligan, MD, Michael S       | 09/08/2009 20:48 | heparin        | lansoprazole  | 136/165 No    | 4/4/3     | Normal     | OK            | Done    |
|              | U-SE EE503-1<br>Greer, MD, Benjamin E        | 09/14/2009 12:30 | No DVT Prophyl | No Vent       | 75/235 Yes    | No Vent   | No Vent    | No Assessment | No Vent |
|              | U-SE EE505-1<br>Tonell, MD, Mark Raymond     | 09/17/2009 18:11 | Mech Only      | pantoprazole  | 125/152 No    | 4/2/0     | Normal     | OK            | Missed  |
|              | U-SE EE510-1<br>Tonell, MD, Mark Raymond     | 09/06/2009 16:39 | No DVT Prophyl | lansoprazole  | 163/199 Yes   | 2/2/1     | Normal     | OK            | Missed  |
|              | U-SE EE515-1<br>Gentry, MD, Fobb William     | 09/16/2009 04:27 | Mech Only      | No Vent       | 158/158 No    | No Vent   | No Vent    | OK            | No Vent |
|              | U-SE EE516-1<br>Gentry, MD, Fobb William     | 09/27/2009 14:33 | heparin        | No Vent       | 110/139 No    | No Vent   | No Vent    | OK            | No Vent |
|              | U-SE EE516-2<br>Tonell, MD, Mark Raymond     | 09/15/2009 17:27 | No DVT Prophyl | No Vent       | 128/135 No    | No Vent   | No Vent    | OK            | No Vent |
|              | U-SE EE521-1<br>Gentry, MD, Fobb William     | 09/15/2009 14:45 | heparin        | No Vent       | 98/193 Yes    | No Vent   | No Vent    | OK            | No Vent |
|              | U-SE EE521-2<br>Nuligan, MBBCH, Peter Carlus | 09/17/2009 06:30 | enoxaparin     | No Vent       | 107/161 Yes   | No Vent   | No Vent    | No Assessment | No Vent |
|              | U-SE EE522-1<br>Tonell, MD, Mark Raymond     | 09/21/2009 10:18 | No DVT Prophyl | lansoprazole  | No Glucose No | 0/0/0     | No Bed Pos | OK            | Missed  |
|              | U-SE EE526-1<br>Tonell, MD, Mark Raymond     | 07/26/2009 19:05 | heparin        | pantoprazole  | 123/190 No    | 2/1/2     | Normal     | OK            | Missed  |
|              | U-SE EE526-1<br>Gentry, MD, Fobb William     | 07/25/2009 15:53 | heparin        | lansoprazole  | 97/123 Yes    | 2/2/2     | Normal     | OK            | Missed  |
|              | U-SE EE530-1<br>Flum, MD, David Reed         | 09/17/2009 08:50 | heparin        | No Vent       | 105/144 No    | No Vent   | No Vent    | No Assessment | No Vent |
|              | U-SE EE533-1                                 | 09/17/2009 20:02 |                |               |               |           |            |               |         |







# Quality Safety Dashboard

Quality Safety Dashboard

Data Last Updated 03/18/09 10:46:00

ICU Dashboard RRE Dashboard User Options

Patient Filter: UNIT - U-5E UWMC U-5E --Select a Patient List--  
 Excluding ICU Patients  All  Non-ICU  Only ICU

Main Data Table

| Patient Info                                 | Encounter Info   | Patient Status | DVT Proply    | GI Proply    | Glucose       | Oral Care | IBOB       | Sedation      | SBT     |
|--|------------------|----------------|---------------|--------------|---------------|-----------|------------|---------------|---------|
| U-5E 94504-1<br>Gentry, MD, Fobb Willem      | 03/15/2009 13:45 | -              | heparin       | rantidine    | 105/140 Yes   | 4/1/2     | Normal     | OK            | Missed  |
| U-5E 94513-1<br>Gentry, MD, Fobb Willem      | 03/14/2009 05:16 | -              | heparin       | No Vent      | 93/178 Yes    | No Vent   | No Vent    | Low           | No Vent |
| U-5E 94516-1<br>Flum, MD, David Reed         | 03/17/2009 06:10 | -              | heparin       | No GI Proply | 95/153 No     | 4/1/0     | Normal     | OK            | Missed  |
| U-5E 94518-1<br>Nebel, MD, Susan Eva         | 03/17/2009 03:54 | -              | heparin       | No Vent      | 108/111 No    | No Vent   | No Vent    | No Assessment | No Vent |
| U-5E 94519-2<br>Nebel, MD, Susan Eva         | 03/16/2009 04:06 | -              | heparin       | No Vent      | 111/127 No    | No Vent   | No Vent    | OK            | No Vent |
| U-5E 94520-2<br>Tonell, MD, Mark Raymond     | 03/17/2009 07:02 | -              | No DVT Proply | No Vent      | 102/102 No    | No Vent   | No Vent    | No Assessment | No Vent |
| U-5E EE502-1<br>Nuligan, MD, Michael S       | 03/08/2009 20:48 | -              | heparin       | lansoprazole | 136/165 No    | 4/4/3     | Normal     | OK            | Done    |
| U-5E EE503-1<br>Greer, MD, Benjamin E        | 03/14/2009 12:30 | -              | No DVT Proply | No Vent      | 75/235 Yes    | No Vent   | No Vent    | No Assessment | No Vent |
| U-5E EE505-1<br>Tonell, MD, Mark Raymond     | 03/17/2009 18:11 | -              | Mech Only     | pantoprazole | 125/152 No    | 4/2/0     | Normal     | OK            | Missed  |
| U-5E EE510-1<br>Tonell, MD, Mark Raymond     | 03/06/2009 16:39 | -              | No DVT Proply | lansoprazole | 163/199 Yes   | 2/2/1     | Normal     | OK            | Missed  |
| U-5E EE515-1<br>Gentry, MD, Fobb Willem      | 03/16/2009 04:27 | -              | Mech Only     | No Vent      | 158/158 No    | No Vent   | No Vent    | OK            | No Vent |
| U-5E EE516-1<br>Gentry, MD, Fobb Willem      | 03/27/2009 14:33 | -              | heparin       | No Vent      | 110/139 No    | No Vent   | No Vent    | OK            | No Vent |
| U-5E EE516-2<br>Tonell, MD, Mark Raymond     | 03/15/2009 17:27 | -              | No DVT Proply | No Vent      | 128/135 No    | No Vent   | No Vent    | OK            | No Vent |
| U-5E EE521-1<br>Gentry, MD, Fobb Willem      | 03/15/2009 14:45 | -              | heparin       | No Vent      | 98/193 Yes    | No Vent   | No Vent    | OK            | No Vent |
| U-5E EE521-2<br>Nuligan, MBBCH, Peter Carlus | 03/17/2009 06:30 | -              | enoxaparin    | No Vent      | 107/161 Yes   | No Vent   | No Vent    | No Assessment | No Vent |
| U-5E EE522-1<br>Tonell, MD, Mark Raymond     | 03/21/2009 10:18 | -              | No DVT Proply | lansoprazole | No Glucose No | 0/0/0     | No Bed Pos | OK            | Missed  |
| U-5E EE526-1<br>Tonell, MD, Mark Raymond     | 07/26/2009 19:05 | -              | heparin       | pantoprazole | 123/190 No    | 2/1/2     | Normal     | OK            | Missed  |
| U-5E EE526-1<br>Gentry, MD, Fobb Willem      | 07/25/2009 15:53 | -              | heparin       | lansoprazole | 97/123 Yes    | 2/2/2     | Normal     | OK            | Missed  |
| U-5E EE530-1<br>Flum, MD, David Reed         | 03/17/2009 08:50 | -              | heparin       | No Vent      | 105/144 No    | No Vent   | No Vent    | No Assessment | No Vent |
| U-5E EE531-1<br>Flum, MD, David Reed         | 03/17/2009 20:57 | -              | heparin       | No Vent      | 105/144 No    | No Vent   | No Vent    | No Assessment | No Vent |



# Document

DVT Prophylaxis - NORDSTRUM, LORENE M

Performed on: 10/22/2009 1411 By: Aaronson, MD, Barry Alan

### DVT Prophylaxis

- Done - Compression devices on
- Done - On Anticoagulant
- Not done
- Not ordered
- Not Indicated - patient ambulatory
- Not Indicated - IVC filter
- Not Indicated - Bone Marrow Transplant
- Not Indicated - Post Liver Transplant

In Progress

Expires in 24 Hours



# Quality Safety Dashboard

Quality Safety Dashboard

Data Last Updated 03/18/09 10:46:00

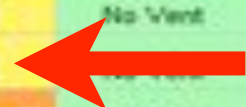
ICU Dashboard **RRE Dashboard** User Options

Patient Filter: UNIT - U-5E   U-5E

Excluding ICU Patients  All  Non-ICU  Only ICU

Main Data Table

| Patient Info | Encounter Info                               | Patient Status   | DVT Prophylaxis    | GI Prophylaxis    | Glucose       | Oral Care | IBOB       | Sedation      | SBT     |
|--------------|--|------------------|--------------------|-------------------|---------------|-----------|------------|---------------|---------|
|              | U-5E 94504-1<br>Olerly, MD, Fobb Willem      | 03/15/2009 13:45 | heparin            | rantidine         | 105/140 Yes   | 4/1/2     | Normal     | OK            | Missed  |
|              | U-5E 94513-1<br>Olerly, MD, Fobb Willem      | 03/14/2009 05:16 | heparin            | No Vent           | 93/178 Yes    | No Vent   | No Vent    | Low           | No Vent |
|              | U-5E 94516-1<br>Flum, MD, David Reed         | 03/17/2009 06:10 | heparin            | No GI Prophylaxis | 95/153 No     | 4/1/0     | Normal     | OK            | Missed  |
|              | U-5E 94518-1<br>Nebel, MD, Susan Eva         | 03/17/2009 03:54 | heparin            | No Vent           | 108/111 No    | No Vent   | No Vent    | No Assessment | No Vent |
|              | U-5E 94519-2<br>Nebel, MD, Susan Eva         | 03/16/2009 04:06 | heparin            | No Vent           | 111/127 No    | No Vent   | No Vent    | OK            | No Vent |
|              | U-5E 94520-2<br>Tonell, MD, Mark Raymond     | 03/17/2009 07:02 | No DVT Prophylaxis | No Vent           | 102/102 No    | No Vent   | No Vent    | No Assessment | No Vent |
|              | U-5E EE502-1<br>Nuligan, MD, Michael S       | 03/08/2009 20:48 | heparin            | lansoprazole      | 136/165 No    | 4/4/3     | Normal     | OK            | Done    |
|              | U-5E EE503-1<br>Greer, MD, Benjamin E        | 03/14/2009 12:30 | No DVT Prophylaxis | No Vent           | 75/235 Yes    | No Vent   | No Vent    | No Assessment | No Vent |
|              | U-5E EE505-1<br>Tonell, MD, Mark Raymond     | 03/17/2009 18:11 | Mech Only          | pantoprazole      | 125/152 No    | 4/2/0     | Normal     | OK            | Missed  |
|              | U-5E EE510-1<br>Tonell, MD, Mark Raymond     | 03/06/2009 16:39 | No DVT Prophylaxis | lansoprazole      | 163/199 Yes   | 2/2/1     | Normal     | OK            | Missed  |
|              | U-5E EE515-1<br>Olerly, MD, Fobb Willem      | 03/16/2009 04:27 | Mech Only          | No Vent           | 158/158 No    | No Vent   | No Vent    | OK            | No Vent |
|              | U-5E EE516-1<br>Olerly, MD, Fobb Willem      | 03/27/2009 14:33 | heparin            | No Vent           | 110/139 No    | No Vent   | No Vent    | OK            | No Vent |
|              | U-5E EE516-2<br>Tonell, MD, Mark Raymond     | 03/15/2009 17:27 | No DVT Prophylaxis | No Vent           | 128/135 No    | No Vent   | No Vent    | OK            | No Vent |
|              | U-5E EE521-1<br>Olerly, MD, Fobb Willem      | 03/15/2009 14:45 | heparin            | No Vent           | 98/193 Yes    | No Vent   | No Vent    | OK            | No Vent |
|              | U-5E EE521-2<br>Nuligan, MBBCH, Peter Carlus | 03/17/2009 06:30 | enoxaparin         | No Vent           | 107/161 Yes   | No Vent   | No Vent    | No Assessment | No Vent |
|              | U-5E EE522-1<br>Tonell, MD, Mark Raymond     | 03/21/2009 10:18 | No DVT Prophylaxis | lansoprazole      | No Glucose No | 0/0/0     | No Bed Pos | OK            | Missed  |
|              | U-5E EE526-1<br>Tonell, MD, Mark Raymond     | 07/26/2009 19:05 | heparin            | pantoprazole      | 123/190 No    | 2/1/2     | Normal     | OK            | Missed  |
|              | U-5E EE526-1<br>Olerly, MD, Fobb Willem      | 07/26/2009 15:53 | heparin            | lansoprazole      | 97/123 Yes    | 2/2/2     | Normal     | OK            | Missed  |
|              | U-5E EE530-1<br>Flum, MD, David Reed         | 03/17/2009 08:50 | heparin            | No Vent           | 105/144 No    | No Vent   | No Vent    | No Assessment | No Vent |
|              | U-5E EE531-1                                 | 03/17/2009 20:07 |                    |                   |               |           |            |               |         |





# Specify Risk

The screenshot shows a software window titled "DVT Risk". At the top, there is a header bar with the text "Performed on: 10/22/2009" and "By: Aaronson, MD, Barry Alan". Below the header, there is a section labeled "DVT Risk" with a black background. Underneath, there are two radio buttons: "High" (which is selected) and "Low". Below the radio buttons, there are two sections: "High Risk:" followed by a list of factors: "Obese", "Malignancy", "Orthopedic Injuries/Repairs", "Spinal Injuries/Repairs", and "Major Trauma". Below that is "Low Risk:" followed by the text "Anyone who is NOT high risk is low risk." At the bottom right of the window, there is a status indicator that says "In Progress".

Performed on: 10/22/2009 1:40 PM By: Aaronson, MD, Barry Alan

**DVT Risk**

High  Low

**High Risk:**

- Obese
- Malignancy
- Orthopedic Injuries/Repairs
- Spinal Injuries/Repairs
- Major Trauma

**Low Risk:**

- Anyone who is NOT high risk is low risk.

In Progress

# Write Orders

Quality Safety Dashboard

Data Last Updated 09/18/09 10:45:00

ICU Dashboard RRT Dashboard User Options

Patient Filter: UNIT - U5E UWMC U5E --Select a Patient List--

Excluding ICU Patients All New ICU Only ICU

Maximum Table

| Patient Info                                   | Encounter Info | Patient Status              | SBT           |
|--|----------------|-----------------------------|---------------|
| U5E 5N504-1<br>Glenry, MD, Robt Willem         | 09/15/09 13:45 | -                           | Missed        |
| U5E 5N512-1<br>Glenry, MD, Robt Willem         | 09/14/09 06:18 | -                           | No Vent       |
| U5E 5N516-1<br>Flan, MD, David Reed            | 09/17/09 06:10 | -                           | Missed        |
| U5E 5N518-1<br>Merrit, MD, Susan Eva           | 09/17/09 23:54 | -                           | No Vent       |
| U5E 5N518-2<br>Merrit, MD, Susan Eva           | 09/18/09 04:06 | -                           | No Vent       |
| U5E 5N520-2<br>Tonell, MD, Mark Raymond        | 09/17/09 07:00 | No I                        | No Vent       |
| U5E EE502-1<br>Mulligan, MD, Michael S         | 09/08/09 20:48 | -                           | Done          |
| U5E EE503-1<br>Greer, MD, Benjamin E           | 09/14/09 12:32 | No I                        | No Vent       |
| U5E EE505-1<br>Tonell, MD, Mark Raymond        | 09/17/09 18:11 | -                           | Missed        |
| U5E EE510-1<br>Tonell, MD, Mark Raymond        | 09/06/09 16:38 | No I                        | Missed        |
| U5E EE515-1<br>Glenry, MD, Robt Willem         | 09/16/09 04:27 | -                           | In Progress   |
| U5E EE516-1<br>Glenry, MD, Robt Willem         | 09/07/09 14:33 | -                           | OK            |
| U5E EE516-2<br>Tonell, MD, Mark Raymond        | 09/15/09 17:27 | No DVT Prophyl              | No Vent       |
| U5E EE521-1<br>Glenry, MD, Robt Willem         | 09/15/09 14:45 | heparin                     | OK            |
| U5E EE521-2<br>Mulligan, MDDOH, Peter Camillus | 09/17/09 05:32 | enoxaparin                  | No Assessment |
| U5E EE522-1<br>Tonell, MD, Mark Raymond        | 09/21/09 10:10 | No DVT Prophyl lansoprazole | OK            |
| U5E EE525-1<br>Tonell, MD, Mark Raymond        | 07/26/09 19:01 | heparin pantoprazole        | Missed        |
| U5E EE529-1<br>Glenry, MD, Robt Willem         | 07/25/09 15:53 | heparin lansoprazole        | Missed        |
| U5E EE530-1<br>Flan, MD, David Reed            | 09/17/09 06:50 | heparin                     | No Assessment |
| U5E EE531-1<br>Flan, MD, David Reed            | 09/17/09 20:47 | -                           | No Vent       |

DVT Risk - DEMPSEY, MRS. ELIZABETH

- Heparin 5000u sq BID
- Heparin 5000u sq TID
- Enoxaparin 40mg sq qd
- SCDs

# Critical HIT Components Needed to Ensure Quality

- ✓ Computer System
- ✓ Discrete Data
- ✓ Right Software/Programming
- ✓ Realtime Provider Feedback aka Clinical Decision Support
- Group (Team) Situational Awareness



# Alert Fatigue



Discern

*Discern Alert*

Patient: ZZZTEST, PMS

CHF is on the Diagnosis List  
LVEF is <40%  
Creat <2.4 mg/dl  
No ACE/ARB Ordered

Add ACE/ARB as per CHF Bundle?

- Lisinopril
- Losartan

Cancel Previous Order for digoxin

OK

# JAMA<sup>®</sup>

## Patient Care, Square-Rigger Sailing, and Safety

Steven J. Henkind; J. Christopher Sinnett

*JAMA*. 2008;300(14):1691-1693 (doi:10.1001/jama.300.14.1691)

<http://jama.ama-assn.org/cgi/content/full/300/14/1691>

Online article and related content  
current as of November 19, 2008.





# OR Dashboard





# Bed Control



# Hospital Dispatch



# Harborview Cafe





# White Board

| ROOM    | PATIENT | STATUS | ON DUTY          | VPCT   |        |
|---------|---------|--------|------------------|--------|--------|
| 755-1   |         | Red    | Susan Courtney   | Alison | Target |
| 755-2   |         | Yellow | Sharon           | Alison | Target |
| 756     |         | Yellow | Sharon           | Alison | Target |
| 757-1   |         | Red    | Laura            | Alison | Target |
| 757-2   |         |        |                  |        | Target |
| 758     |         | Yellow | Sharon           | Alison | Target |
| 759-1   |         |        |                  |        | Target |
| 759-2   |         |        |                  |        | Target |
| 763     |         | Red    | Laura            | BJ     | Target |
| 76A     |         | Blue   | Susan & Courtney | Alison | Target |
| 766     |         | Blue   | Susan & Courtney | Alison | Target |
| 768     |         | Yellow | Laura            | BJ     | Target |
| ANN/CAR |         |        |                  |        |        |
| PFC/TH  |         |        |                  |        |        |

# Quality Safety Dashboard

Quality Safety Dashboard

Data Last Updated 03/18/09 10:46:00

ICU Dashboard **RRE Dashboard** User Options

Patient Filter: UNIT - U-5E   U-5E

Excluding ICU Patients  All  Non-ICU  Only ICU

Main Data Table

| Patient Info | Encounter Info                               | Patient Status   | DVT Proply    | GI Proply    | Glucose       | Oral Care | IBOB       | Sedation      | SBT     |
|--------------|--|------------------|---------------|--------------|---------------|-----------|------------|---------------|---------|
|              | U-5E 94504-1<br>Gentry, MD, Fobb William     | 03/15/2009 13:45 | heparin       | rantidine    | 105/140 Yes   | 4/1/2     | Normal     | OK            | Missed  |
|              | U-5E 94513-1<br>Gentry, MD, Fobb William     | 03/14/2009 05:16 | heparin       | No Vent      | 93/178 Yes    | No Vent   | No Vent    | Low           | No Vent |
|              | U-5E 94516-1<br>Flum, MD, David Reed         | 03/17/2009 06:10 | heparin       | No GI Proply | 95/153 No     | 4/1/0     | Normal     | OK            | Missed  |
|              | U-5E 94518-1<br>Nevet, MD, Susan Eva         | 03/17/2009 03:54 | heparin       | No Vent      | 108/111 No    | No Vent   | No Vent    | No Assessment | No Vent |
|              | U-5E 94519-2<br>Nevet, MD, Susan Eva         | 03/16/2009 04:06 | heparin       | No Vent      | 111/127 No    | No Vent   | No Vent    | OK            | No Vent |
|              | U-5E 94520-2<br>Tonell, MD, Mark Raymond     | 03/17/2009 07:02 | No DVT Proply | No Vent      | 102/102 No    | No Vent   | No Vent    | No Assessment | No Vent |
|              | U-5E EE502-1<br>Nuligan, MD, Michael S       | 03/08/2009 20:48 | heparin       | lansoprazole | 136/165 No    | 4/4/3     | Normal     | OK            | Done    |
|              | U-5E EE503-1<br>Greer, MD, Benjamin E        | 03/14/2009 12:30 | No DVT Proply | No Vent      | 75/235 Yes    | No Vent   | No Vent    | No Assessment | No Vent |
|              | U-5E EE505-1<br>Tonell, MD, Mark Raymond     | 03/17/2009 18:11 | Mech Only     | pantoprazole | 125/152 No    | 4/2/0     | Normal     | OK            | Missed  |
|              | U-5E EE510-1<br>Tonell, MD, Mark Raymond     | 03/06/2009 16:39 | No DVT Proply | lansoprazole | 163/199 Yes   | 2/2/1     | Normal     | OK            | Missed  |
|              | U-5E EE515-1<br>Gentry, MD, Fobb William     | 03/16/2009 04:27 | Mech Only     | No Vent      | 158/158 No    | No Vent   | No Vent    | OK            | No Vent |
|              | U-5E EE516-1<br>Gentry, MD, Fobb William     | 03/27/2009 14:33 | heparin       | No Vent      | 110/139 No    | No Vent   | No Vent    | OK            | No Vent |
|              | U-5E EE516-2<br>Tonell, MD, Mark Raymond     | 03/15/2009 17:27 | No DVT Proply | No Vent      | 128/135 No    | No Vent   | No Vent    | OK            | No Vent |
|              | U-5E EE521-1<br>Gentry, MD, Fobb William     | 03/15/2009 14:45 | heparin       | No Vent      | 98/193 Yes    | No Vent   | No Vent    | OK            | No Vent |
|              | U-5E EE521-2<br>Nuligan, MBBCH, Peter Carlus | 03/17/2009 06:30 | enoxaparin    | No Vent      | 107/161 Yes   | No Vent   | No Vent    | No Assessment | No Vent |
|              | U-5E EE522-1<br>Tonell, MD, Mark Raymond     | 03/21/2009 10:18 | No DVT Proply | lansoprazole | No Glucose No | 0/0/0     | No Bed Pos | OK            | Missed  |
|              | U-5E EE526-1<br>Tonell, MD, Mark Raymond     | 07/26/2009 19:05 | heparin       | pantoprazole | 123/190 No    | 2/1/2     | Normal     | OK            | Missed  |
|              | U-5E EE526-1<br>Gentry, MD, Fobb William     | 07/25/2009 15:53 | heparin       | lansoprazole | 97/123 Yes    | 2/2/2     | Normal     | OK            | Missed  |
|              | U-5E EE530-1<br>Flum, MD, David Reed         | 03/17/2009 08:50 | heparin       | No Vent      | 105/144 No    | No Vent   | No Vent    | No Assessment | No Vent |
|              | U-5E EE531-1                                 | 03/17/2009 20:02 |               |              |               |           |            |               |         |



# UW ICU





# Harborview ICU



# Dashboard Study Design

Measure of Compliance with Quality Parameter

|                   | 6 Week Control Period | 6 Week Intervention Period |
|-------------------|-----------------------|----------------------------|
| Control Unit      | No Dashboard          | No Dashboard               |
| Intervention Unit | No Dashboard          | Dashboard                  |

# Med-Surg Dashboard







# Critical HIT Components Needed to Ensure Quality

- ✓ Computer System
- ✓ Discrete Data
- ✓ Realtime Provider Feedback aka Clinical Decision Support
- ✓ Realtime Provider Feedback aka Clinical Decision Support
- ✓ Group Situational Awareness

# Health IT- Ensuring Quality and Safety



Quality Safety Dashboard

Data Last Updated 09/18/09 10:46:00

ICU Dashboard RRE Dashboard User Options

Patient Filter: UNIT - USE [UWMC] [USE] --Select a Patient List--

Excluding ICU Patients:  All  Non-ICU  Only ICU

| Patient Info     | Encounter Info | Patient Status | DVT Prophyl    | GI Prophyl    | Glucose       | Oral Care | IBOB       | Sedation      | SBT     |
|------------------|----------------|----------------|----------------|---------------|---------------|-----------|------------|---------------|---------|
| DOONELL, BRUCE M | U-09-09504-0   | 20110209-13345 | heparin        | ranitidine    | 101/140 Yes   | 4/1/2     | Normal     | OK            | Missed  |
|                  |                |                | heparin        | No Vent       | 93/178 Yes    | No Vent   | No Vent    | Low           | No Vent |
|                  |                |                | heparin        | No GI Prophyl | 95/153 No     | 4/1/5     | Normal     | OK            | Missed  |
|                  |                |                | heparin        | No Vent       | 109/111 No    | No Vent   | No Vent    | No Assessment | No Vent |
|                  |                |                | heparin        | No Vent       | 111/127 No    | No Vent   | No Vent    | OK            | No Vent |
|                  |                |                | No DVT Prophyl | No Vent       | 102/102 No    | No Vent   | No Vent    | No Assessment | No Vent |
|                  |                |                | heparin        | lansoprazole  | 136/166 No    | 4/4/3     | Normal     | OK            | Done    |
|                  |                |                | No DVT Prophyl | No Vent       | 75/235 Yes    | No Vent   | No Vent    | No Assessment | No Vent |
|                  |                |                | Mech Only      | gastroprazole | 125/152 No    | 4/0/0     | Normal     | OK            | Missed  |
|                  |                |                | No DVT Prophyl | lansoprazole  | 163/199 Yes   | 2/2/1     | Normal     | OK            | Missed  |
|                  |                |                | Mech Only      | No Vent       | 158/158 No    | No Vent   | No Vent    | OK            | No Vent |
|                  |                |                | heparin        | No Vent       | 110/139 No    | No Vent   | No Vent    | OK            | No Vent |
|                  |                |                | No DVT Prophyl | No Vent       | 120/135 No    | No Vent   | No Vent    | OK            | No Vent |
|                  |                |                | heparin        | No Vent       | 98/193 Yes    | No Vent   | No Vent    | OK            | No Vent |
|                  |                |                | aspirin        | No Vent       | 107/161 Yes   | No Vent   | No Vent    | No Assessment | No Vent |
|                  |                |                | No DVT Prophyl | lansoprazole  | No Glucose No | 0/0/0     | No Bed Pos | OK            | Missed  |
|                  |                |                | heparin        | gastroprazole | 123/190 No    | 2/1/2     | Normal     | OK            | Missed  |
|                  |                |                | heparin        | lansoprazole  | 97/123 Yes    | 2/2/2     | Normal     | OK            | Missed  |
|                  |                |                | heparin        | No Vent       | 105/144 No    | No Vent   | No Vent    | No Assessment | No Vent |





# QUESTIONS

QUESTIONS  
QUESTIONS  
QUESTIONS  
QUESTIONS