

# Critical Care, Critical Choices: The Case for Tele-ICUs in Intensive Care

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# ***FAST* Initiative Overview**

## **2004 - 2010**



*New England  
Healthcare  
Institute*



**MASSACHUSETTS  
TECHNOLOGY  
COLLABORATIVE**



*A national collaboration to accelerate the adoption of technologies to lower healthcare costs and improve quality.*



MASSACHUSETTS  
TECHNOLOGY  
COLLABORATIVE



## Select Medical Technologies

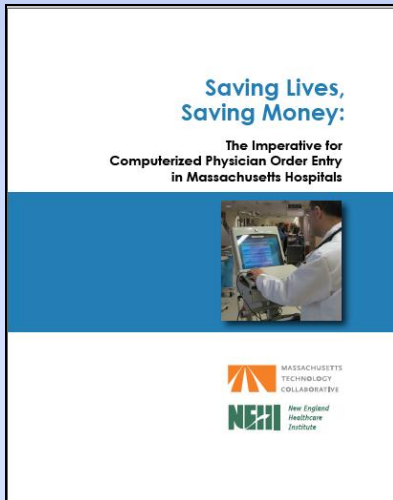
- Improve quality and save money
- Technology proven and effective
- Adoption is low
- Adoption would move the needle
- Understand barriers to adoption

## Create Action Agenda to Eliminate Barriers and Speed Adoption

- Engage all key stakeholders
- Build compelling case to speed adoption
  - Massachusetts demonstration project
  - ROI - providers and payers
  - Changes in the health care system
    - clinical practice
    - statute/regulation

# FAST CPOE Initiative

- **Key Stakeholders Engaged 2006 – 2007**
- **Massachusetts Demonstration Project (February 2008)**



- 6 Community Hospitals  
(in depth assessment – 4,100 charts reviewed)
  - Preventable Adverse Drug Events (ADEs) = 10.4%
  - CPOE Systems could reduce ADEs by 80%
  - Payback period 26 months
  - Hospitals and Payers state-wide would save \$170 million annually

- **Policy Changes Resulted**

- Reimbursement
- Chapter 305 of the Acts of 2008 – CPOE required
- HITECH Act – 2009 – CPOE required

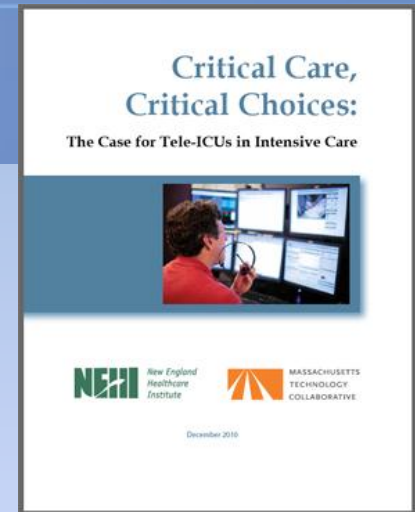
# FAST Tele-ICU Initiative

## Challenge:

ICU care is a substantial and growing portion of U.S. health care costs:

- **Cost: 4 percent** of total U.S. health care expenditures, or \$107 billion annually (**\$1.8 billion** in MA)
- **Staffing:** In 2010, only 40 percent of eligible Massachusetts hospitals met national Leapfrog Group standards for intensivist staffing in ICUs
- **Shortage of Intensivists:** By 2020, number of intensivists will meet 35% of need (SCCM).

Solution: **Tele-ICU technology** has a significant potential to address this challenge



# 2008: Tele-ICU Partnership

- Demonstrate Tele-ICUs' ability to save lives and save money by completing a pre- post- intervention study in Massachusetts community hospitals.
- Publish and disseminate a report of the findings.
- Work to speed the adoption of Tele-ICU remote monitoring by all appropriate hospitals for the benefit of patients in the Commonwealth and nationally.



MASSACHUSETTS  
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PRICEWATERHOUSECOOPERS 

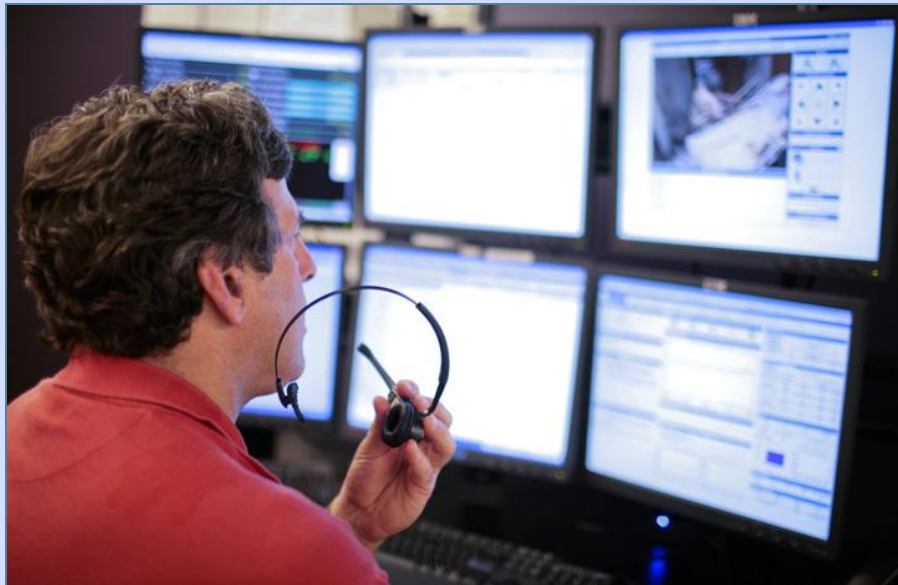


UMassMemorial  
Medical Center

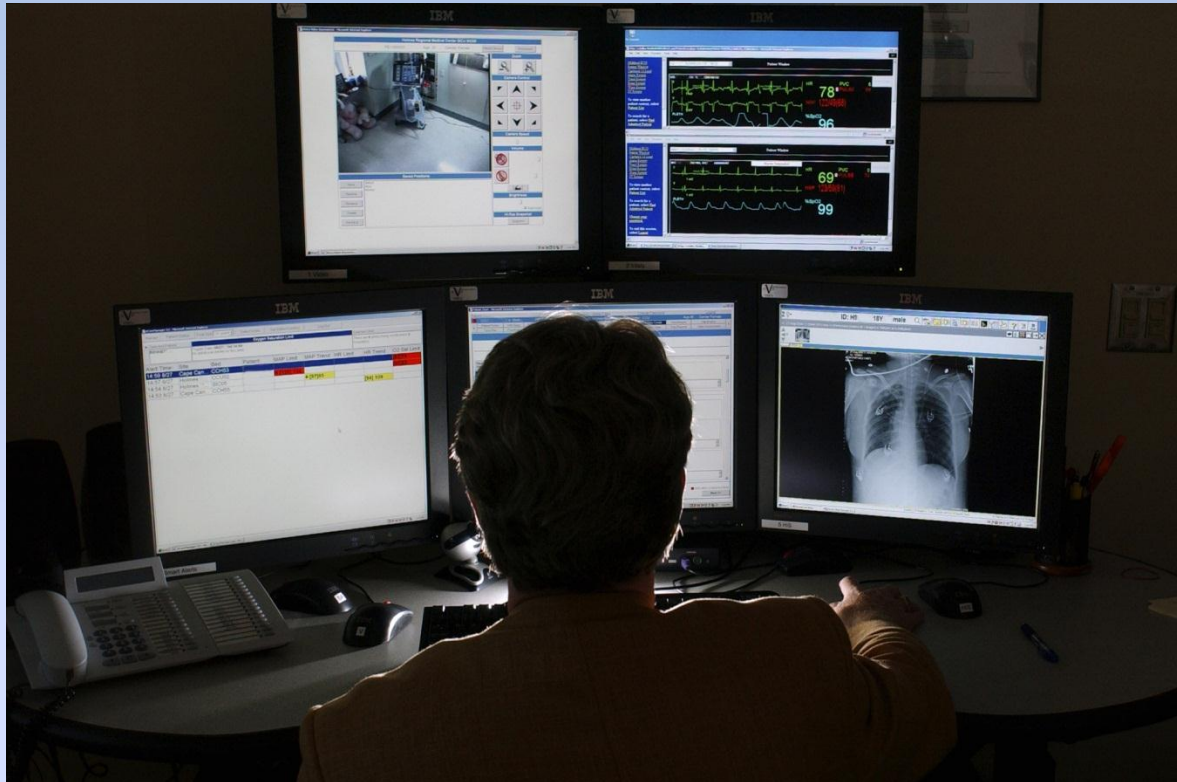
*A Member of UMass Memorial Health Care*

# Tele-ICU: What is it?

**A technology that enables critical care doctors and nurses to monitor and manage patients in multiple, remote ICUs.**



# What Is a Tele-ICU Workstation?



Care provided to critically ill patients remotely by health care professionals using audio, video, and electronic links to leverage clinical resources.

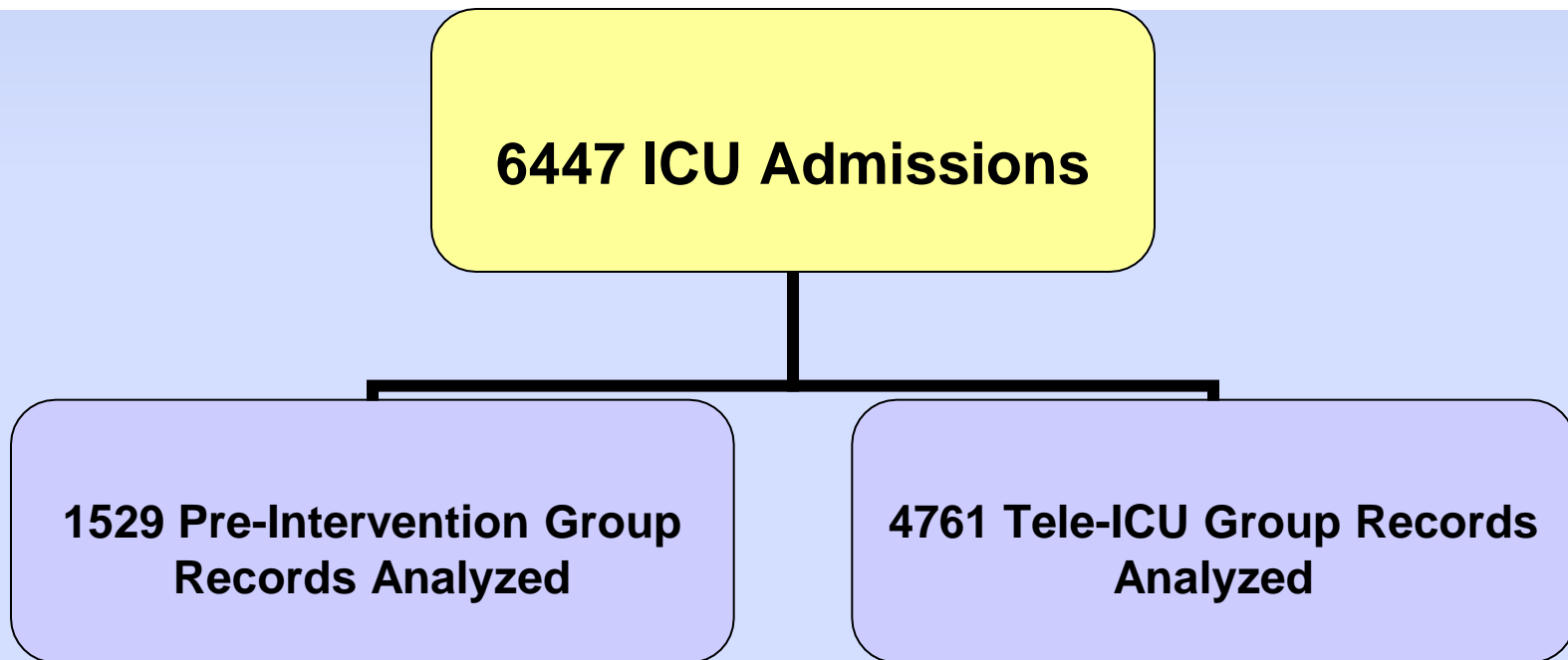
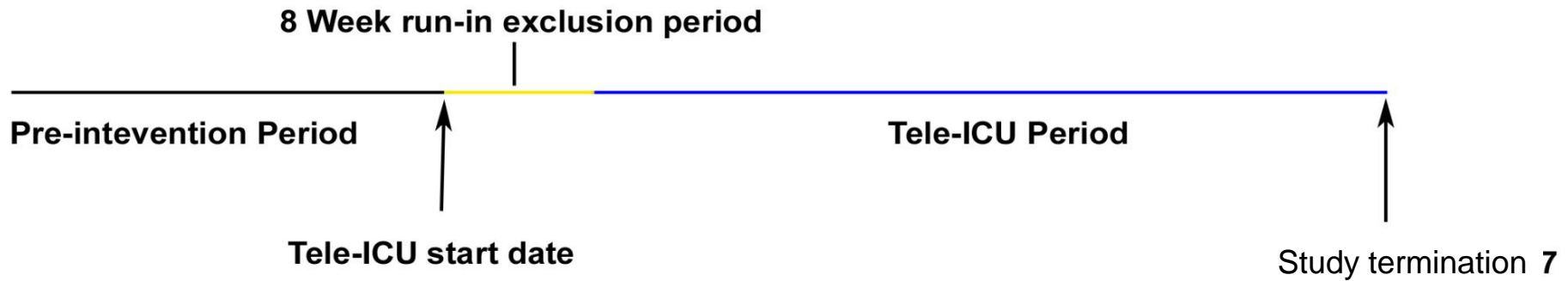


# ICU Telemedicine: Re-engineering ICU Care Delivery

## Objectives:

1. To identify the tele-ICU components that are associated with improved outcomes
2. To review what is known about variation among implementations and the relationship of these variations to outcomes
3. To review the outcomes of a ICU telemedicine demonstration project on access, cost, and mortality across a region

# UMMMC Study Design

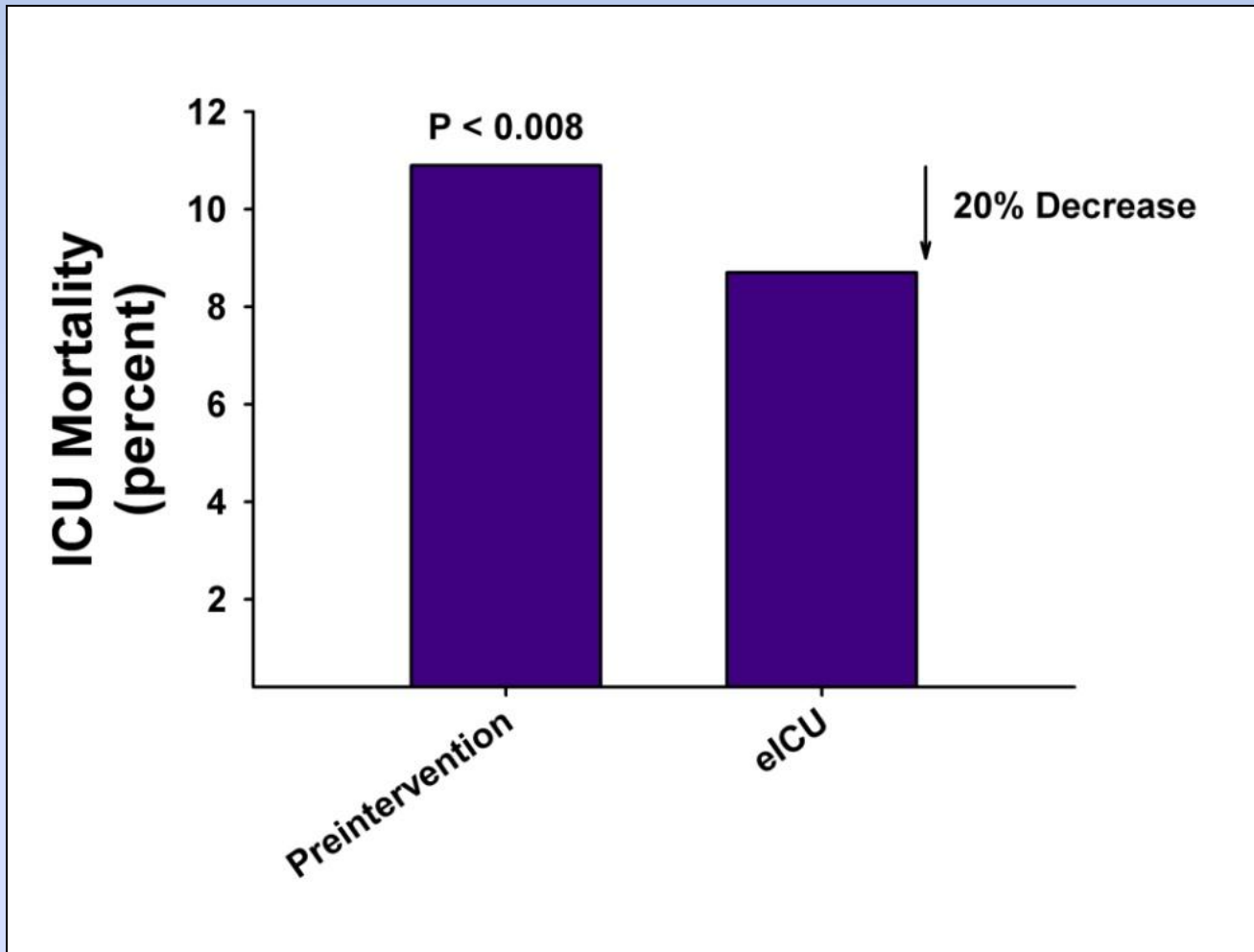


# Tele-ICU Care: Responses to Alarms

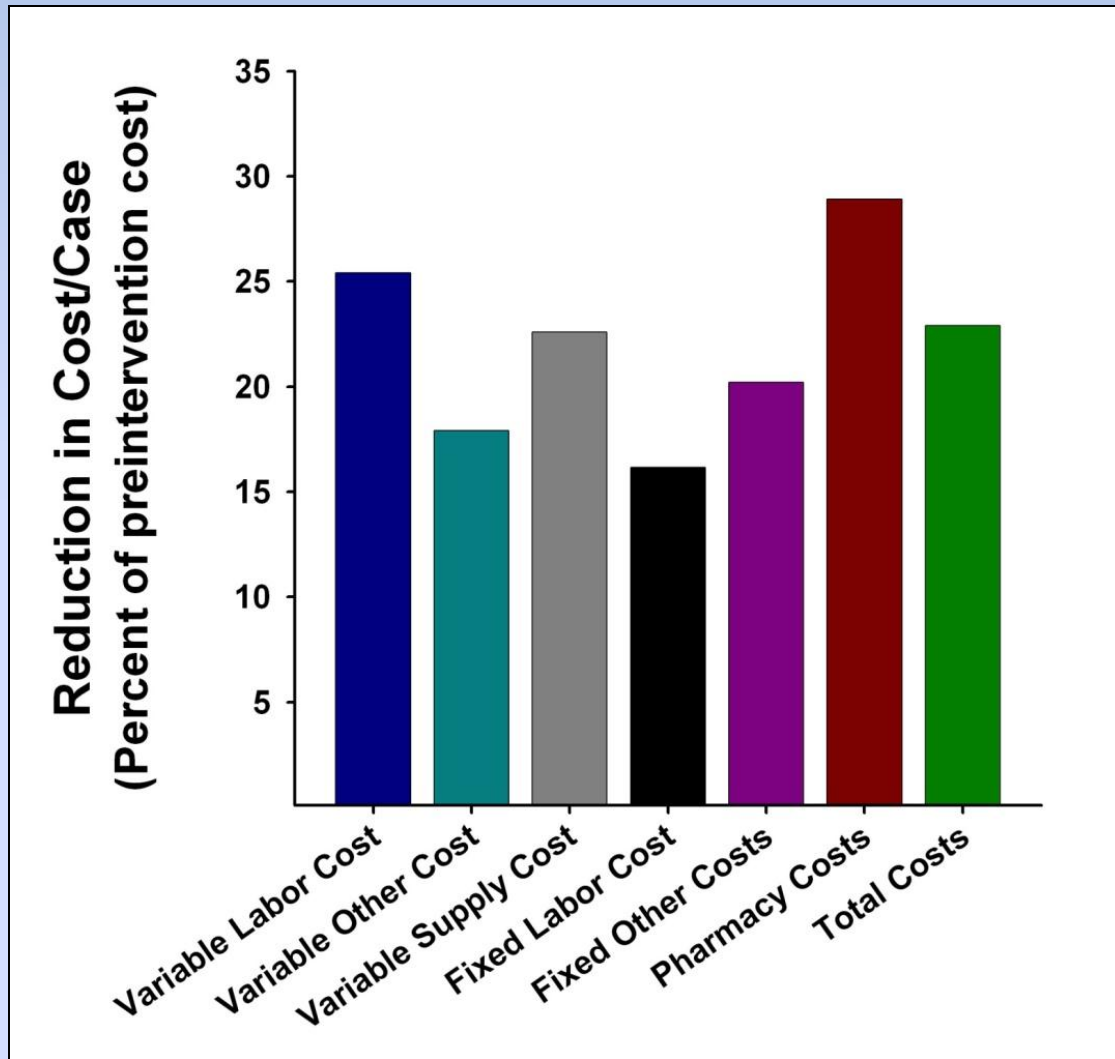
	<b>24,426</b>	<b>Clinically Significant Interventions</b>
<b>Tele-ICU Program</b>	<b>483</b>	<b>Initiated by bedside providers</b>
	<b>23,943</b>	<b>Initiated by the off-site team</b>



# Tele-ICU Effects on UMMMC ICU Mortality



# Tele-ICU Effects on UMMMC Costs



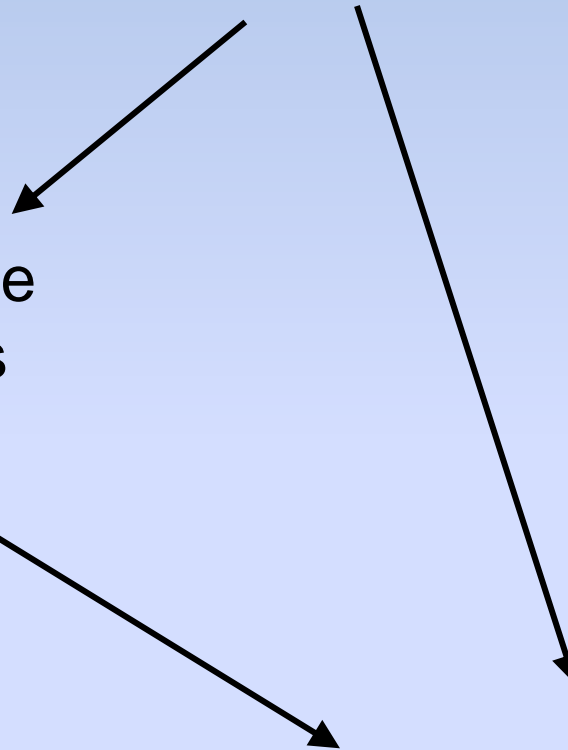
1. The cost savings were \$5,400 per case
2. The ICU LOS decreased by 30 percent (1.9 days)

# Tele-ICU: How It Worked

Tele-ICU intervention

Best practice adherence  
Reduced complications

Mortality



# Community Hospital Study



**Two community hospitals  
10 ICU beds each  
One year time period  
927 patients pre-period  
1,377 patients post-period**



# Community Hospital Tele-ICU Program Objectives

## **Intervention:**

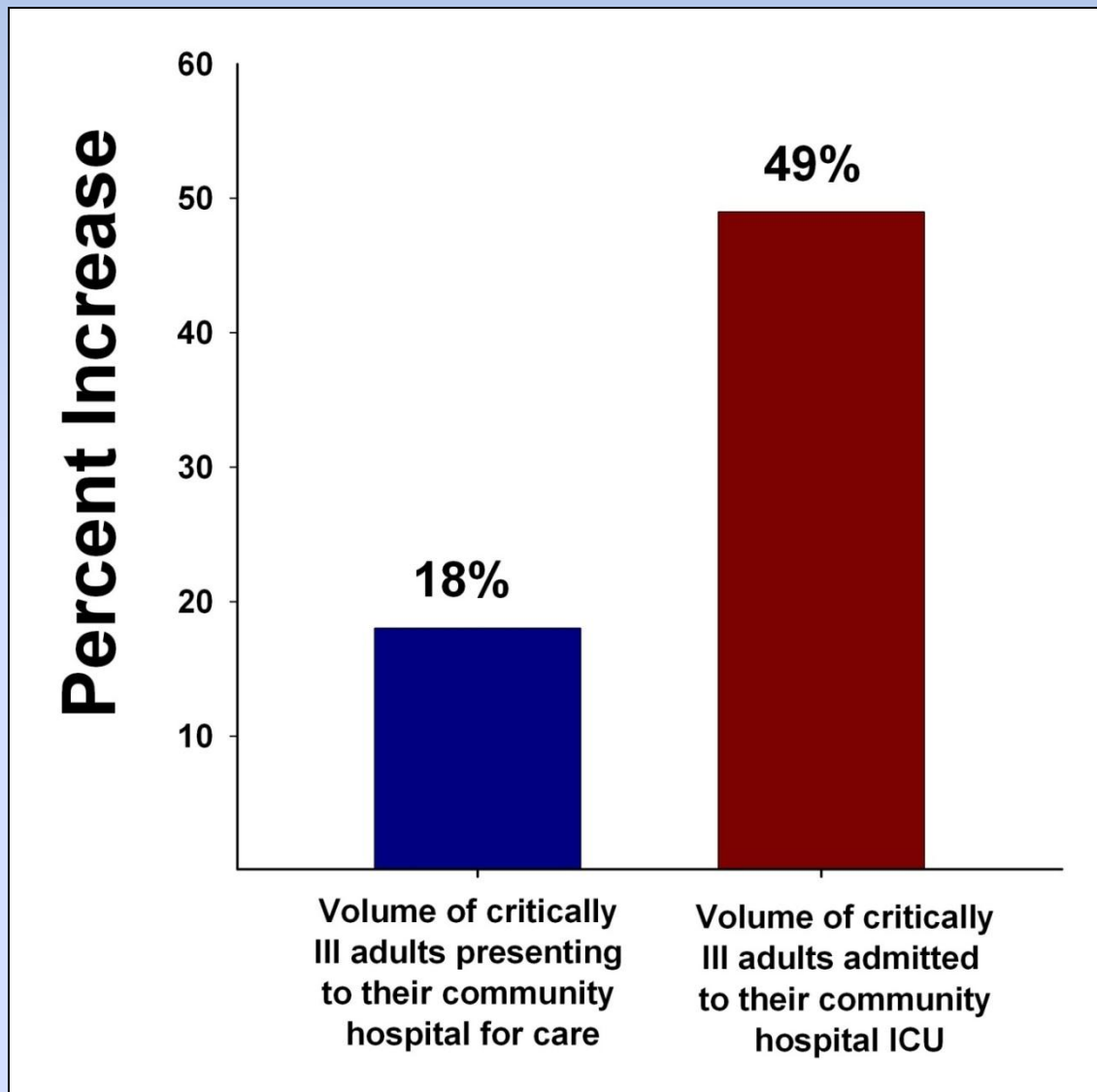
**Tele-ICU was added to support an on-site weekday intensivist program**

At the community hospitals, the primary aims of the program were to:

- ✓ increase the volume of higher acuity ICU cases
- ✓ without increasing mortality
- ✓ or length of stay



# Tele-ICU: Effects on Community Hospital ICU Volume



# Community Hospital Tele-ICU Program Objectives

***At the community hospitals, the primary aims of the program were to increase the volume of higher acuity ICU cases without increasing mortality or length of stay***

- ★ The volume of ICU patients increased by 45%
- ★ The patient acuity levels increased significantly and the adjusted mortality rates decreased
- ★ The ICU LOS decreased in both hospitals
- ★ 23 percent of patients were cared for at the community hospitals and *not* transferred to AMCs
- ★ Net increase of contribution to margin of \$1,000 to \$4,000 per case

# Financial Impact Analysis



## Goal

Compelling demonstration of financial impact on:

- Hospitals
- Payers
- State-wide potential impact

# Costs and Recovery of Costs



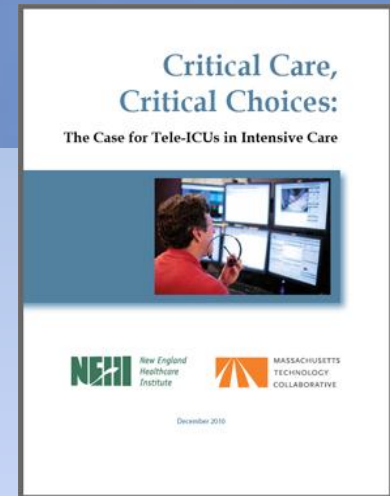
## **UMMMC**

- \$7.1 million investment
- 30% length of stay reduction results in lower costs and net financial improvement for UMMC of \$5,400 per case (\$20.4M)
- Full recovery of all costs within one year

## **Community Hospitals 1 and 2**

- \$400,000 (each) investment
- Higher volume (45% average) of patients of greater severity resulted in increased revenue and net financial improvement of \$2,500 (average) per case
- Full recovery of all costs within one year

# Financial Impact on Payers



## 1. Community Hospitals

Matched Case Cost Study:

- 450 cases managed at an academic medical center or a community hospital were each matched on age, diagnosis, and APACHE IV score
- Costs for payers were compared. Community hospitals cost substantially less. Average difference = **\$10,000 less per case**

## 2. Academic Medical Centers

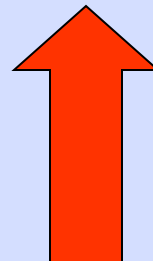
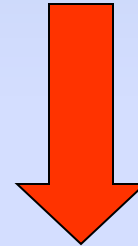
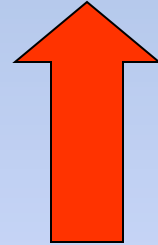
Post Tele-ICU average cost to all payers was **\$2,600 less per case**

# Financial Impact on Payers: Estimated Annual Benefit in Massachusetts

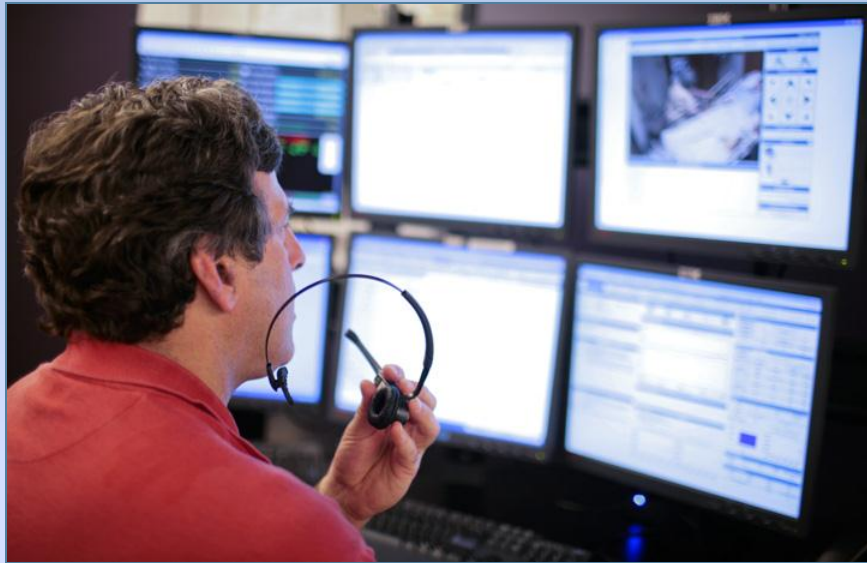


UMMMC	\$12	million
Community Hospitals 1 and 2	2.6	million
Other AMCs	\$27	million
Other community hospitals	\$80	million
Total	\$122	million

# The Perfect Storm



# “It’s a Home Run!”



=



**If Tele-ICU allows us to improve quality of care and reduce cost, then we need to move ahead as quickly as possible to achieve this win-win-win for patients, providers, and payers**



## Next Steps: Massachusetts

- **Recruit Massachusetts hospitals** to implement Tele-ICU
- **Educate the state's ICU community,** hospital leadership, payers and policymakers about the benefits of intensivist staffing via Tele-ICU.
- **Advocate for policy change to promote Tele-ICU adoption.**

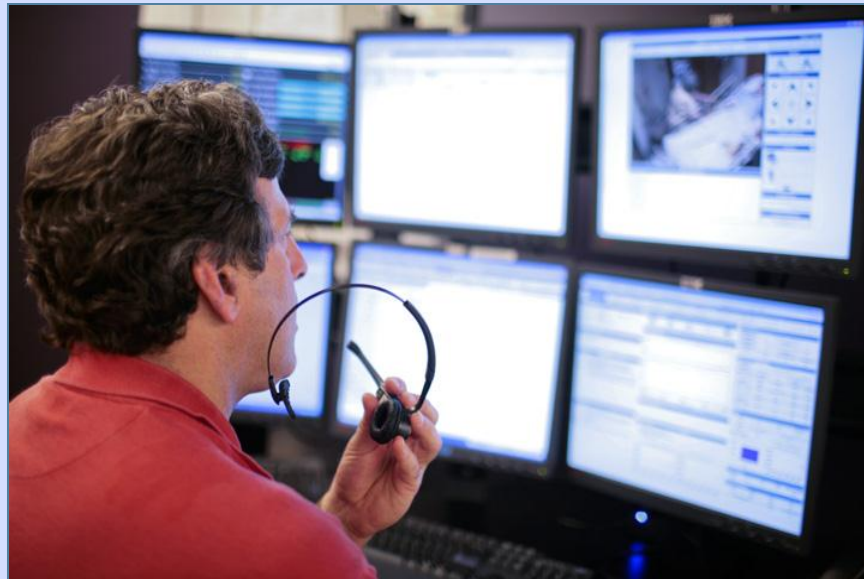
- Study finds telehealth use lowers mortality, length of stay in ICUs
  - Iowa City Veterans Affairs Medical Center
  - Meta-analysis of 13 published studies, 2004-2010
  - ICU impact: 20% decline in ICU mortality
  - ICU impact: decrease in ICU ALOS by 1.26 days
  - No effect on in-hospital mortality or hospital LOS

# The intensivist effect on ICU outcomes

- Society for Critical Care Medicine reports:
  - National shortage of intensivists
    - 8,000 intensivists staff 6,000 ICUs
    - By 2020, the supply of intensivists will meet 35% of demand
  - Intensivist care results in better ICU outcomes:
    - Lower ICU mortality (6% with intensivists versus 14% without intensivists)
    - 30 percent reduction in length of stay
    - Lower ICU costs

# Tele-ICU leverages critical care resources

- Tele-intensivists are critical care physicians who practice medicine via interactive audio-visual equipment (tele-ICU)
- One tele-ICU command center can provide care for up to 500 patients, with staffing constellations of one tele-intensivist, 4 critical care nurses and a pharmacist to care for 75 ICU patients



# Tele-ICU: A new critical care nursing sub-specialty

- Tele-ICU in community hospital settings increases ICU patient volume and acuity
- American Association of Critical Care Nurses (AACN) has approved a new certification for tele RN's (CCRNe)

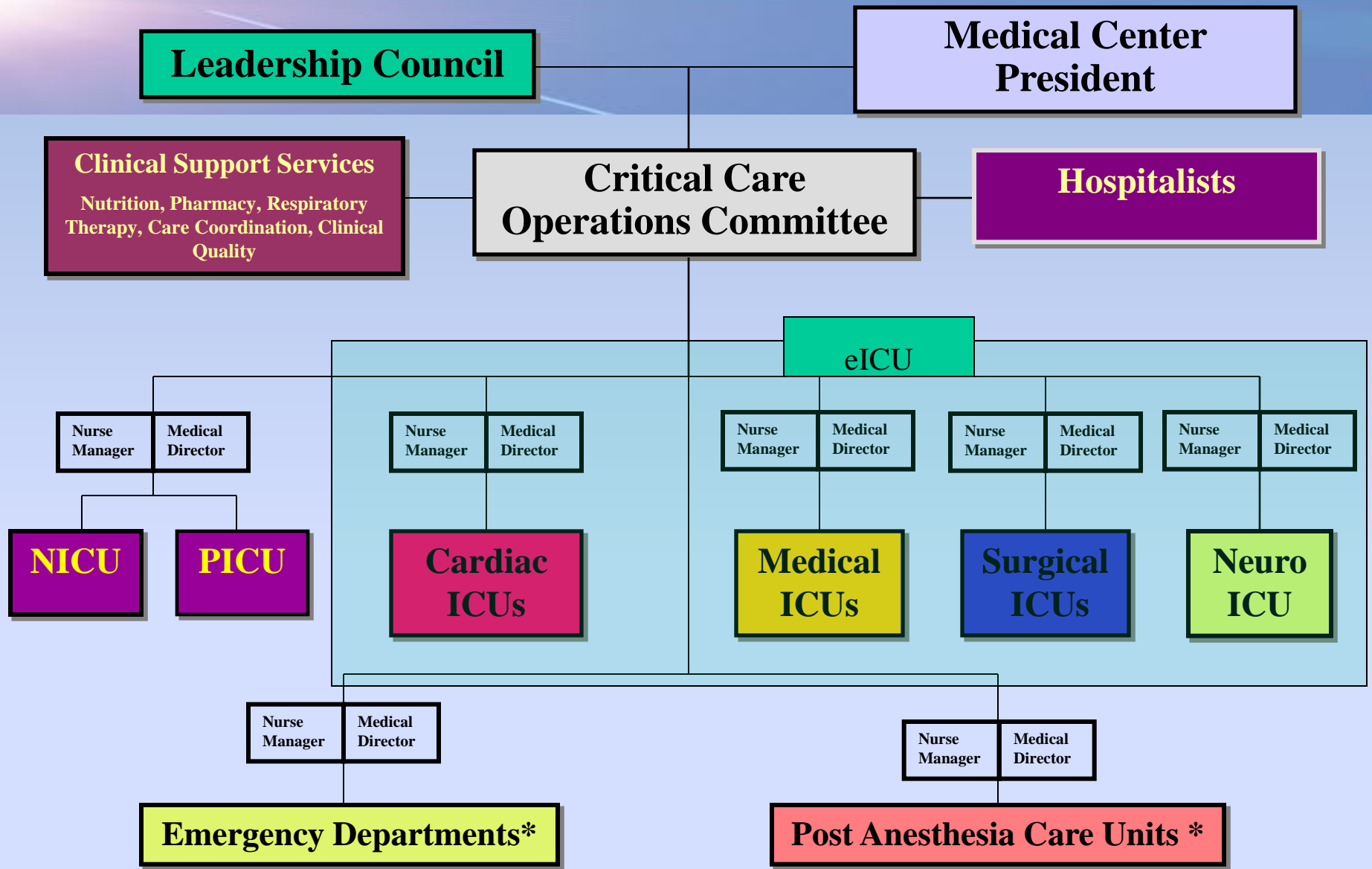


# The UMassMemorial Experience

- Why eICU
  - Support infrastructure
    - Critical Care Operations
  - Improve quality
    - Best Practices
- Lessons Learned

# Medical Center Structure- Critical Care Organization

- A single administrative structure for Critical Care
  - Task Forces
  - Developing and refining Clinical Practice Guidelines
  - Agreement on best practices
  - Outreach through education
  - Best practice adherence- ICU daily goals
  - Measurement
  - Reporting
  - Real-time intervention
  - Accountability



\* For Critical Care Functions



# Mechanisms that link ICU processes of care to outcomes

## Process steps added by the tele-ICU intervention

### Earlier Recognition of Physiological Instability

- Bedside monitor alarms
- Physiological trend alerts
- Abnormal lab value alerts
- Continuous alert monitoring by off-site team
- Off-site team review of response to alerts
- Rounding by off-site providers

### Best Practice Reminders

- ICU daily goal sheet
- Real-Time Audits**
- ICU nurse manager
- Tele-ICU Team

### Off-hours Intensivist Admission Review

- Bedside provider initiated
- Verbal report
- Alerts can prompt Intensivist to initiate
- Review can include:**
- Radiological images
- Electronic medical record
- Communication with the patient or nurse

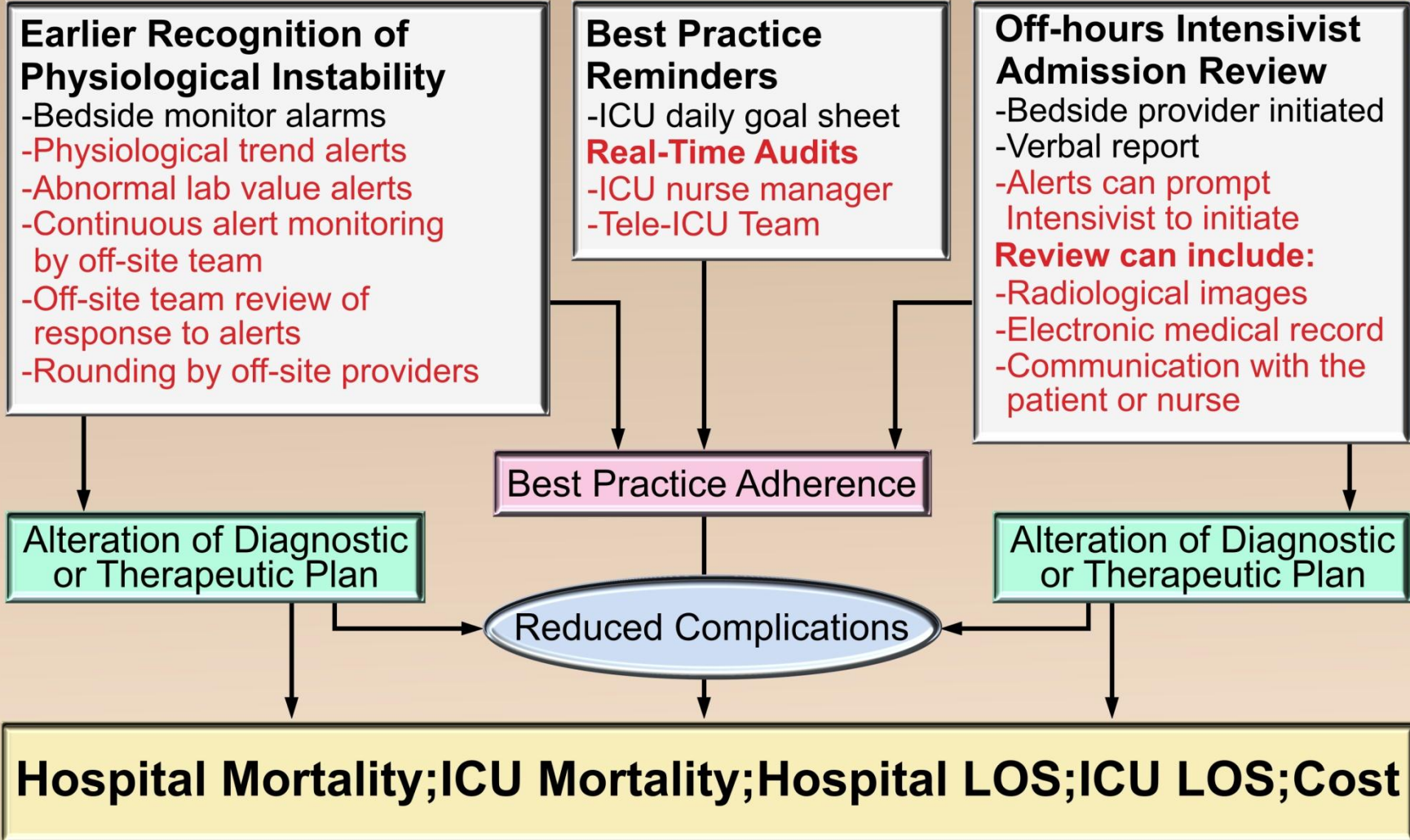
Best Practice Adherence

Alteration of Diagnostic or Therapeutic Plan

Alteration of Diagnostic or Therapeutic Plan

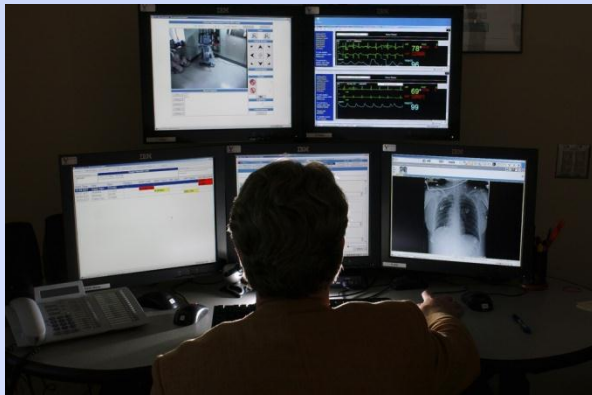
Reduced Complications

Hospital Mortality;ICU Mortality;Hospital LOS;ICU LOS;Cost



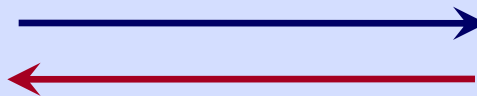
## *Improving Critical Care Delivery*

- Telemedicine tools for monitoring and intervening

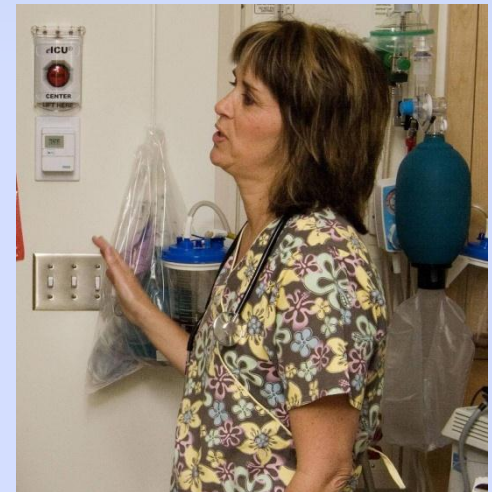


Real time patient monitoring

New pathways for  
communication



Access to an intensivist  
at the touch of a button



# Nurse Manager Rounding Tool

Form1 - Microsoft Office InfoPath 2003

File Edit View Insert Format Tools Table Help

Submit

Verdana 10

Type a question for help

### UMMHC Critical Care Nurse Manager's Rounding Tool

Unit: **3ICU University**      Census Date:      © 2007 UMassMemorial. All rights reserved

Bed	Patient	Unit LOS	Median Glucose	Protocol Ordered?	Central Line / Duration	Femoral / Hi-Risk?	CHG Dressing	Vented? Days / PUD	Sed.Hol. Perf?	Pain Doc. / RASS Doc. / Weight Doc.	HOB Doc. / Oral Hyg. Doc.	HOB Contr?	DVT Protocol
ICU360		10 <input type="checkbox"/>	112.00 <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Cent.Line 11 <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> 10 Proton p	<input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/>	Combined device and drug therapy
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Insert Item

CPG Areas

Select CPG

# Rates of Adherence to Best Practice Guidelines Increased Significantly

<b>Clinical Practice Guideline Adherence</b>	<b>Pre-intervention Group Percent (n/eligible)</b>	<b>Tele-ICU Group Percent (n/eligible)</b>	<b>P value</b>
Stress Ulcer Prophylaxis	83 (1253/1505)	96 (4550/4760)	< 0.001
DVT Prophylaxis	85 (1299/1527)	99.5 (4707/4733)	< 0.001
Acute Coronary Syndrome	80 (311/391)	99 (2866/2894)	< 0.001
Ventilator Associated Pneumonia Prevention	33 (190/582)	52 (770/1492)	< 0.001

# Lessons Learned

- Start small, one unit at a time, learn from each one
- To ring or not to ring-how intrusive should one be “taking the back seat”
- Empower the ICU Leadership and practitioners, it is “their tool”
- Use the system to it’s full extent (i.e. Quality)
- Communication, Communication, Communication