

# PHILIPS

sense and simplicity

## Clinical Decision Support

Bas van Breugel  
Philips Healthcare

*“It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change”.*

Charles Darwin

Does a PDMS solve the following 'issues'?

National Data Sets

Data security

Staff shortages

Budgetary restrictions

DRGs

HIPAA

Integrated care

Quality management

Data-/Process analysis

Cost

Evidence-based medicine

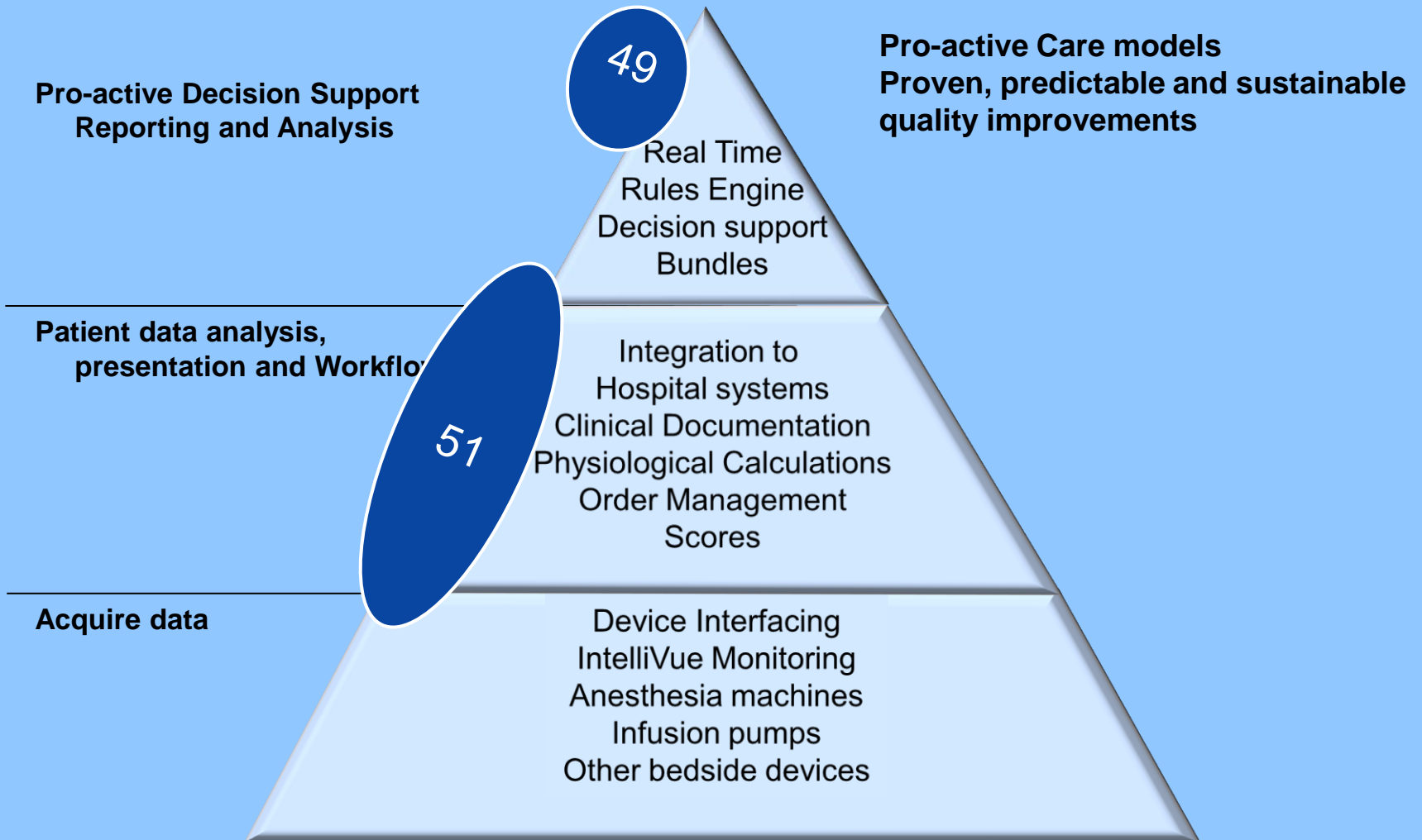
reduction

Not on it's own

Management reporting

Medication Errors

# Question 1: What is your goal?

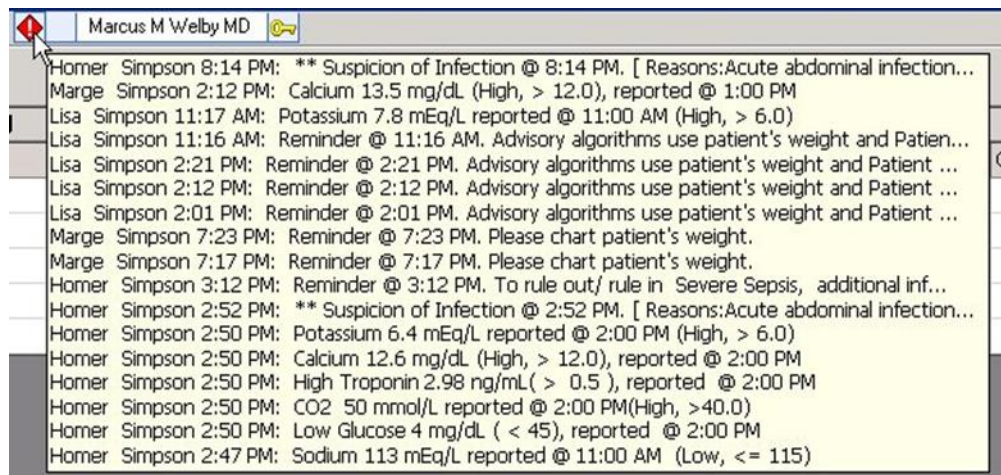


# ICCA Clinical Decision Support

## Standard Advisories

### Advisories

- Over 75 built in clinical advisories



**10:11: Reminder @ 10:11. To rule out/ rule in Severe Sepsis, additional information requested :Bilirubin:Platelets:Creatinine:Lactate:SPO2:MA...**

<p><b>AT_BSIDailyCo mpl_01</b></p>	<p>This advisory will fire at 11:00 PM if the patient currently has a central line that was not documented as inserted today, or was not removed already today. Advisory will remind the user to chart, "assessment for removal" for the central line if it has not already been charted during the current day. 24 hour refractory, 10 hour persistence</p>	<p>" Advisory Reminder @ {time}: Central Line Bundle Daily Review; please chart {daily assessment for removal}"</p>
--	--	---

# ICCA Clinical Decision Support

## Standard Bundles

- Sepsis Resuscitation & Sepsis Management
- Glycemic Control
- Prevention of Central Line Blood Stream Infections
- Prevention of Ventilator Associated Pneumonia
- Prevention of Stress Ulcer Disease
- Prevention of Deep Vein Thrombosis

Admission Documents | Summary | Forms/Checklists | Orders | Notes | Flowsheets

Bundles Worksheet | 1/15/2007 | 9:00 AM

[Auto-chart every 1hr]

Infection Assessment 2:

- HOB elevation 31
- HOB elevation 31
- Contraindicated
- DVT prophylaxis Heparin
- DVT prophylaxis Heparin
- Contraindicated
- SUD prophylaxis Antacids
- SUD prophylaxis Antacids
- Contraindicated
- Hold Sedation Yes
- Hold Sedation Yes
- Contraindicated
- Assess for weaning Yes

**Infection Assessment**

**VAP Assessment**

Ventilator Associated Pneumonia

NOTE: Consider VAP only if Continuous Ventilation time => 48 hours

- Ventilator Associated Pneumonia
  - VAP: Abnormal Temperature
  - VAP: Abnormal WBC (x1000/mcl)
  - VAP: Sputum Description
  - VAP: CXR Infiltrates
  - VAP: Decr PaO2/FiO2
  - VAP Confirmed by Clinician
- Culture Results

**BSI Assessment**

- Catheter-related Bloodstream Infection

**Sepsis Assessment**

- History and Symptoms of new infection
- Sepsis Assessment Data
- Presentation

Admission Category

IHI Compliance by Element

VAP Compliance by Element

Incidence/Compliance

3

Month	Year	Vent Days	DVT Count	DVT Compliance	SIB Count	SIB Compliance	HOB Count	HOB Compliance	Hold Sedation Count	Hold Sedation Compliance	Weaning Count	Weaning Compliance
July	2007	26	22	85%	23	88%	19	73%	23	88%	22	85%
August	2007	30	20	67%	20	67%	12	40%	20	67%	20	67%

4

**Getting Started Kit: Prevent Ventilator-Associated Pneumonia How-to Guide**

5 million lives FROM HARM

2 Symptoms of possible infection @:06. Reasons: Hyperthermia: Tachypnea. Please add "InfectionAssessment form"

# ICCA Clinical Decision Support

## *Does it work?*

- Yes, but . . . .
  - Only when:
    - Goals were set at the start of the project
    - Management buy in
    - Clinical staff buy in and engagement
    - Make it an integral part of the care in the department (bonus)
    - Make it a continuous effort, not a one-shot
    - Do one thing at the time
    - Adopt the bundle / protocol when needed

# ELIMINATING CATHETER RELATED BLOODSTREAM INFECTION ON THE INTENSIVE CARE UNIT: NOT A MYTH!

T. Szakmany<sup>1,2</sup>, T. Pain<sup>1</sup>, P. Beckett<sup>1</sup>, H. Jerrett<sup>1</sup>, A. Hermon<sup>1</sup>

<sup>1</sup>Royal Glamorgan Hospital, Anaesthetics, Theatres and Critical Care, Llantrisant, UK, <sup>2</sup>Cardiff University, Anaesthetics, Intensive Care and Pain Medicine, Cardiff, UK

## Background

- Catheter related bloodstream infection (CRBSI) is still a common problem on UK ICUs
- 42.3% of bloodstream infections in England are central line-related  
Tacconelli E et al. J Hosp Infect 2009;72:97-103
- National Audit Office (2000) estimated the additional cost of a bloodstream infection to be £6,209 per patient
- The surveillance of central venous catheter (CVC) related infections became mandatory in Wales on the 1<sup>st</sup> September 2007 utilising HELICS defined infection criteria (Table 1).
- Implementation of care bundles have been advocated to reduce the infection rate  
Pronovost PJ et al. BMJ 2010 Feb 4;340:c309. doi: 10.1136/bmj.c309.

## Objective of the study

The aim of the study was to identify the different factors leading to reduction and elimination of CRBSI on our unit

## Methods

- Retrospective audit on the rate of CRBSI for a three months period before the implementation of the CVC bundle provided baseline data.
- Prospective audits for the corresponding three months were carried out after the CVC bundle was firmly embedded in clinical practice.
- We collected data on overall compliance with the bundle, mean dwell time, number of CRBSIs, site of infection and whether the patient left the unit with a CVC line in situ.
- For statistical analysis Chi-square test and Wilcoxon test were used.

## The CVC bundle consisted:

- hand hygiene (alcohol gel)
- barrier precautions on insertion (cap, sterile gloves, sterile gown, mask)
- 2% chlorhexidine skin preparation
- using femoral site as last resort
- daily review of necessity of central access
- daily inspection of insertion site
- use of TPN on a dedicated port
- maintaining asepsis when accessing the line

Table 1. CRBSI DEFINITION FOR USE IN CENTRAL VENOUS CATHETER RELATED INFECTIONS

**Local Infection**

- The patient shows infection at the catheter insertion site but it is not related to a pre-punctured wound or catheter tip colonization.

**General Venous Catheter Infection - General Infection**

- A patient develops an infection (fever, bacteraemia, septicaemia, endocarditis) that cannot be explained by any other condition or infection.

**General Venous Catheter Infection - Bloodstream Infection**

- The patient has a positive blood culture with a microorganism.
- The patient has a positive culture from a sterile site (e.g. joint, pleural space, peritoneum) or other site that is not related to any other condition or infection.

**NI - A blood culture positive ESR or other test result can also be included in the definition of local infection.**

**And a positive culture with the same organism of either:**

- any positive culture
- any positive culture from a sterile site
- any positive culture from a sterile site
- any positive culture from a sterile site
- any positive culture from a sterile site

**Definition of CRBSI: CRBSI is defined as a positive blood culture with the same organism as the organism cultured from the insertion site within 48 hours of catheter insertion or within 48 hours of catheter removal.**

**Reference:** An international definition of infection (CRBSI). Hospital Infection 11, September 2006

## Results

Compared to the initial audit period, we have observed:

- Increase in the compliance with the bundle
- Sustained reduction in mean dwell time
- Reduced CVC related infection rate
- Less patients transferred to the ward with CVC in situ
- We have seen a marked reduction in the rate of CRBSI once we changed to antiseptic impregnated catheters in 2009 (ArrowGuard Blue Plus, Arrow, UK)
- Compliance was enhanced by the introduction of pre-packed CVC insertion packs in 2010
- Once compliance with the CVC bundle reached 100% for more than a year we have not experienced any CRBSI

Year (quarter)	Cathet or days	CVCs inserted (n)	CVC mean dwell time (days)	Bundle compliance	CRBSI (n)	CRBSI/1000 catheter days	Patients transferred to ward with CVC in situ (n)
2006 (Q4)	503	114	4.41	55%	8	15.9	61
2007 (Q4)	628	122	5.14	92%	4	6.4	52
2008 (Q1)	547	103	5.30	96%	1	1.8*	42
2008 (Q2)	561	125	4.48	98%	2	3.6*	43
2008 (Q3)	493	105	4.69	98%	2	4.1*	39
2008 (Q4)	511	104	4.91	100%	0	0.0*	23
2009 (Q1)	570	123	4.63	100%	2	3.5*	21*
2009 (Q2)	518	83	6.24	100%	0	0*	10*
2009 (Q3)	537	111	4.83	100%	0	0*	8*
2009 (Q4)	635	127	5.00	100%	1	1.6*	9*
2010 (Q1)	724	117	6.18	100%	0	0*	6*
2010 (Q2)	451	92	4.90	100%	0	0*	4*
2010 (Q3)	626	103	6.07	100%	0	0*	2*
2010 (Q4)	621	114	5.44	100%	0	0*	3*

\* p<0.05

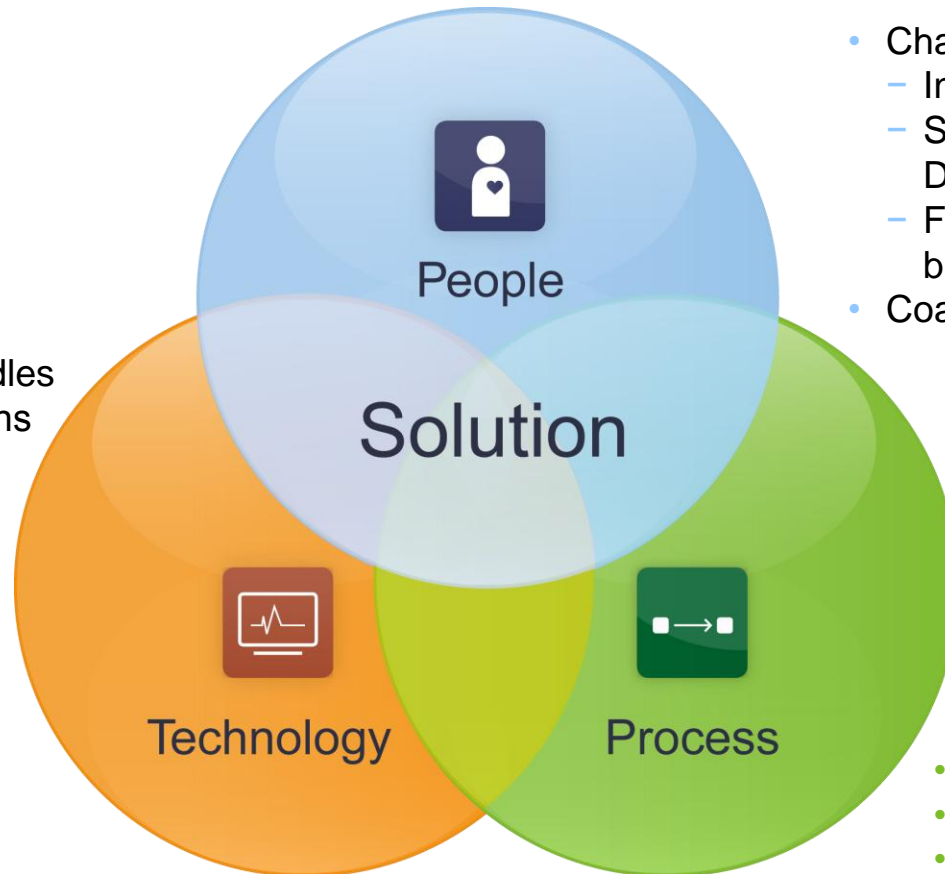
## Conclusion

- Our data shows that implementation of care bundles can significantly and sustainably reduce and eliminate CRBSI on the ICU in a real life setting.
- 100% compliance with the bundle over a sustained period seems to be necessary to eliminate CRBSI completely.
- The use of CIS enables us to display real-time compliance data, which reinforces this message.
- Interestingly, a significant drop in CRBSI rate coincided with the introduction of new CVCs and since the application of the pre-prepared CVC insertion packs we have not experienced any infections.

# ICCA Clinical Decision Support

## *Solution one: The “Fighting Sepsis” program*

- ProtocolWatch
- ICCA Sepsis Bundles
- “Low tech” solutions



- Change management
  - Increase awareness
  - Staff training: Emergency Department (ED) and/or ICU
  - Foster collaboration between departments
- Coaching

- Assess status quo
- Select and prioritize goals
- Redesign process, implement and monitor

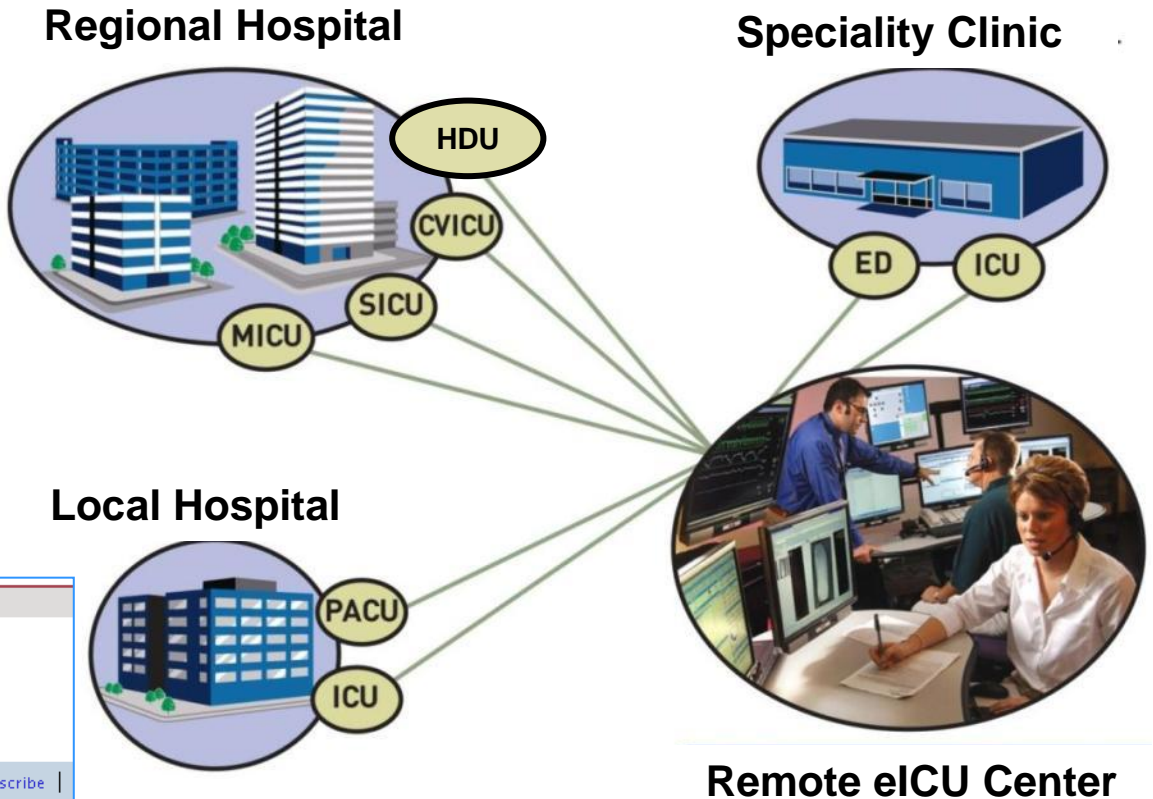


## eICU program

### *Solution two: technology enabled Care Model*

*Leveraging scarce resources to create a system-wide safety net*

*Manages patient populations across high acuity patients*



# JAMA<sup>®</sup>

The Journal of the American Medical Association

[Home](#) | [Current Issue](#) | [Past Issues](#) | [Topic Collections](#) | [CME](#) | [Multimedia](#) | [Subscribe](#)

#### Highlights in This Issue

##### ONLINE FIRST | CARING FOR THE CRITICALLY ILL PATIENT

Hospital Mortality, Length of Stay, and Preventable Complications Among Critically Ill Patients Before and After Tele-ICU  
Reengineering of Critical Care Processes

» [Free Full Text](#)

# eICU program

## Third party validated: predictable, sustainable

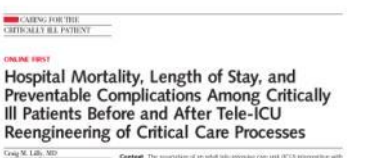
# 23%

### Severity Adjusted ICU Length of Stay

# 22%

### Severity Adjusted ICU Mortality

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



**Semi-Ane Perioperative**  
Technology strategies to improve patient outcomes

March 2015

Michael J. Breslow, MD, FCCM, David

**MARKETING AND PLANNING LEADERSHIP COUNCIL**

**Trends in and Considerations for Implementing eICU Technology**

Original Inquiry Brief • November 18, 2015

**CHEST** Clinical Commentary

**Changing the Work Environment in ICUs to Achieve Patient-Focused Care\***

The Time Has Come

Kathleen McCaughey, RN, CCRN, PhD, and Richard E. Brown, MD, FCCP

**HEALTH ECONOMICS**

**Impact of an Intensive Care Unit Telemedicine Program on a Rural Health Care System**

Edward T. Zawadzki, Jr., MD, MACCP

Patricia Herr, RN, CCRN  
Dorinda Larson, RN  
Robert Franklin, MD, MPH, PhD  
David Erickson, MD

**Journal of Critical Care**

**Remote ICU care programs: Current status**

Michael J. Breslow, MD, FCCM

Research & Development, FISICU, Dr. Baltimore, Maryland 21202, USA

**NEHI** New England Hospital Institute

**24/7 In-House Intensive Care Coverage**

March 2015

Michael J. Breslow, MD, FCCM, David

**HEALTH ECONOMICS**

**Impact of an Intensive Care Unit Telemedicine Program on a Rural Health Care System**

Edward T. Zawadzki, Jr., MD, MACCP

Patricia Herr, RN, CCRN  
Dorinda Larson, RN  
Robert Franklin, MD, MPH, PhD  
David Erickson, MD

**HEALTH ECONOMICS**

**Intensive care unit telemedicine: Alternate paradigm for providing continuous intensive care**

Brian A. Rosenfield, MD, FCCM, FCCP; Todd Dorman, MD, FCCM; Michael J. Breslow, MD, FCCM; Peter Protopopod, MD, PhD; Mollie Jenkins, MS; Nancy Zhang, PhD; Gerard Anderson, PhD; Hays Rubin, MD, PhD

**Journal**

**Prognostic Outcomes After the Initiation of an Electronic Telemedicine Intensive Care Unit (eICU)\* in a Rural Health System**

Edward T. Zawadzki, Jr., MD, MACCP; David Kapinski, PhD; Hays Rubin, RN, CCRN; Michael Anderson, MD; James Bennett, DVM; Bruce Forsberg, MD, FCCP; Donald Bushnell, MD; William Dugan, MD; David Koroloff, MD; Tina Maheshwari, MD; Kelly Bland, MD; Thomas Johnson, PharmD; Aroon Kulkarni, MD

**Journal of Critical Care**

**Remote ICU care programs: Current status**

Michael J. Breslow, MD, FCCM

**NEHI** New England Hospital Institute

**24/7 In-House Intensive Care Coverage**

March 2015

Michael J. Breslow, MD, FCCM, David

**HEALTH ECONOMICS**

**Impact of an Intensive Care Unit Telemedicine Program on a Rural Health Care System**

Edward T. Zawadzki, Jr., MD, MACCP

Patricia Herr, RN, CCRN  
Dorinda Larson, RN  
Robert Franklin, MD, MPH, PhD  
David Erickson, MD

**HEALTH ECONOMICS**

**Intensive care unit telemedicine: Alternate paradigm for providing continuous intensive care**

Brian A. Rosenfield, MD, FCCM, FCCP; Todd Dorman, MD, FCCM; Michael J. Breslow, MD, FCCM; Peter Protopopod, MD, PhD; Mollie Jenkins, MS; Nancy Zhang, PhD; Gerard Anderson, PhD; Hays Rubin, MD, PhD

**Journal**

**Prognostic Outcomes After the Initiation of an Electronic Telemedicine Intensive Care Unit (eICU)\* in a Rural Health System**

Edward T. Zawadzki, Jr., MD, MACCP; David Kapinski, PhD; Hays Rubin, RN, CCRN; Michael Anderson, MD; James Bennett, DVM; Bruce Forsberg, MD, FCCP; Donald Bushnell, MD; William Dugan, MD; David Koroloff, MD; Tina Maheshwari, MD; Kelly Bland, MD; Thomas Johnson, PharmD; Aroon Kulkarni, MD

**Journal of Critical Care**

**Remote ICU care programs: Current status**

Michael J. Breslow, MD, FCCM

# Combination

## CLINICAL TRANSFORMATION

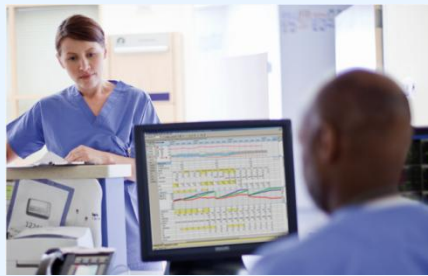
### People

**Clinical Experts and Champions in quality improvement and Change Management**



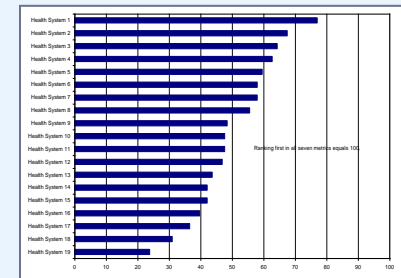
### Technology

**Enabling tools  
Continuous monitoring  
Interoperability**



### Process

**System-wide approach to critical care  
Standardization of care Bundles**



**Proven, Predictable, and Sustainable RESULTS**

# Turn it upside down

