

Clinical and Financial Successes at Advocate Health Care Utilizing our Tele-ICU Program

June 2, 2016

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With Acknowledgement of:
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Medical Director Adult Critical Care and eICU
Advocate Health Care



Objectives

- The success of telemedicine is not just about the technology, but how you use it
- Understand how tele-ICU can achieve clinical and financial benefits across a large healthcare system
- How population management tools can be employed collaboratively between the tele-ICU and ICU to improve patient outcomes and realize financial benefits
- Demonstrate how gap analysis affords an opportunity for telemedicine to improve evidence-based practice adherence in the ICU
- Verbalize how the tele-ICU is a facilitator of change management as much as an “intervention”

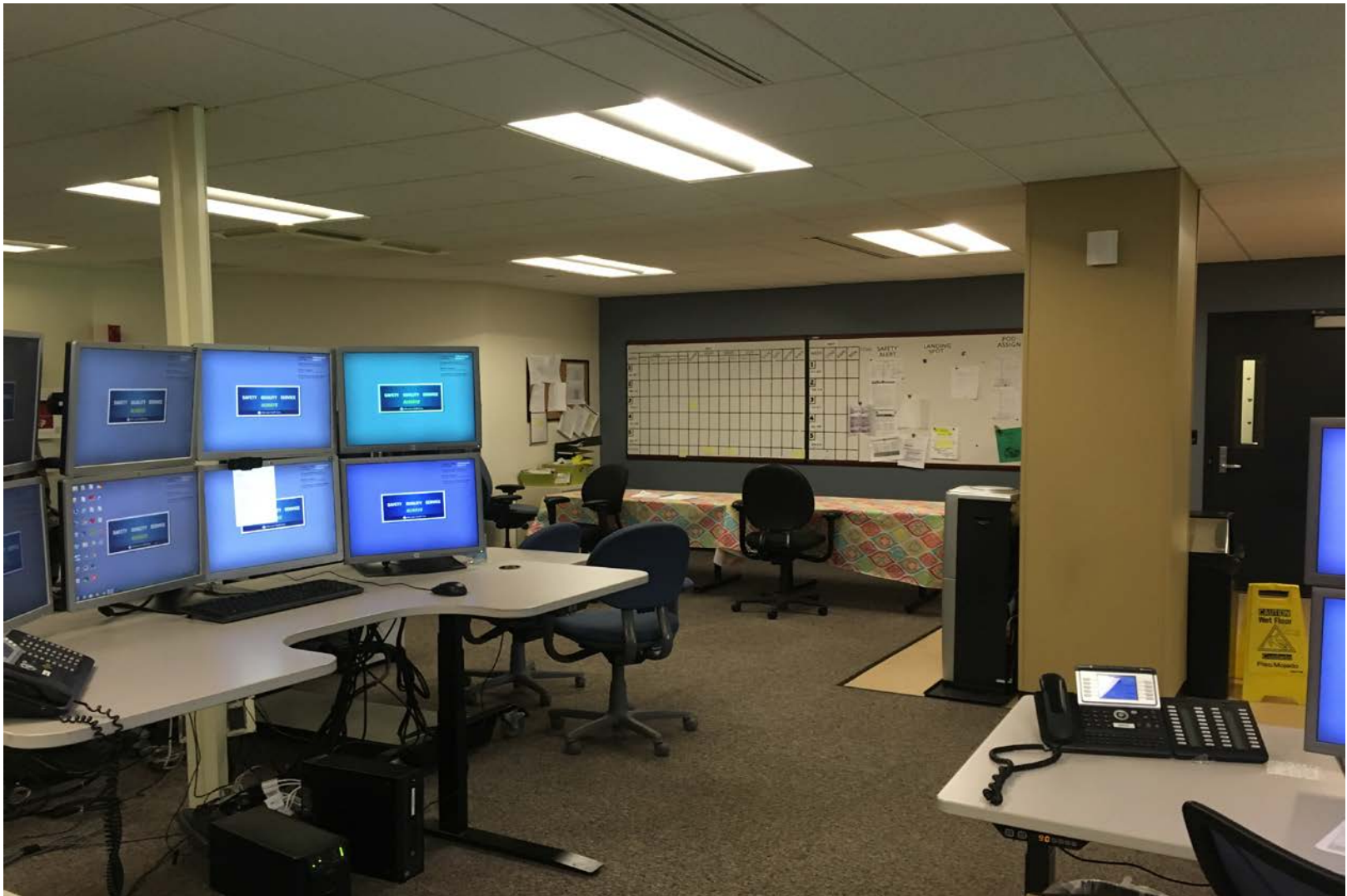
Advocate Critical Care

- 10 hospitals / Five Level One Trauma Centers
- 16 ICUs
- > 6000 physicians / > 100 Intensivists
- Total = 393 beds
 - 296 Critical Care beds (plus three Outreach programs = 97 additional beds)
 - eMobile carts in the ED (N = 7)
 - Critical Access Hospital with eMobile cart
- > 24,000 ICU Admissions in 2014
 - Ventilator days: 29,706 on 6,419 cases
 - Total direct costs for days while the patients were treated in the ICU (excluding ED and OR costs) were approximately \$200M or 17% of direct costs for inpatients
- eIntensivist and eRN coverage 24/7/365 with board certified critical care physicians

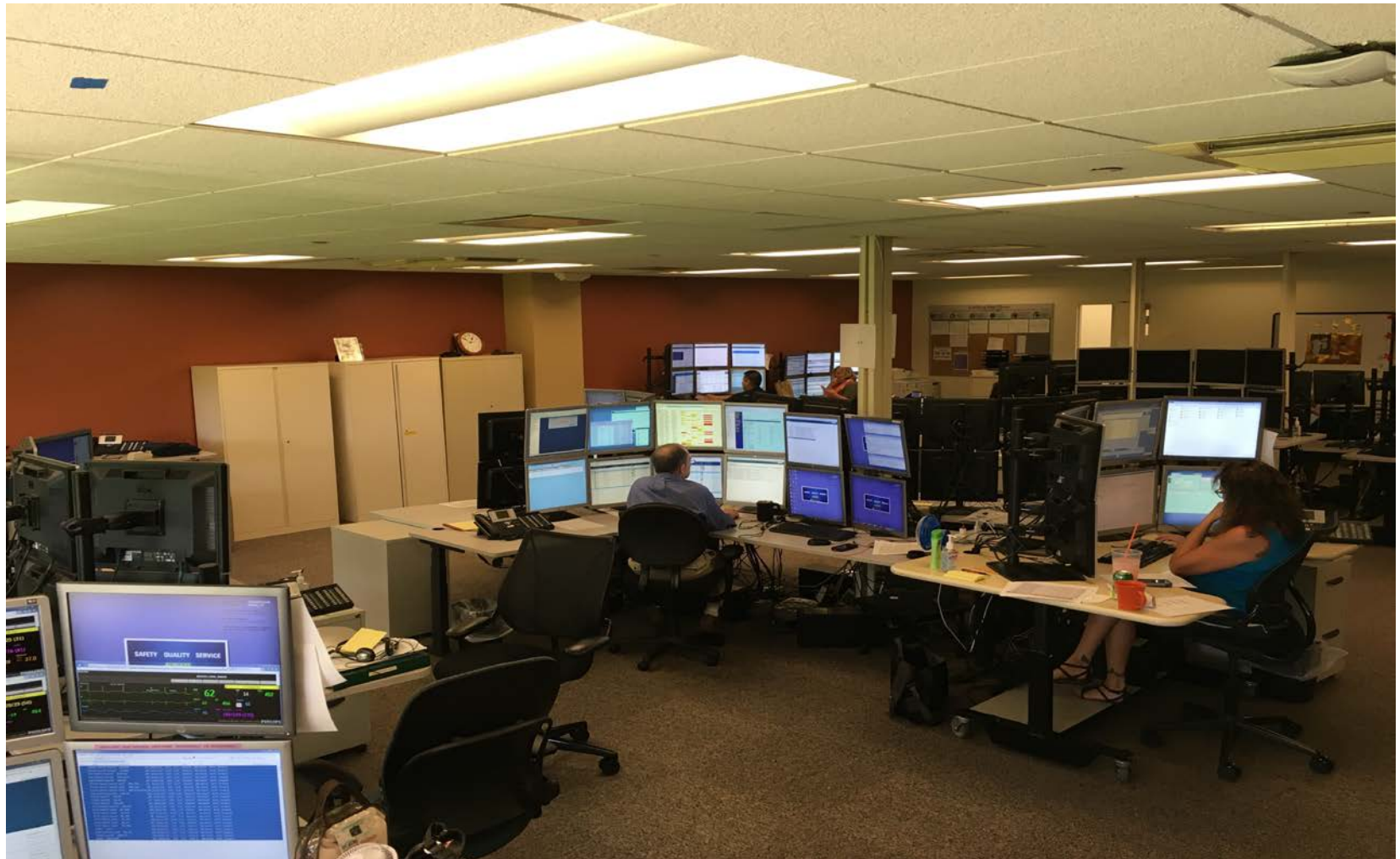
Tele-ICU at Advocate

ICU-Telemedicine is care provided to critically ill patients by off-site clinicians using audio, video, and electronic links to leverage technical, informational, and clinical resources.

A View of the eICU CORE



A View of the eICU CORE



A View of the eICU CORE



eIntensivist Workstation



View into a patient room from the eICU



Saved Positions

Save	default (default)
Restore	
Rename	
...	

Two-Way View from eICU Perspective

eCareManager System

Navigation View Camera About

Previous Patient Next Patient

H 320601 Patient, Test (Gender: Not Specified) DOB: Not Specified PID: 01282015 Account #: Not Specified ADVOCATE HEALTH CARE : CONDELL : CND-IC



Zoom Control

Camera Control

Camera Assistance:
None

Volume

Camera Speed

Low Light Settings

Enable Low Light [Configure](#)

Saved Positions

Save	home (default)
Restore	IV monitor
Rename	
Delete	
Re-save	

2-Way Webcam Video

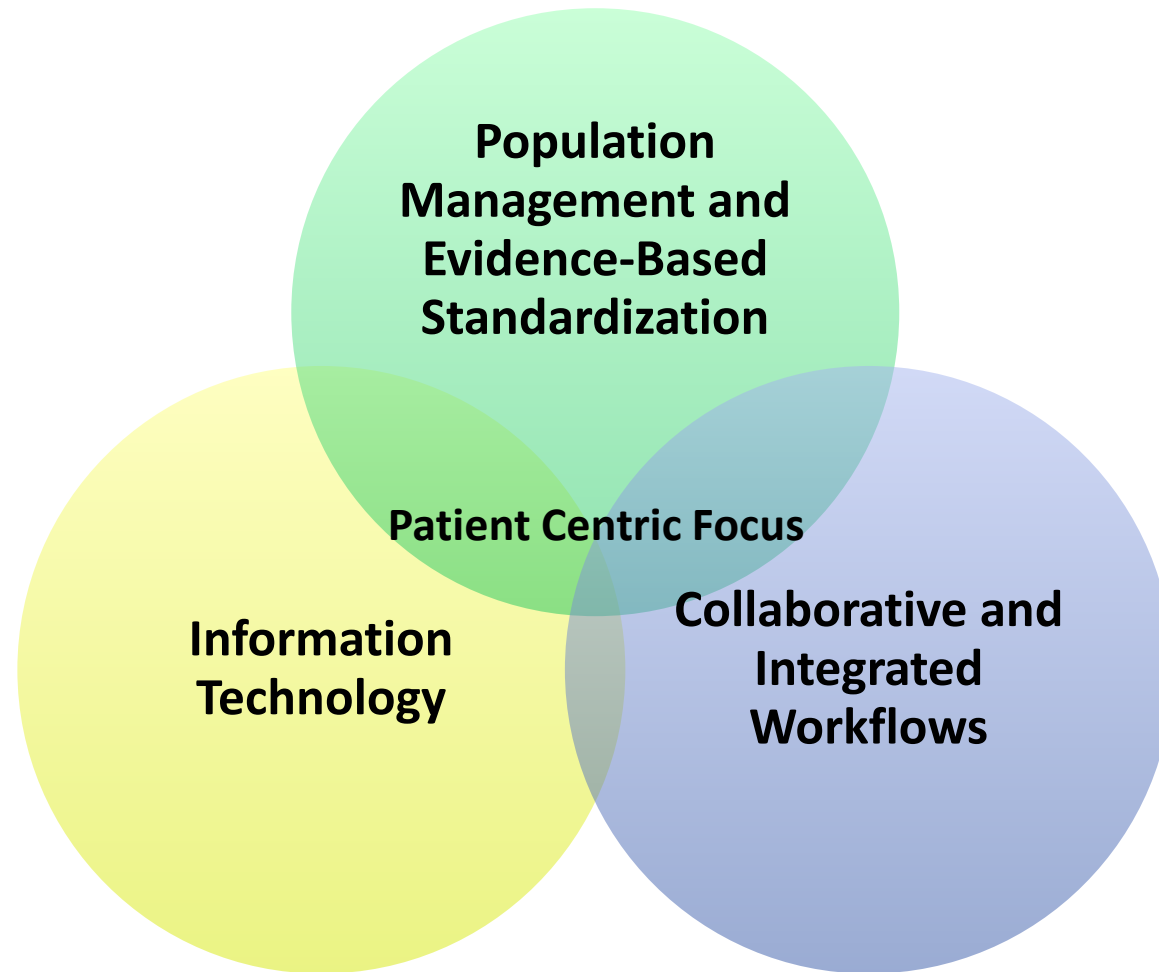


Send video to bed
 Show preview
[Configure](#)

Active Sessions

User	Connected Since	Location	Status
Nikolich, Sanja (MD)	02/09/2015 11:36:14	eICU	Has Camera Control

Transformation to Integrated Care



Benefits/ROI/VOI

▶ Clinical

- Reduced mortality
- LOS
- Reduce adverse events
- DVT
- Sepsis Mortality
- Ventilator days/VAP's
- CLABSI's
- Reduce Transfusions
- Improve nutrition
- Increase mobility

▶ Financial

- Leapfrog compliant
- Reduced costs ("avoid harm", fewer complications, VAPs, ADE's, sepsis, cost of 24/7 onsite intensivists....)
- Reduced LOS
- Increased Capacity
- Reduce unnecessary tests, xrays
- Reduce transfers to higher level facility

▶ Other

- Standardize the delivery of ICU care (workflows and protocols)
- Leverage scarcity of board-certified intensivists
- Facilitate Data Reporting
- Process Flow Variability (Gap Solutions)
- Avoid sleep deprivation
- Housestaff training and satisfaction
- Nurse satisfaction
- Support of less experienced RN's
- Patient/family satisfaction
- Decrease burnout of clinicians
- Extend Intensivist and critical care nurse career (most experienced)

Variance in Practice of Tele-ICU

- Technology
- Types of ICU's
- Bedside intensivist staff model
- Bedside documentation/CPOE availability
- Remote center staffing patterns
- Qualifications of providers
- Hours of Operation
- Buy-in by bedside clinicians
- Adherence to best practices
- Use of quality and safety information
- Intensivist handover of their patients
- Community v. Tertiary Facility
- Teaching v. Non-teaching

What Does Tele-ICU do to Improve Quality?

- Disease Management
 - Acute interventions
 - Patient surveillance for proactive intervention
- “Population Management” – Best Practices
- System Engineering
- Support Individual Unit Special Needs – Process flow variability through “gap analysis”
- Education
 - Resident eRounds
 - Nurse Mentoring

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What Acute Issues Does Tele-ICU Deal With?

- “First look” at all new admissions (seen within 30 minutes)
- Ventilator issues
- Arrhythmias, especially atrial fibrillation with rapid ventricular response
- Hypotension
- Electrolyte abnormalities
- X-ray checks requested by residents or nursing
- MD presence at code, RRT transfer, or before on-site MD arrival
- Adjustment of sedation
- Need for GI prophylaxis
- Ventilator liberation assistance
- Antibiotic stewardship
- Glucose management

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“Population Management”

- VAPs prevention
- DVT prophylaxis
- CLABSI Prevention
- Sepsis screen
- Ventilator liberation
- Multidisciplinary Rounding Tool
- Sedation Management
- CPR Auditing
- eNutrition
- ePharmacy
- Palliative Care
- CAUTI Prevention
- Ventilator Induced Lung Injury (VILI)

eICU Report Sheet

Report Sheet

TEST TEST1 Unit Hot ToDo HandOff

Add New Patient Refresh

29 eInterventions Logged in last 24hr, for Active Unit(s)

TEST - TEST1 - test1 test's 45 M MRN: 111111 Fin: 111111 Admitted 08/26/13 09:53

Acuity **Green** Respiratory NC Rhythm SR Full Code LET CXR Viewed 09/3/13 eN: ADD View Hot ToDo HandOff Discharge ADT

DX 09/3/13 12:00	HX 09/3/13 12:01	Drips 09/3/13 12:00	Notes 09/3/13 12:01	Problem/Mng 09/3/13 12:00	Sign Over 09/3/13 12:01	Hand Over 09/3/13 12:01
8/31 resp failure 2* bil pleural effusions s/p thoracentesis 1.5L off, pericardial effusion, septic shock Strep B sepsis w/ mult organ involvement	G2P2002 on PPD#11		9/2 erythema on R forearm outlined, monitored, Critical care aware	septic effusions	9/2 Strep pyogenes PNA w/ pleural & pericardial effusions post drainage, extubated, cleared lactate, CVP 4, HGB 6.9 >> 1 prbcs	9/2 pleuropericardial effusions, pleural cults + Strep Pyogenes, ECHO EF 50-55% w/ no valve abn, CT chest for 9/3

TEST - TEST1 - test2 Test, David 78 M MRN: 112322 Fin: 123211 Admitted 09/3/13 12:01

Acuity **Yellow** Respiratory CPAP Rhythm SR Full Code LET CXR Viewed 09/3/13 eN: ADD View Hot ToDo HandOff Discharge ADT

DX 09/3/13 12:03	HX	Drips 09/3/13 12:03	Notes 09/3/13 12:03	Problem/Mng 09/3/13 12:02	Sign Over 09/3/13 12:02	Hand Over
Abdominal Pain r/o Ischemic bowel Resp Failure		fentanyl	etoh abuse	9/3 abd US - cholecystitis	Met acidosis Liver failure ?acalculous cholecystitis going for cath -IABP? recheck post cath	

TEST - TEST1 - test3 Test, Jim 64 M MRN: 333333 Fin: 333333 Admitted 09/3/13 12:04

Acuity **Red** Respiratory Room Air Rhythm AF AVR 110s Full Code LET CXR Viewed eN: ADD View Hot ToDo HandOff Discharge ADT

DX 09/3/13 12:04	HX 09/3/13 12:05	Drips	Notes 09/3/13 12:05	Problem/Mng 09/3/13 12:05	Sign Over 09/3/13 12:05	Hand Over
Headache Vasovagal Near Syncope	Metastatic Breast Ca		Syncope, HA Abnl facial CT await final report	?opacification of LT maxillary sinus ?injury ?mets	await final CT reports	

Ventilator Associated Pneumonia(VAP) Bundle Assessment Screen

The screenshot displays the 'VAP-Compliance' software interface. At the top, there is a navigation bar with various menu items like 'Report Sheet', 'Admit Sheet', 'MRSA', 'eye Scoop', 'Calendar', 'Your Passwords', 'Change Password', and 'Logout / Quit'. Below this, a 'VAP-Compliance' window is open, showing a 'DVT / VAP' assessment form. The form includes a table of patient data and a detailed assessment form for patient SVTU03.

Bed	Name:	MRN	Add	Refresh	Compliant	Vent Lib	Vented	AM	PM
SVTU01			Edit		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
SVTU02			Edit		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
SVTU03			Edit		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

frmVbAdd : Form

Bed: is this patient Vented?

Mrn:

Name:

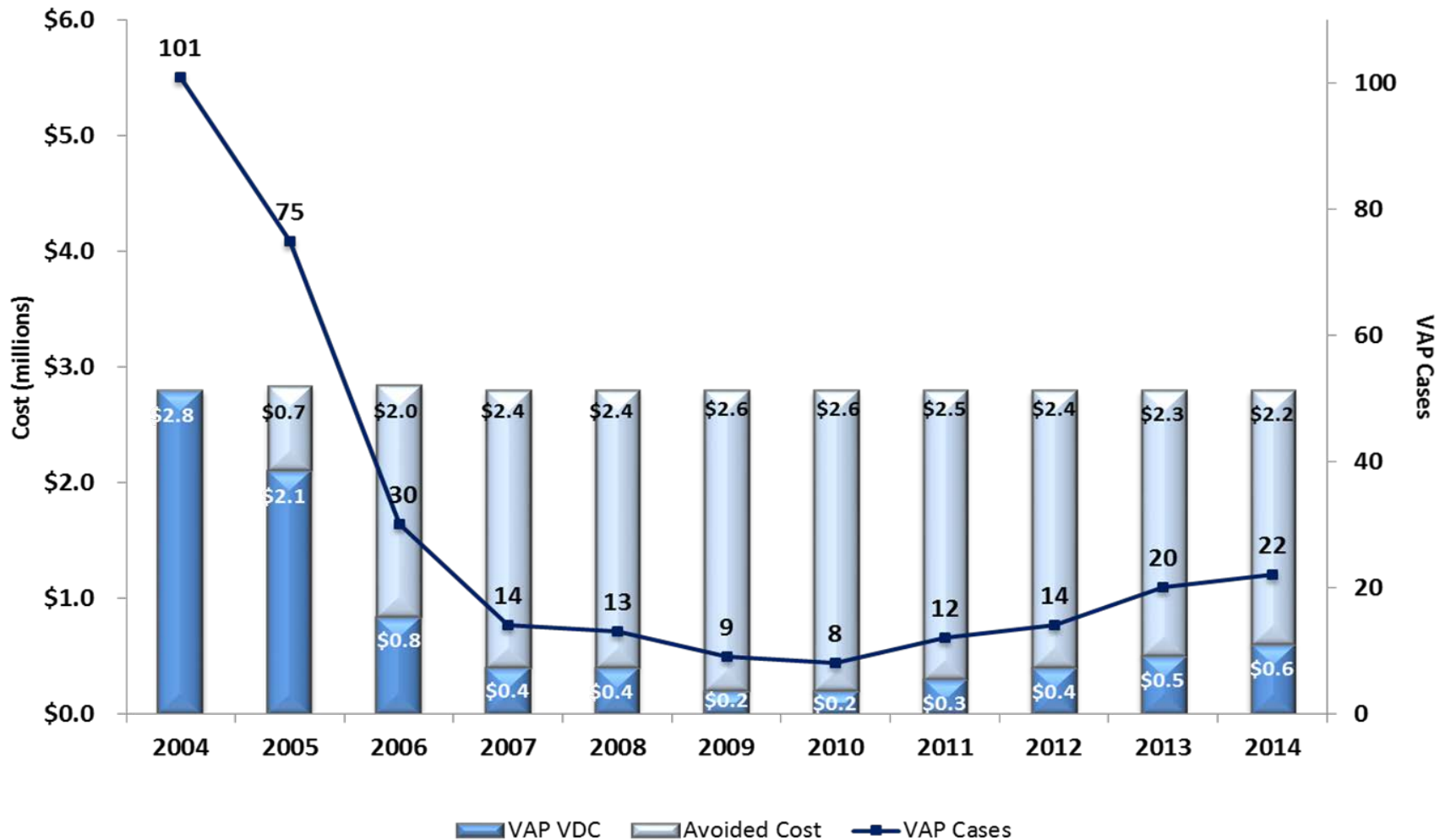
Discharge

Head of Bed AM	Head of Bed PM	Sedation Vacation	Assess Readiness to Extubate	GI Prophylaxis	DVT Prophylaxis	Prophylaxis Type:
<input type="text" value="Not-Assessed"/>	<input type="text" value="Not-Assessed"/>	<input type="text" value="Not-Assessed"/>	<input type="text" value="Not-Assessed"/>	<input type="text" value="Not-Assessed"/>	<input type="text" value="Not-Assessed"/>	<input type="text" value="Prophylaxis Type:"/>
<input type="text" value="Compliant"/>	<input type="text" value="Compliant"/>	<input type="text" value="Compliant"/>	<input type="text" value="Compliant"/>	<input type="text" value="Compliant"/>	<input type="text" value="Compliant"/>	<input type="text" value="Combined Therapy"/>
<input type="text" value="Non-Compliant"/>	<input type="text" value="Non-Compliant"/>	<input type="text" value="Non-Compliant"/>	<input type="text" value="Non-Compliant"/>	<input type="text" value="Non-Compliant"/>	<input type="text" value="Non-Compliant"/>	

Submit Cancel

BP fine

ICU VAP: Avoided Cost Trend



- Bethany Hospital excluded from January 2007 forward
- BroMenn Medical Center included starting in 2010
- Sherman Hospital included starting in 2013
- Data represents Adult ICU units only

Sepsis Screening Tool

Sepsis Edit

Sepsis Screening Tool

Hospital: TEST Unit: TEST1 Bed: test2
Name: test, 2 MRN: 2222

Patient has been transferred (Unable to be Screened)

Pt. Septic > 24hr with no signs of a new infection

Admit Source:

1. Is the patient already on the Sepsis Protocol?

2. Is the patient's history suggestive of a new infection?

Patient does not meet any of the following criteria suggestive of a new infection

<input type="checkbox"/> Pneumonia / Empyema	<input checked="" type="checkbox"/> Meningitis	<input type="checkbox"/> Bone / joint infection
<input type="checkbox"/> UTI	<input type="checkbox"/> Skin / soft tissue inflammation	<input type="checkbox"/> Catheter or device infection
<input type="checkbox"/> Acute abdominal infection	<input type="checkbox"/> Bone / joint infection	<input type="checkbox"/> Endocarditis
<input type="checkbox"/> Unknown Source		

3. Are any two of the following signs and/or symptoms of infection both present and new to the patient?

Patient does not have any of the following signs or symptoms

<input type="checkbox"/> Temp > 38.3 C (101 F)	<input type="checkbox"/> WBC <4 or > 12 or > 10 % bands	<input type="checkbox"/> Lactate > 2.2 mmol/L
<input type="checkbox"/> Temp < 36 C (96.8 F)	<input checked="" type="checkbox"/> Systolic Blood Pressure < 90 mm/Hg	<input checked="" type="checkbox"/> Creatinine > 2.0 mg/dl
<input type="checkbox"/> PaCO2 < 32 mm/Hg		<input type="checkbox"/> On Vasopressors
<input type="checkbox"/> Heart Rate > 90 bpm		<input type="checkbox"/> Bilirubin > 2 mg/dl (34.2 mmol/L)
<input type="checkbox"/> Resp. Rate > 20 bpm		<input type="checkbox"/> Platelet count < 100,000

Sepsis Screening Tool (cont'd)

Sepsis Audit

Hosp: TEST Unit: TEST1 Bed: test2 Name: test, 2 MRN: 2222 FIN: 222222

Is patient Septic?

- Yes, protocol indicated
- Yes, protocol not indicated because of contraindications or treatment limited (DNR)
- Yes, protocol not indicated because patient already on the sepsis protocol for >24hr
- No, patient not septic

70 kg

3 Hour

- Antibiotics initiated within 1hr of septic shock /severe sepsis recognition
- Blood cultures x2 done
- Serum Lactate ordered Other appropriate cultures sent
- Appropriate studies ordered to evaluate infection source Repeat Lactate in 2-6 hr ordered

If hypotensive (SBP < 90 or MAP <65) or lactate > 4 mmol/L

- Fluid bolus of 30 ml/kg crystalloid (2100 ml) completed
- Additional 20 ml/kg crystalloid (1400 ml) if needed
- Central Line for BP not responsive to fluids Arterial line for BP monitoring

6 Hour - if hypotension persistent

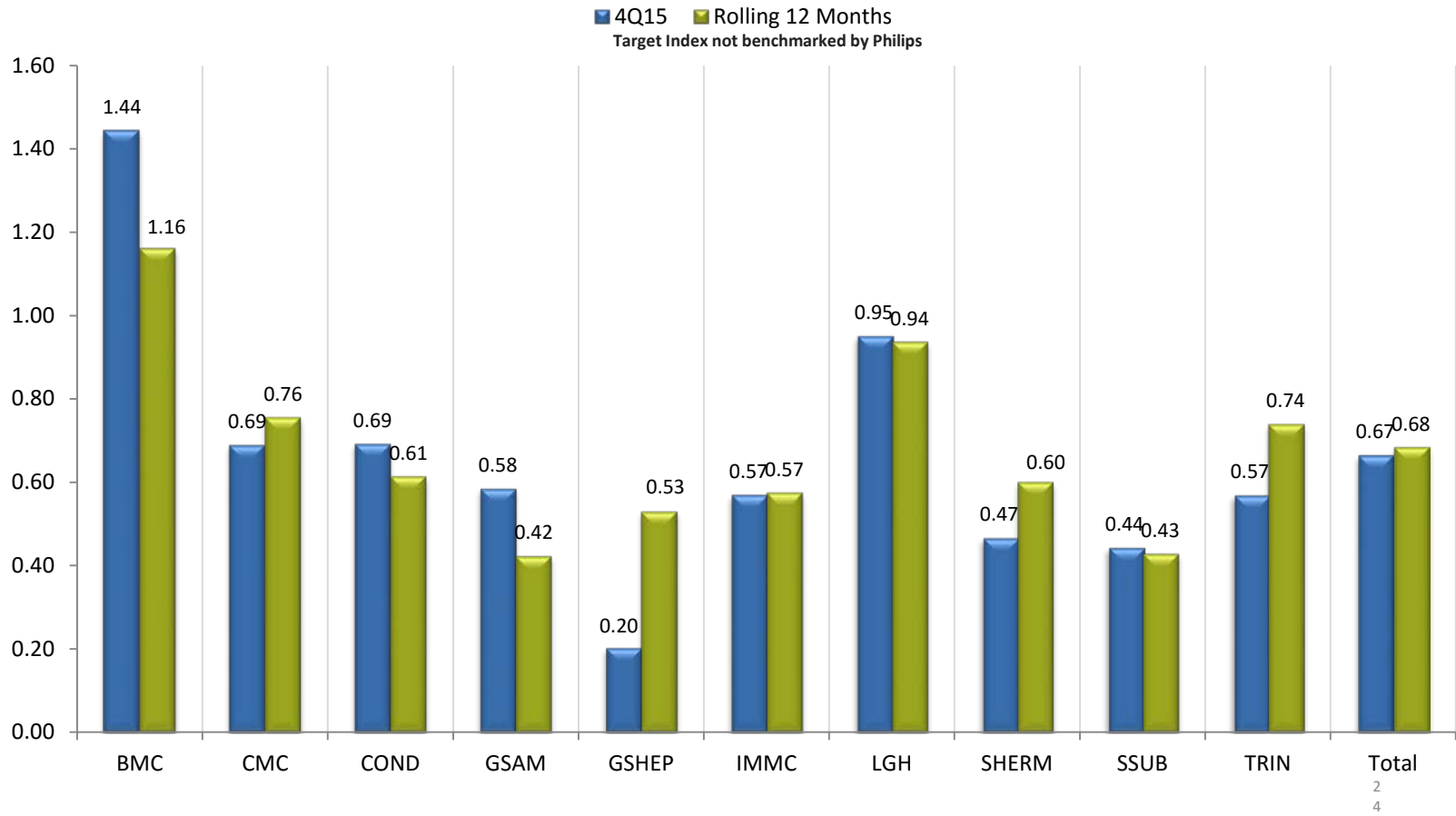
- Add epinephrine continuous infusion
- Add Vasopressin at 0.03 - 0.04 units/min
- Hydrocortisone 200 mg/day
- Source control of infection addressed
- Remove intravascular access device(s) if possible source of infection
- If ScvO2 < 70% or lactate clearance not > 10%**
 - If Hgb < 7.0, transfuse 1 unit PRBC's
 - If Hgb 7 - 10 consider IV albumin or transfusion of 1 unit PRBC's
 - Consider Dobutamine continuous infusion if evidence for myocardial dysfunction
- If on mechanical ventilator**
 - Tidal volume = 6ml/kg lean body weight(420 ml)

Maintenance

- SBP > 90 or MAP > 65
- Urine output > 0.5 ml/kg/hour
- Lactate < 4.0 or improving by > 10% of initial value
- CVP optimized
- Nutrition addressed
- Limitation of care status addressed
- Off vasopressors
- Mobility addressed

3 and 6 hour Bundles completed, remove from audit list

Sepsis Hospital Mortality Index



Data reflected is subject to rounding

Data Source: APACHE IVa/ 1Q2015, 2Q2015, 3Q2015, 4Q2015

Target Index not benchmarked by Philips

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Final Target State Guiding Principles

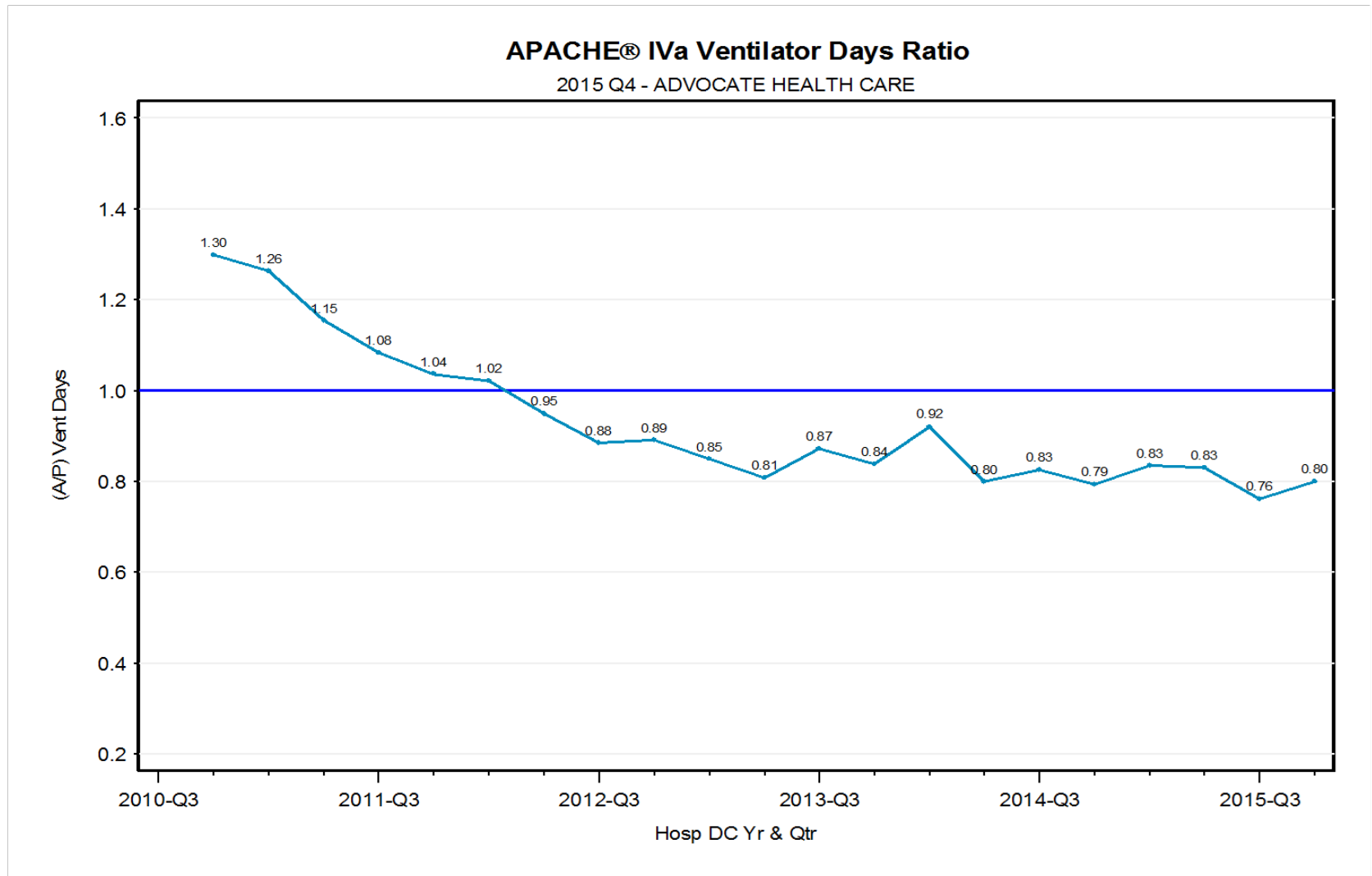
- Improve Communication/Coordination
- Achieve System Standardization of Care but with site innovation
- Creating a Critical Care Team with a strong leader
- **Documentation/Technology**
- Integrate Services (e.g. Pharmacy, PT, Resp Therapy...)
- Enable the Clinical Staff to care for the patient

KRA Target Overview and Weights

	Measure	Min	Target	Max	Weight
67%	ICU Ventilator Days Index	Baseline	Mid of Min/Max	90th	19.0%
	CLABSI (ICU) SIR	50th	75th	90th	9.5%
	CLABSI (non-ICU) SIR	50th	75th	90th	9.5%
	Unassisted Fall Percentile Rank	50th	75th	90th	19.0%
	Culture of Safety Survey Percentile	50th	75th	90th	10.0%
33%	LOS	Moderate	Mid of Min/Max	Well	11.0%
	CI PHO Score	TBD	TBD	TBD	11.0%
	Readmissions Rate	50th	63rd	75th	11.0%

- Lower weight on duplicative measures
 - LOS and readmissions appear in both CI and AdvocateCare index

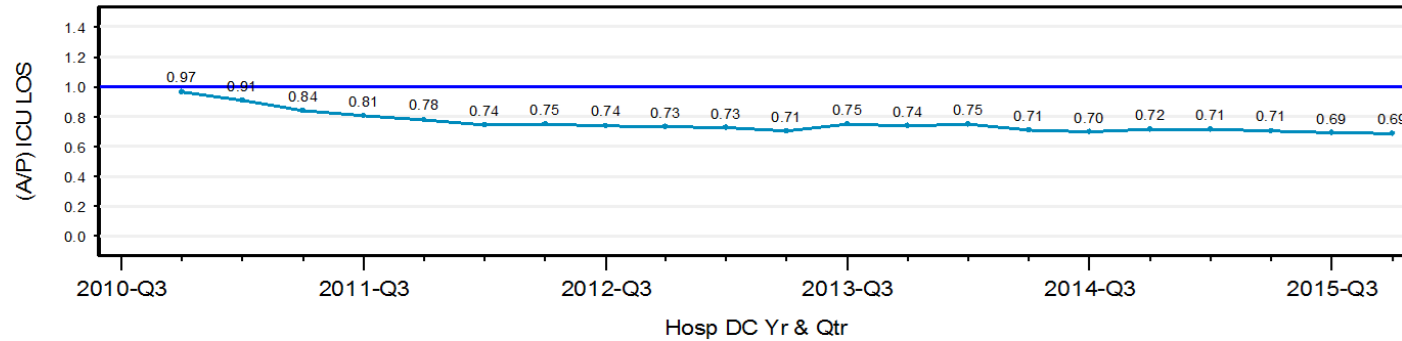
ICU Ventilator Days Ratio



ICU/Hospital LOS Ratio

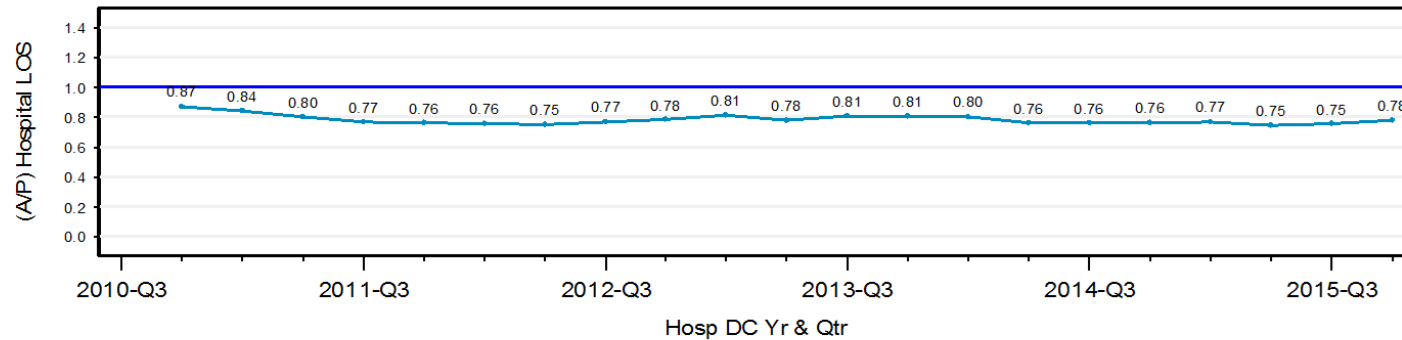
APACHE® IVa ICU LOS Ratio

2015 Q4 - ADVOCATE HEALTH CARE



APACHE® IVa Hospital LOS Ratio

2015 Q4 - ADVOCATE HEALTH CARE



2015 Safety & Quality Accomplishments

Area of Focus	Initiative	Financial Impact
eICU®	Improvements in quality of patient care	<p>23 ICU lives saved</p> <p>Decrease of 352 ICU days, resulting in savings of \$305,382</p> <p>Decrease of 331 ICU vent days, resulting in savings of \$430,251</p>

Multidisciplinary Round Checklist

Multiple Disciplinary Rounds

MRN# [REDACTED]

eIntervention MDR Activity << Next Prev >>

MDR Date: Friday, May 13, 2016
Last Updated: 5/13/2016 9:02:25 AM

Central Line N/A

Line 1 Type: Subclavian Line 2 Type: [REDACTED]

Insertion Date: 05/05/2016 8 Days Clear Insertion Date: [REDACTED] 0 Days Clear

Necessity: Yes No Indication: Administration of drugs likely to induce phlebitis

Remarks: [REDACTED]

Foley N/A

Insertion Date: 05/05/2016 8 Days Indication: Need for accurate measurements of urinary output in critically ill patients

Remarks: [REDACTED]

Glucose

Are all Glucose's in the last 12 hrs. between 100/200?
 Yes No None Done

Remarks: [REDACTED]

DVT Prophylaxis in Place CI Refused

Pharmacological
 Mechanical

Remarks: [REDACTED]

Nutrition

Receiving Nutrition: Yes No NA

Enteral
 TPN

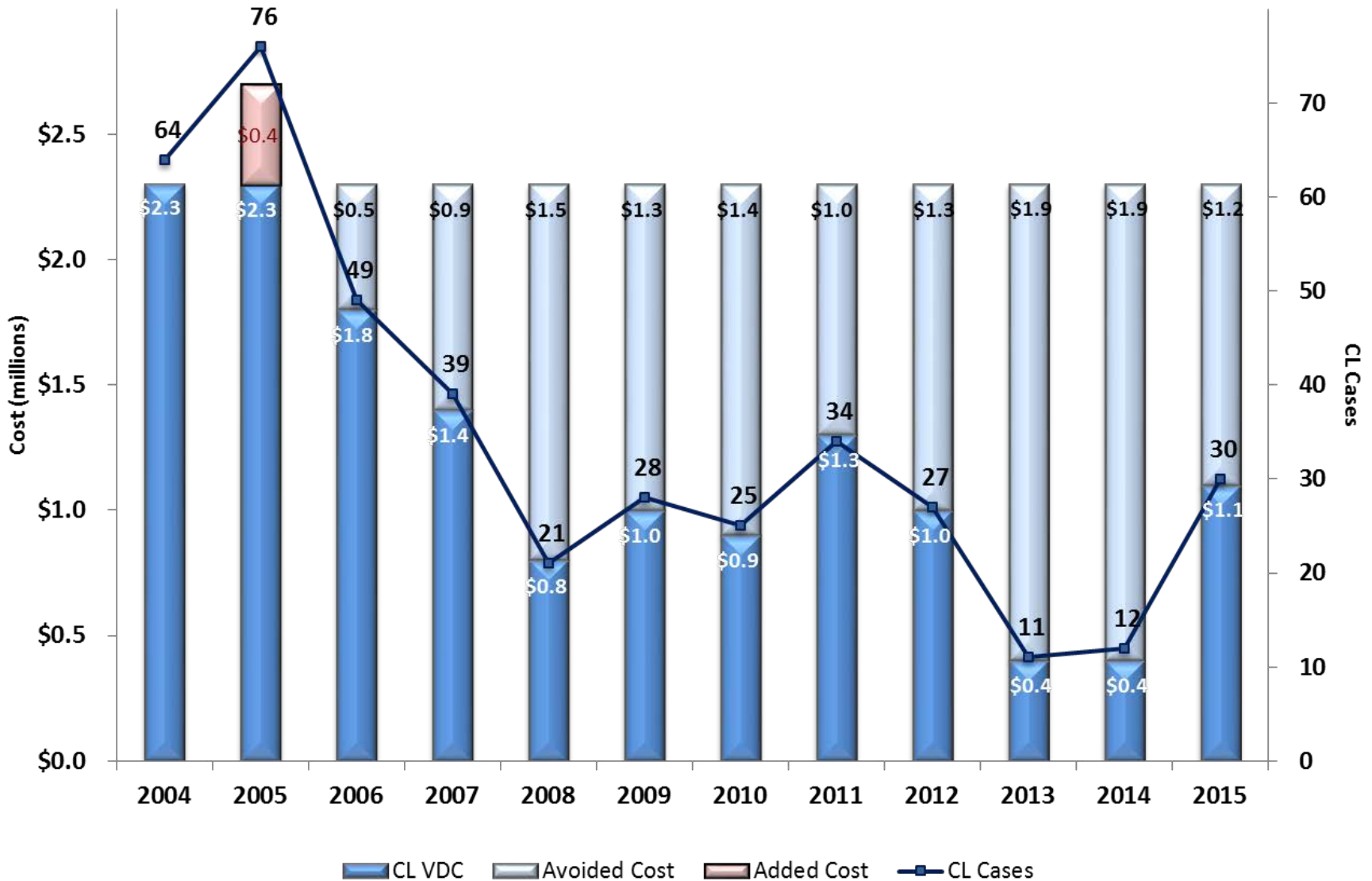
Remarks: TF 65/65

Advanced Directive Addressed **HAS BEEN ADDRESSED**

Remarks: [REDACTED]

Submit Cancel

ICU CLABSI: Avoided Cost Trend



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Collaboration with Individual Sites on Certain Processes

- Pneumonia Screening
- CPR Audit
- Central Line insertion bundle compliance
- DVT Intensity of Prophylaxis
- Foley catheter assessment
- Sedation Withdrawal
- Multidisciplinary Rounds
- ED Sepsis Management
- Resident Coverage/Nurse Mentoring
- eNutrition
- ED Boards

Patient Safety Story

- An elderly patient arrived to the ED with severe shortness of breath and O2 sats in the 70's. She refused intubation and was placed on BiPap. The decision was made to admit the patient and an ICU bed was requested. The ED was informed there were no beds available.
- While the patient was boarding in the ED, she was not tolerating BiPap and was having runs of V-Tach. The ED physician intubated the patient. The intensivist discussed the case several times with the ED physician, but did not come down to see the patient.
- Four hours later, the patient was still waiting for an ICU bed. She had continued runs of V-Tach and was given Mag and Amiodarone.

Patient Safety Story

- The patient continued to receive care in the ED, including an EKG. Sixteen hours after the initial bed request, the patient was assigned a bed and report called to the MICCU. A repeat EKG identified a possible STEMI. Serial troponins identified STEMI.
- Three hours later the patient was taken to the Cath Lab and clinically progressed and was then considered a poor candidate for a CABG. The patient was returned to the ICU. Care was withdrawn and the patient expired.

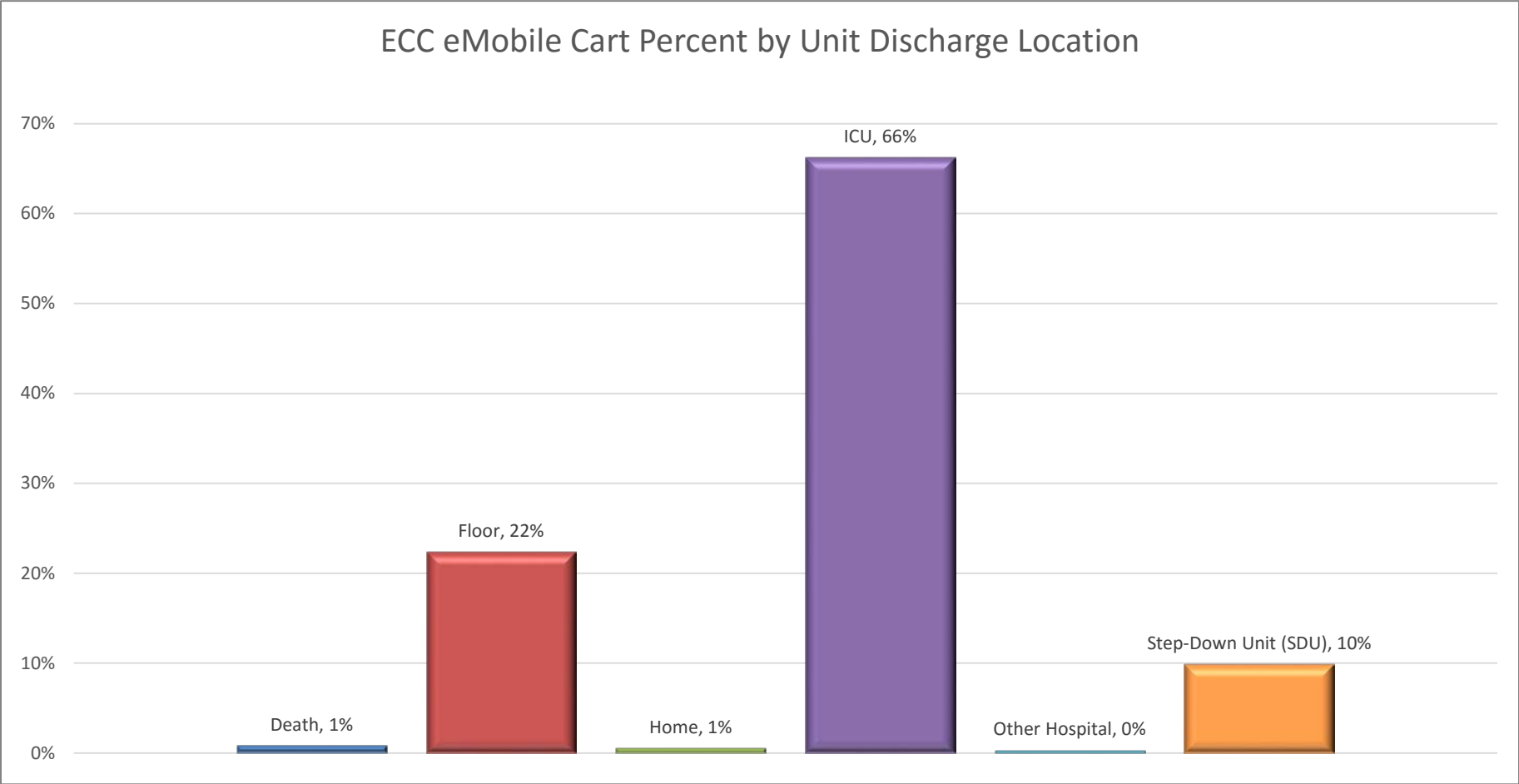
Corrective Action

Collaborate with eICU team to identify potential solutions

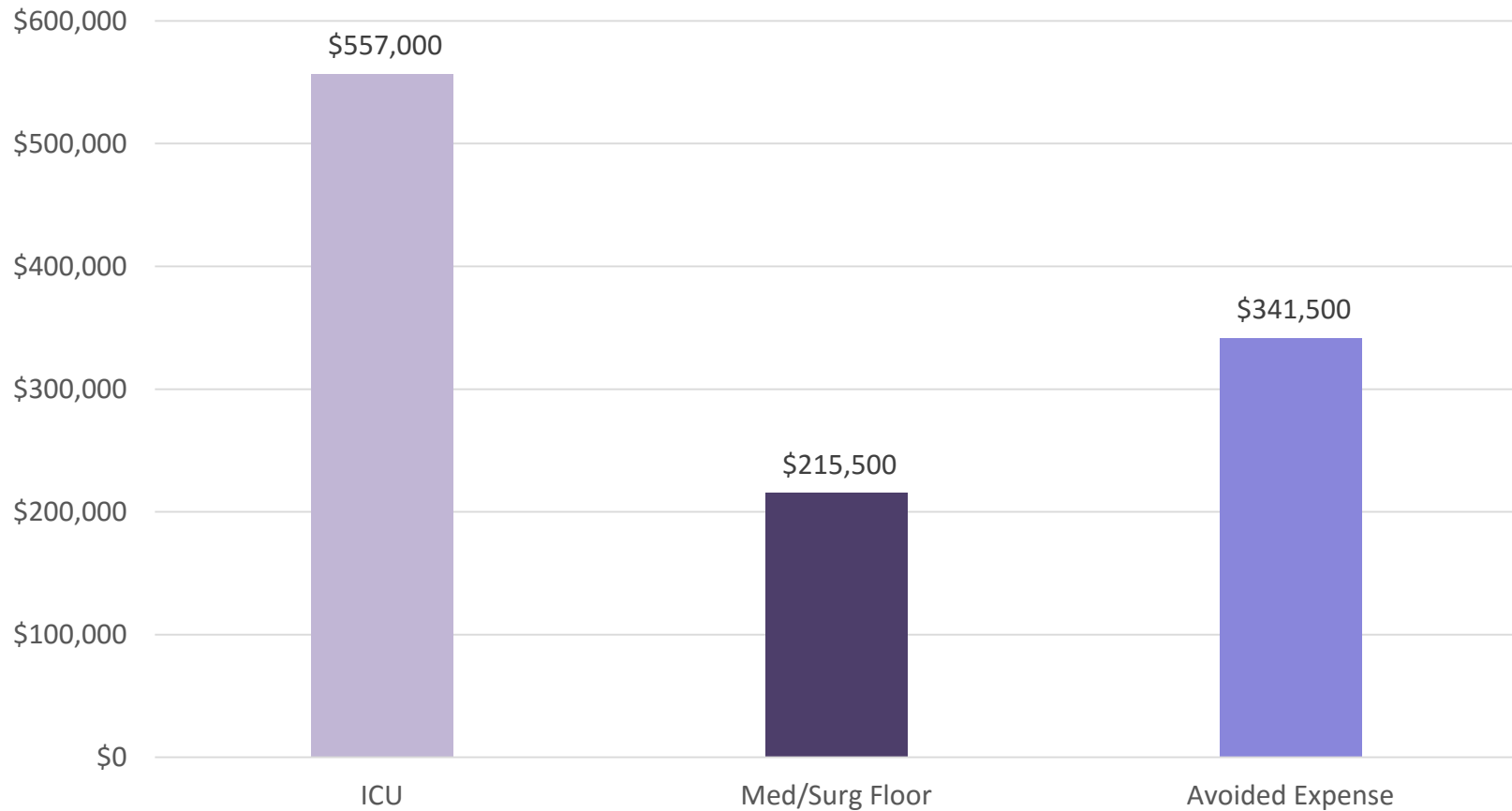
- 4 eICU carts
- Create workflow process
- Hand off process with ED physician, ED resident, ED RN, Intensivist and eICU MD
- First eICU service in an ED with a continuous workflow process

Cumulative February 2015 thru March 2016

ECC eMobile Cart Percent by Unit Discharge Location



ICU vs. MED/Surg Saved Expenditures February 2015 - March 2016



Other Benefits:

- No additional Patient Safety events for ICU/ED boarders
- Shorter LOS indicates improved throughput

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Advocate eICU Mentorship Program

Need:

- Our sites identified that new RNs often feel under supported at the bedside and this program was developed to bridge the gap from novice to advanced beginner ICU RN

Results:

- To date (from 2012), 80 RNs have completed the program; 8 currently enrolled and 10 in pipeline
- Will be expanded to outreach partners and to two additional Advocate sites
- This program is utilized as part of the recruitment/retention strategy by our ICUs

Lessons Learned:

- Adapt the program based on feedback from each participant
- eRN staff requested additional education on mentor/precepting principles
- Adjust eRN schedule, for consistency in mentor, based on number of participants
- Instituted support pods in CORE to provide support to mentor/coach

Objectives

- The success of telemedicine is not just about the technology, but how you use it
- Understand how tele-ICU can achieve clinical and financial benefits across a large healthcare system
- How population management tools can be employed collaboratively between the tele-ICU and ICU to improve patient outcomes and realize financial benefits
- Demonstrate how gap analysis affords an opportunity for telemedicine to improve evidence-based practice adherence in the ICU
- Verbalize how the tele-ICU is a facilitator of change management as much as an “intervention”

Thank You!

Contact: Cindy.Welsh@advocatehealth.com

Office: (630) 575-8363