Virtual Medicine
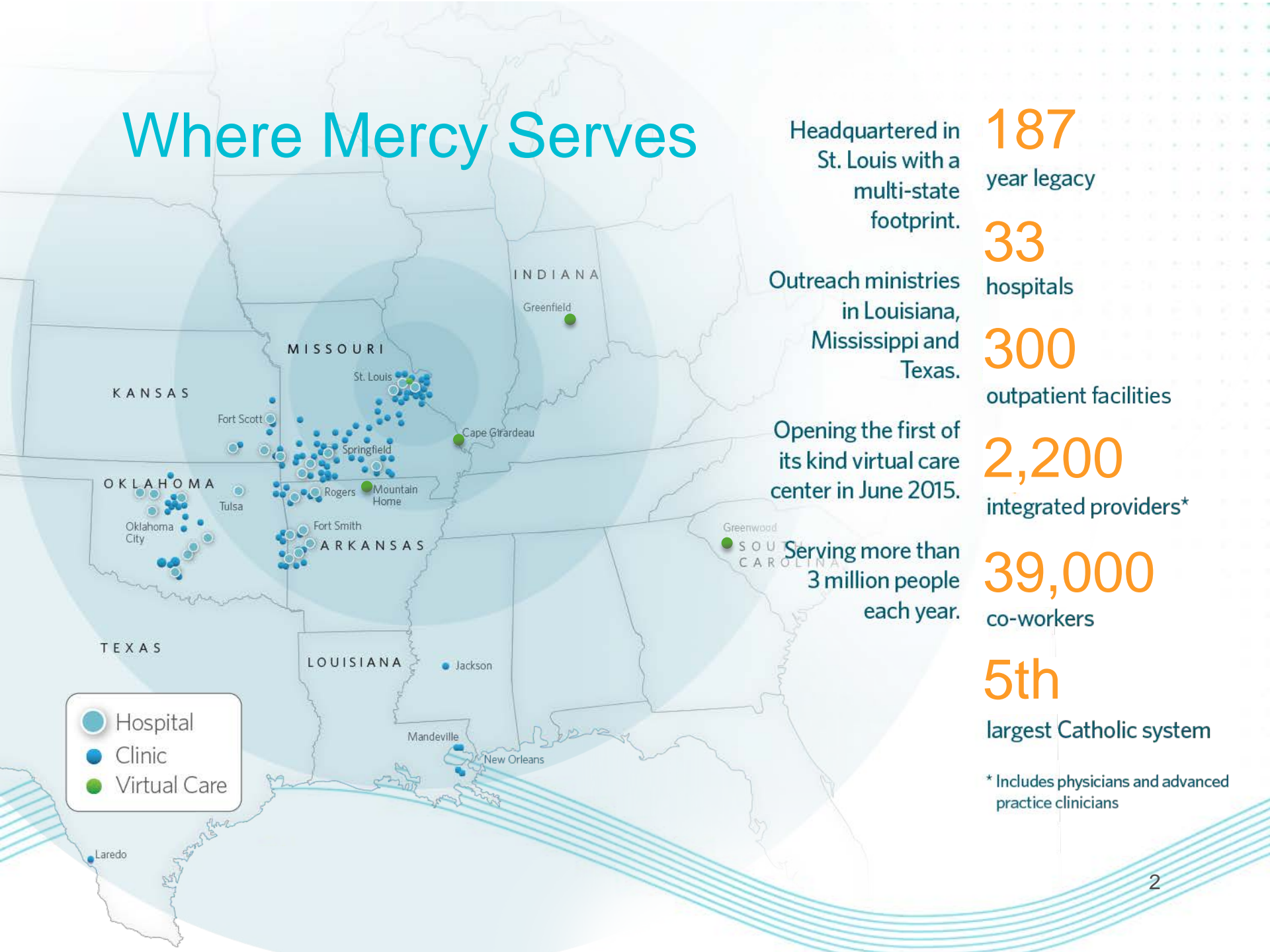## Redefining Health Care

Jim R. Gebhart, FACHE
President
Mercy Hospital
Oklahoma City, Oklahoma USA

Mercy✝Virtual

Where Mercy Serves

Headquartered in St. Louis with a multi-state footprint.

Outreach ministries in Louisiana, Mississippi and Texas.

Opening the first of its kind virtual care center in June 2015.

Serving more than 3 million people each year.

187 year legacy

33 hospitals

300 outpatient facilities

2,200 integrated providers*

39,000 co-workers

5th largest Catholic system

* Includes physicians and advanced practice clinicians

Legend:
- Hospital
- Clinic
- Virtual Care

2002 ROi

Resource Optimization & Innovation (ROi)

- Formed as an integrated health care supply chain
- Centralized contracting, sourcing, manufacturing, packaging, distribution and transportation
- Consistently ranked as a top supply chain organization

2003

Mercy Meds Bedside Scanning

- Patient wristbands verify correct medication, time and dosage

<<< Market Force Headwinds

Mercy

2004
CMS Physician Group Practice Demonstration
- First Medicare pay-for-performance initiative
- Focused on coordinating care, improving quality and reducing readmission rates

2006
Mercy SafeWatch
- Largest single-hub electronic intensive care unit (teleICU)
- 450+ monitored beds in 15 hospitals across five states
- Support 28 ICUs and 2 step-down units

<<< Market Force Headwinds

2007 Epic

Electronic Health Record

- Mercy launches comprehensive, fully integrated EHR
- Highly customized
- Led by team of 400 clinicians and trainers
- EHR goes lives first in Mercy Clinic

2008

First Hospital EHR Go Live

- At newly constructed Mercy Hospital Northwest Arkansas

<<< Market Force Headwinds

2009

Center for Innovative Care
- Driving a new model of Care
- Foundation for creation of Mercy Virtual

2010

Mercy Data Center
- Opens Tier 3 facility providing vast capacity and protection
- Mercy consistently among the "Most Wired"
- Ability to host systems and services for other organizations

Mercy Care Management
- Merged health plan care management with provider-based services
- Launched comprehensive population health
- Initiated Mercy's new integrated Care Model services for payers, employers and providers

<<< Market Force Headwinds

2011
Telehealth Grants
- Rural home telemonitoring services
- Medical home pilots

2012
Telesepsis Program
- Uses data in electronic health record
- Identifies hospital patients most susceptible to sepsis
- Continuously monitors at-risk patients

2013

Clinical Pathways

- Day-by-day, admission-to-discharge plans of care
- Full integrated in and driven by EHR system

2014

Mercy Virtual Care Center Groundbreaking

- First of its kind in the nation
- Accommodates nearly 300 physicians, nurses, researchers
- Provides 24/7 care virtual care across Mercy and
- Hub for advancing telemedicine through research and training.

<<< Market Force Headwinds

Mercy Virtual Services Suite

SafeWatch

- TeleICU
- Telesepsis
- eLTACH
- eSNF
- Home Monitoring
- Virtual Telemetry
- eAcute
- SafeWatch Ambulatory
- CCM & TCM support

ConnectNow

- Nurse on Call
- eVisits
- eConsults
  - Cardiology
  - Neurology
  - Psychiatry
  - Pediatric Specialties
  - Post op care
  - Maternal Fetal Medicine
  - Telestroke

CareEngage

- Chronic Disease Management
- Utilization Management
- Data Analytics, Reporting, Predictive Analytics
- Coaching
- Transition of care
- Disease Management
- Health education
- Research

Mercy Virtual

Mercy Virtual: SafeWatch

Mercy✝Virtual

SafeWatch

Augment care with centralized monitoring that provides another set of experienced eyes and intelligent systems.

Mercy Virtual

TeleICU

- Largest single-hub electronic intensive care unit

- 450+ monitored beds, 15 hospitals, 5 states

- Supports 28 ICUs and 2 step-down units

- 40+ board-certified critical care physicians

- 16 neuro-critical care certified physicians

- 60+ critical care nurses

Mercy✝Virtual
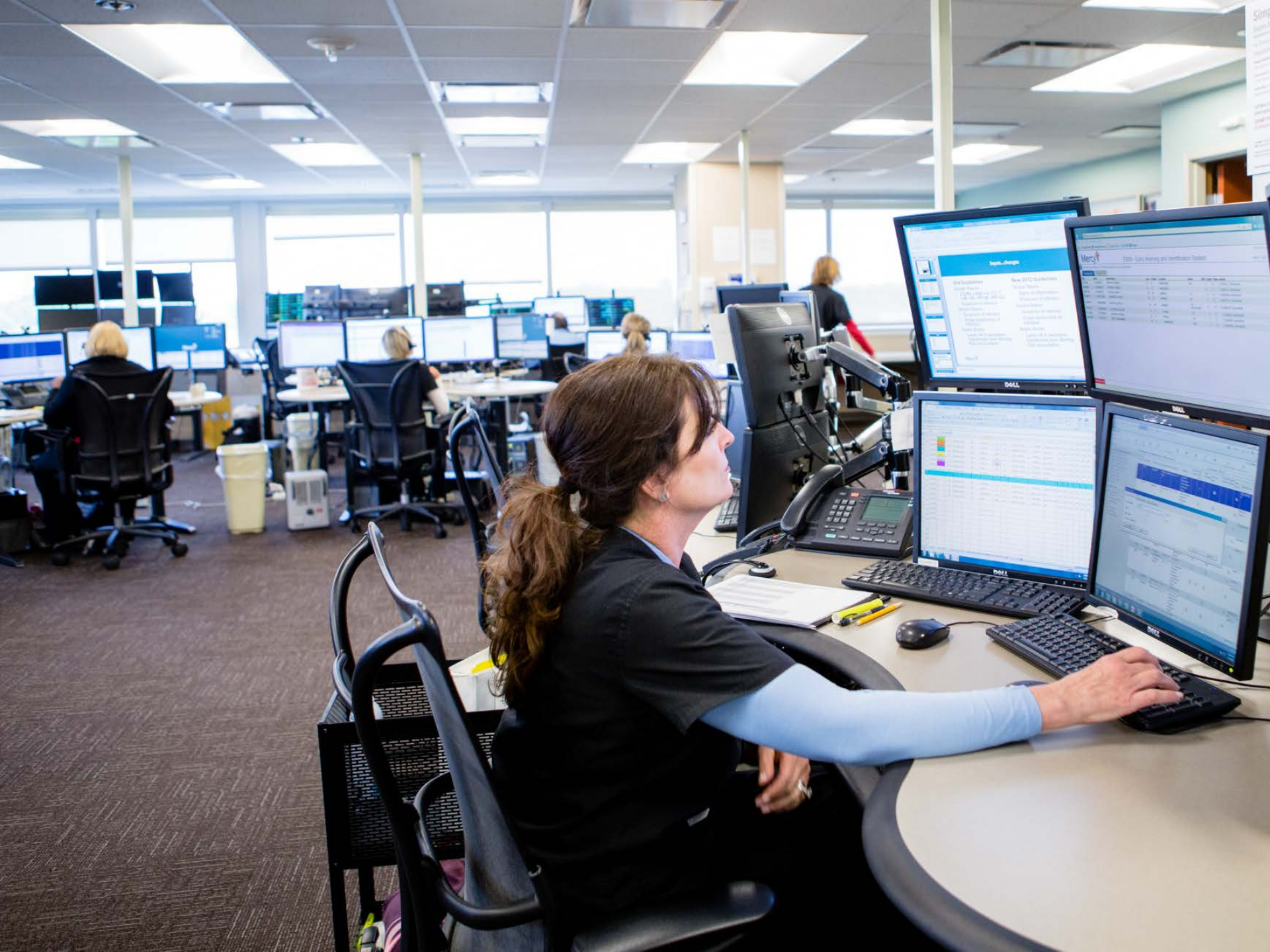
Implementation Track Record

15 eICU Implementations

Average 120 days from start to go-live

Site	Beds	Implementation
Oklahoma City, OK	36	September-06
Ardmore, OK	13	September-06
Ft. Scott, KS	10	November-06
Independence, KS	8	November-06
Washington, MO	13	December-06
Rogers, AR	24	January-07
Ft. Smith, AR	38	March-07
Hot Springs, AR	25	April-07
St. Louis, MO	144	September-07
Springfield, MO	94	March-08
Mountain Home, AR	17	December-09
St. Louis, MO (LTACH)	6	December-10
Lebanon, MO	8	November-11
Joplin, MO	18	May-12
Greenwood, SC	31	August-13
Crystal City, MO	12	November 14
Army Hospital	6-12	January-15

Mercy Virtual

Active Staff

Medical Staff

- 40+ certified Critical Care Physicians
- **16 Neuro Critical Care** certified Physicians
- 75% bedside clinicians
- 25% eICU clinicians
- Epic, Meditech, Cerner, McKesson experienced
- Currently licensed in five states: MO, AR, KS, OK, SC
- Credentialed at every hospital
- Teaching faculty

Nursing Staff

- 60+ Critical Care Nurses
- 24.4 average years of nursing experience
- **18.6 average years of ICU nursing experience**
- Minimum 5 years of critical care nursing experience required
- Epic, Meditech, Cerner, McKesson experienced
- Currently licensed in five states: MO, AR, KS, OK, SC
- ACLS, BLS, NIHSS certified
- **100% CCRN or CCRN-E**

Management & Ancillary Staff

- 2 Medical Directors
- Operations Director / Manager / CNS
- Information Technology Systems
- Telehealth Credentialers
- Telehealth Scheduling / Billing Center

Mercy Virtual

Supporting the Bedside Staff

- 24hr/day nursing support
  - Mentor/coach new and inexperienced nurses
  - Extend/enhance nurse coverage (high fall risk, transports, etc.)
  - Nursing documentation (vital signs, drips, events, codes, etc.)
  - Verification of high risk medications or processes

- 24hr/day Critical Care physician coverage
  - Support current plan of care or augment care
  - Emergency or rapid response
  - Off-hour support with full electronic health record access
  - Order and note writing capabilities

- Augment Quality Initiatives
  - Patient safety
  - Evidence-based medicine
  - Core measures
  - Quality audits (DVT propholaxis, central line insertion checklist, etc.)
  - Sitter program
  - Whole System Measures: Sepsis, CLABSI, VAE

Mercy Virtual

eCareManager™

- Organizes clinical information

- Allows for efficient and easy rounding

- Is a smart software utilizing various algorithms to trigger alerts

Mercy Virtual

Automated Acuity Monitoring

- Orbs visually identify worsening/improving patients
- Allow the eICU staff to determine the body system with greatest physiological instability in real time
- Orbs for Automated Acuity and Pain, Agitation & Delirium (PAD)
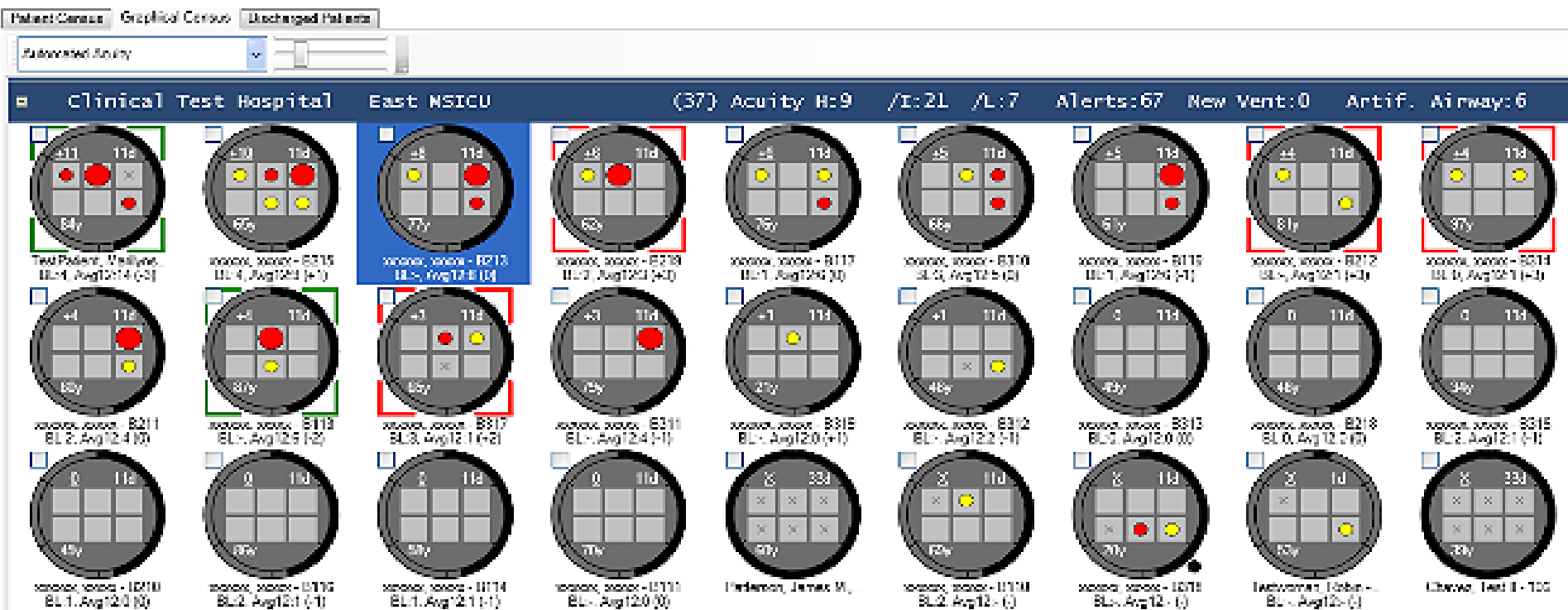
Discharge Readiness Score

- On Census: Clinical Decision Support (CDS) column

- On Patient Profile in the Message Center

- On Discharge Readiness DMR to support clinical workflow

Discharge Readiness Score (DRS) icon
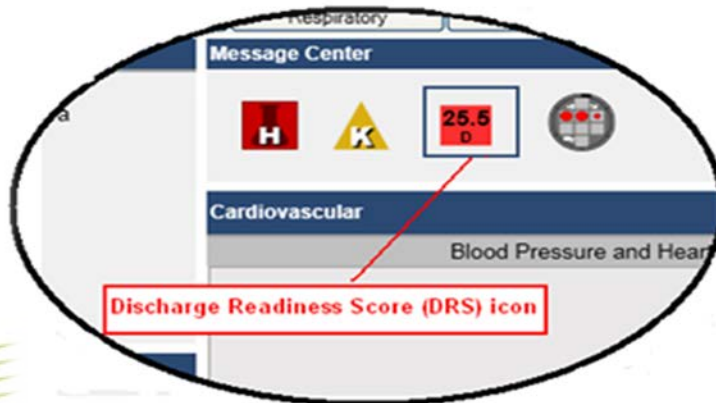
Icon	Risk Indication
3.89 D (red)	Red indicates the risk of death is high for any score > 3%
2.53 D (yellow)	Yellow indicates the risk of death is moderate if the score is 0.1% to 3%
0.01 D (green)	Green indicates the risk of death is low if the score is < 0.1%
X (gray)	Risk of death score is unavailable due to missing data. Hover over this icon to view a summary of missing data.
N/A (gray)	N/A indicates the patient is not eligible for scoring.

Mercy Virtual

When can SafeWatch help?

- When you intubate or extubate your patient
- When you do a sedation vacation
- When you get a new admit or leave ICU
- When you need medication or blood product second signature
- When you need help or a physician
- When you have a question, need information or an X-ray read
- When you get behind with documentation
- When your patient is confused and requires verbal cueing
- When you need to update the eICU on the plan of care
- When you are just not sure what is wrong

Mercy✝Virtual

Emergency Guidelines
ICU Rapid Response

Purpose:

- The purpose of this policy is to create an operational definition of "emergency" and rapid response process for all ICU patients

Policy:

- ICU staff and/or Mercy SafeWatch staff are required to make contact (eLert Button or phone call) with the other side when an emergency condition is identified

Responsibilities:

- In emergency situations (as defined) Mercy SafeWatch will:
  - Issue orders to address the immediate clinical problem
  - Place a call and/or page to the primary managing physician. The Mercy SafeWatch physician will make every attempt to contact and communicate directly with the managing physician. This is vitally important for optimal patient care and to avoid misunderstandings.
  - A note will be written, in the medical record, by the Mercy SafeWatch physician that will describe the situation and interventions taken

The physiologic disturbances listed below will constitute an emergency:

HEART RATE:
1. Greater than 140 beats /per minute in a patient with known heart disease or Age > 50
2. Less than 50 beats /minute with symptoms of hypoperfusion or evidence of complete heart block

BLOOD PRESSURE:
1. Less than 80mm Hg systolic or less than 90mmHg if this constitutes a 20% drop from previous hour's (> 110) systolic blood pressure (< 50 MAP, < 60 if 20% drop).
2. Systolic Blood pressure > 220mmHg or Diastolic Blood pressure >120mmHg

RESPIRATORY DISTRESS:
1. Sustained (> 5 minutes) arterial desaturation to $SaO2$ <86% or
2. $PCO2$ >70 torr <u>and</u> ph<7.20 or
3. Respiratory rate >35 per minute
4. Respiratory rate < 8 per minute

POTASSIUM:
1. Potassium < 2.5 mmol/l or
2. Potassium < 3.0 mmol/l with Ventricular ectopy or
3. Potassium > 6.0mmol/l

NEUROLOGIC
1. Active Generalized Seizure
2. Sustained intra cranial pressure > 30 $cmH2O$
3. Acute decrease in Glascow coma score by 2 with absolute value < 12

METABOLIC
1. Glucose > 1000mg/dl or < 40mg/dl
2. PH < 7.0

Mercy✝Virtual

Eliminating Ventilator Assisted Pneumonia

Ventilator Associated Pneumonia (VAP) Cases
and VAP Bundle Compliance

Mercy Virtual
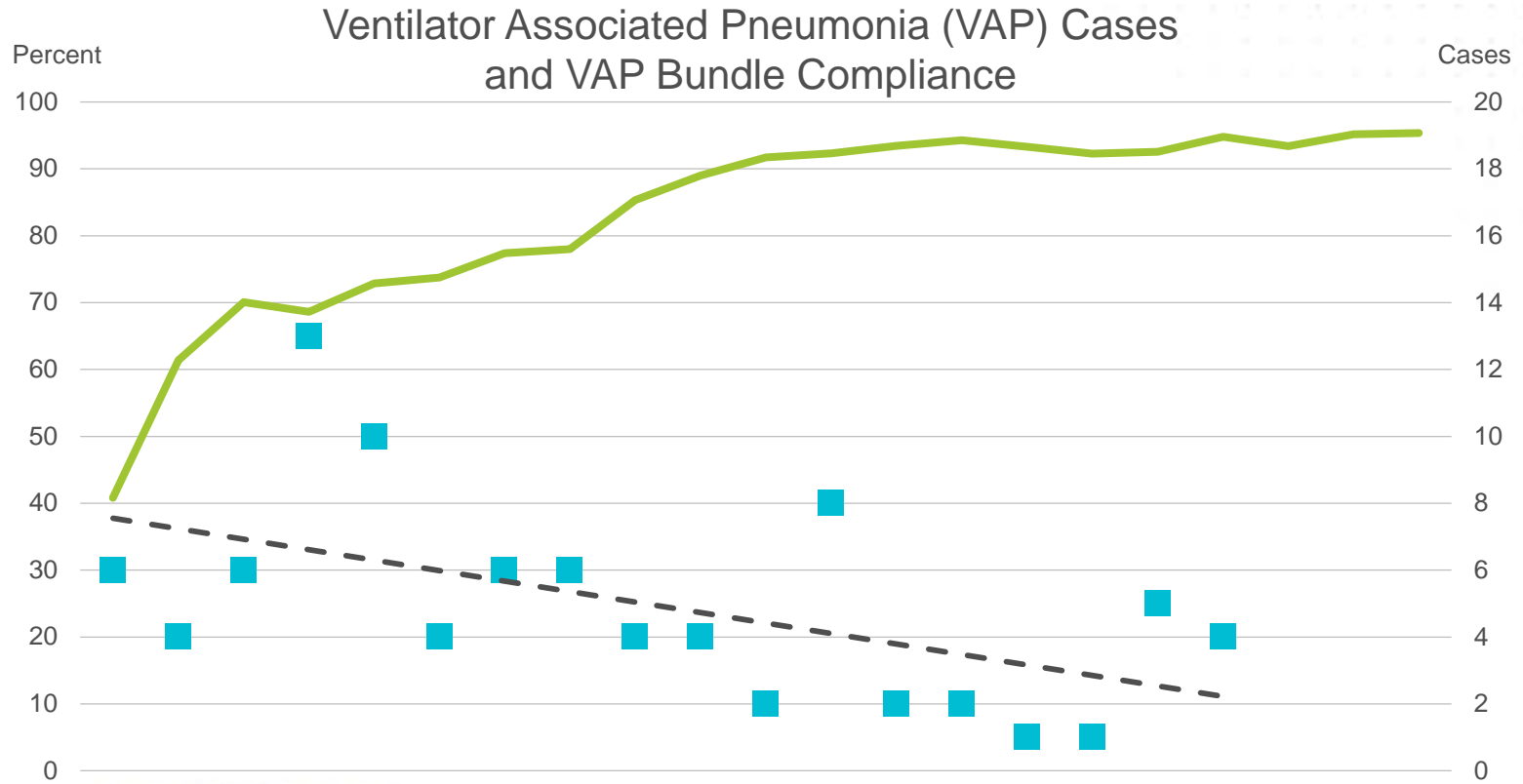
Eliminating Central Line Blood Infections

Central Line Blood Stream Infections
All Nursing Units, All Mercy Communities
March 2010 to March 2012
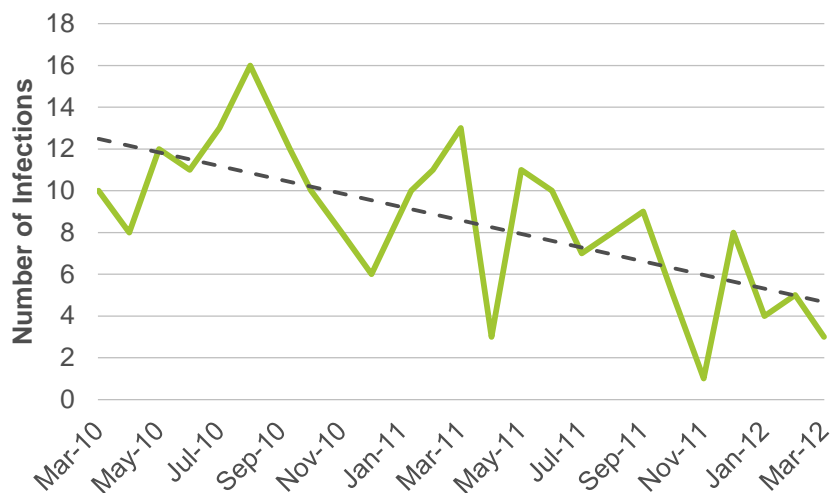
Central Line Blood Stream Infections
Intensive Care Unit (ICU CLABSI)
March 2010 to March 2012
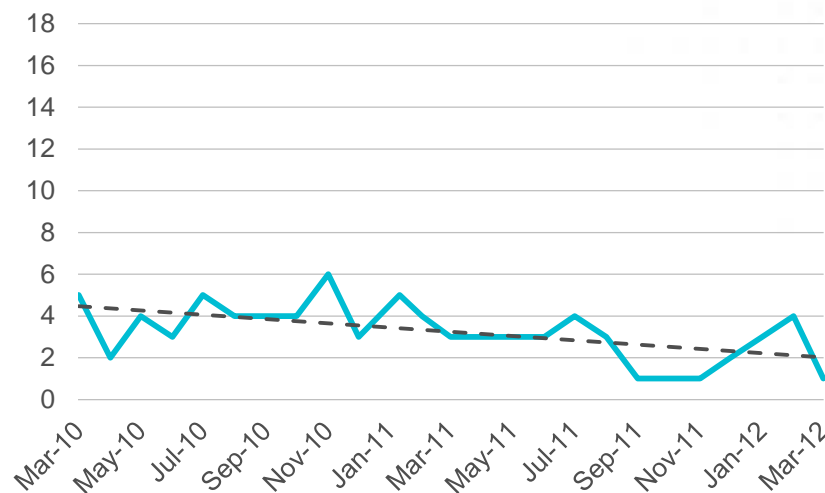
While we have yet to achieve our goal of zero, on average we are performing 26% better than the national benchmark

Mercy✝Virtual

Saving Lives & Reducing Costs

More than 1,500 patients have gone home that were not expected to.

Mercy is saving approximately $25 million annually by reducing length of stay.

Hospital Length of Stay

- - - APACHE Predicted

Actual/Predicted LOS

1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00

2009   2010   2011   2012   2013

20% reduction in LOS saving **$900/ ICU day**

Hospital Mortality

- - - APACHE Predicted

Actual/Predicted Mortality

1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00

2009   2010   2011   2012   2013

Mortality rates **25% below** expected

Mercy ✝ Virtual
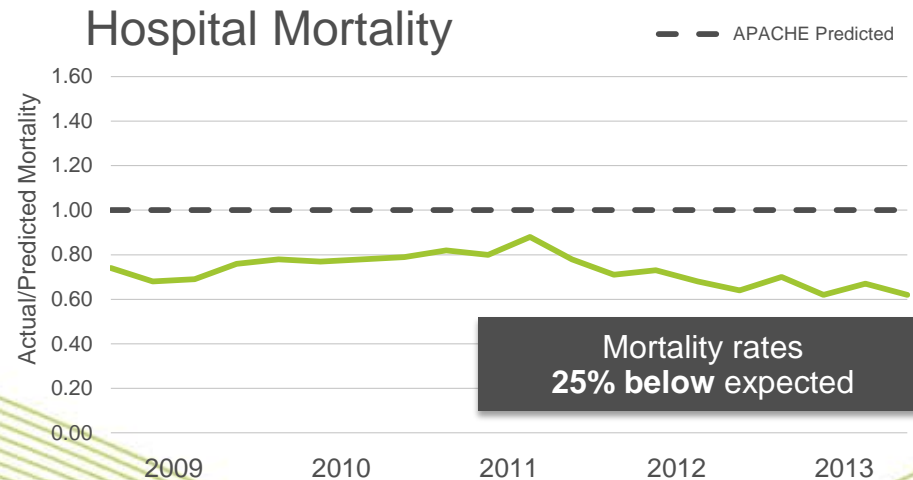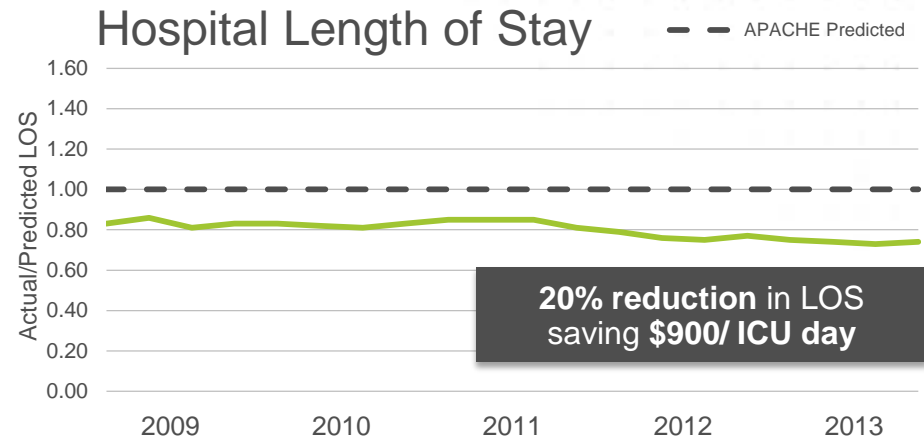
TeleICU Implementation Impact

Pre/Post TeleICU Implementation in a Non-Mercy Hospital
APACHE Summary Actual : Predicted Ratios

Non-Mercy ICU	APACHE Score	Actual to Predicted Ratios			
		ICU Mortality	ICU LOS	Hospital Mortality	Hospital LOS
Pre (Q4 2008 - Q3 2009)	49.7	1.45	1.00	0.93	0.68
Post (Q4 2009 - Q3 2010)	**50.1**	**0.62**	**0.72**	**0.71**	**0.64**

Shown in the table above are the actual to predicted ratios comparing before and after teleICU implementation. All showed improvement post implementation.

Mercy✝Virtual

eICU Program

1. Hardwired 2 way audio video unit mounted in each patient room (1 unit per patient

2. Hardwired bedside vital sign monitor or wireless monitoring system that is interfaced to the EMR (biosensor/wired/wireless monitoring tools)

3. Bluetooth stethoscope that provides the ability to check lung, heart and bowel sounds

4. Telepresenter, at the bedside when needed to complete a more thorough patient assessment

5. Communication system that allows caregivers to be accessed at a moments notice and is voice activated/hands free on both sides of the communication chain

Mercy Virtual

Telesepsis

Using EHR data, bedside process reengineering and centralized early warning alerts, patients at risk for sepsis are identified and treated at the first sign of deterioration

Mercy✝Virtual

Telesepsis Workflow
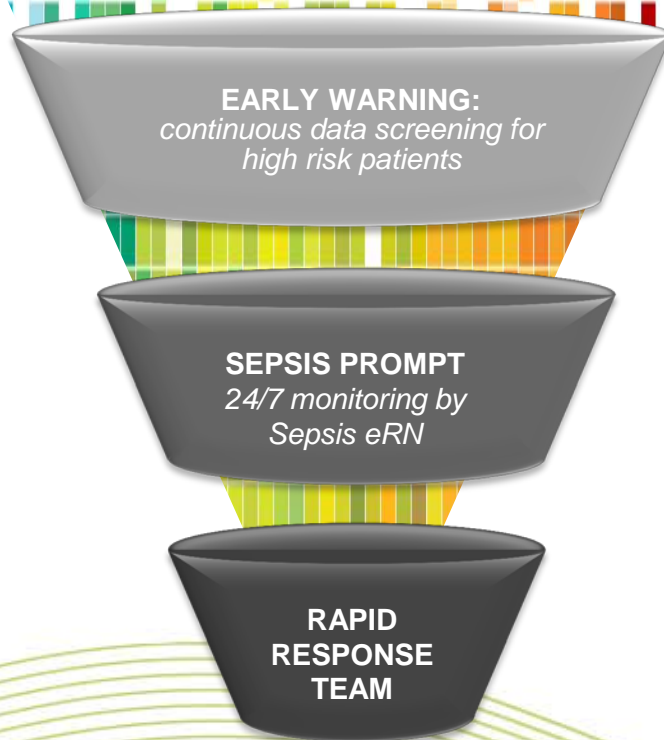
SIRs / Sepsis
Continuous computer screening of all patients in the hospital / ED

Severe Sepsis / Septic Shock
Sepsis prompt data validated and verified by Sepsis eRN

Fast Track Treatment
Patients are fast tracked to the ICU by the bedside Sepsis / RRT Team and bundle compliance monitored

EARLY WARNING: *continuous data screening for high risk patients*

SEPSIS PROMPT *24/7 monitoring by Sepsis eRN*

RAPID RESPONSE TEAM

Mercy Virtual

Mortality Pre- and Post-EWIS

Mortality Per Year Among Patients with Severe Sepsis or Septic Shock

Pre-EWIS Septic Shock Mortality = 22.1%

EWIS Septic Shock Mortality = 16.2%

Pre-EWIS Total Mortality = 16.3%

EWIS Total Mortality = 10.7%

Percent Mortality Post EWIS

30%

20%

10%

0%

2011   2012   2013   2013 EWIS   2014 EWIS   2015 EWIS

━━ Septic Shock   ━━ Severe Sepsis   ━━ Total
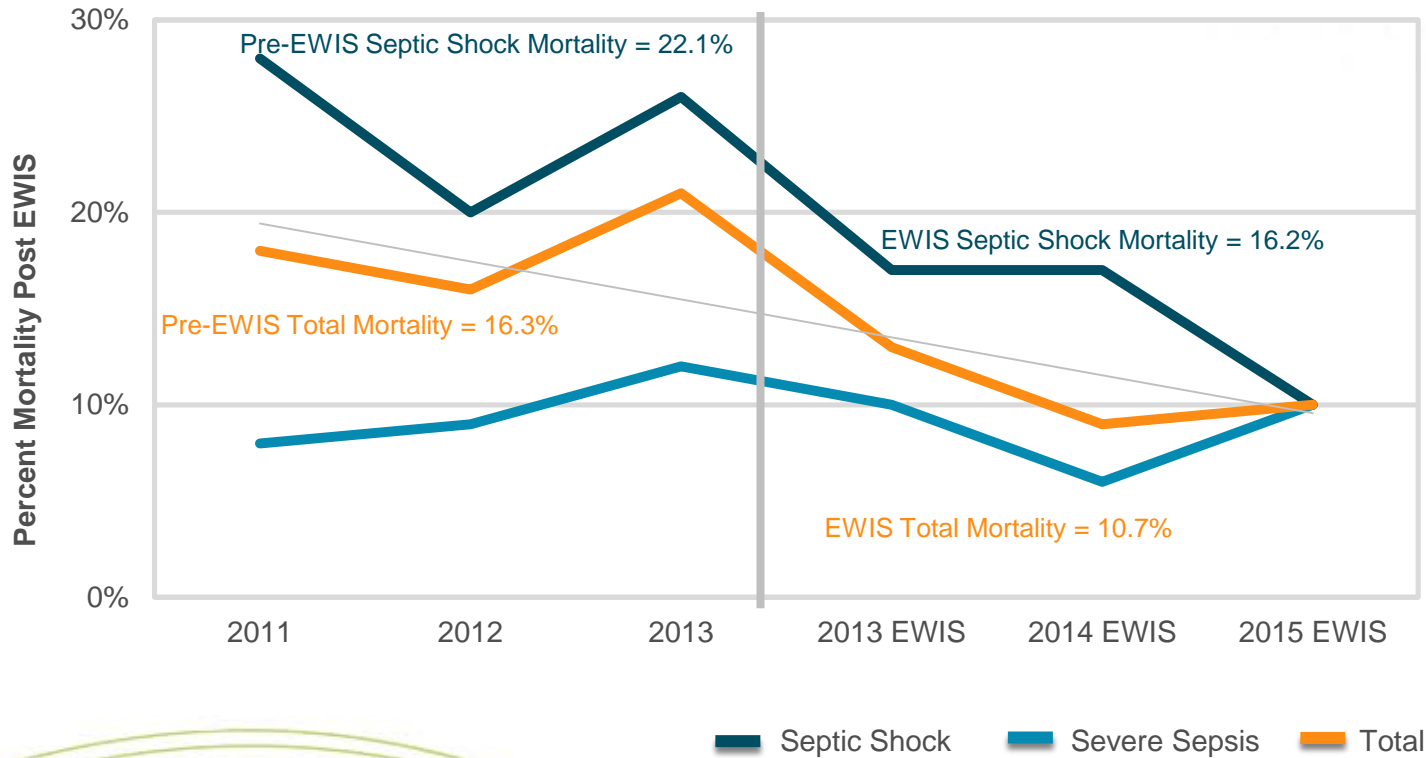
Septic Shock Development Pre- and Post-EWIS

Percentage of patients with severe sepsis developing septic shock within 24 hours of presentation time zero, by location
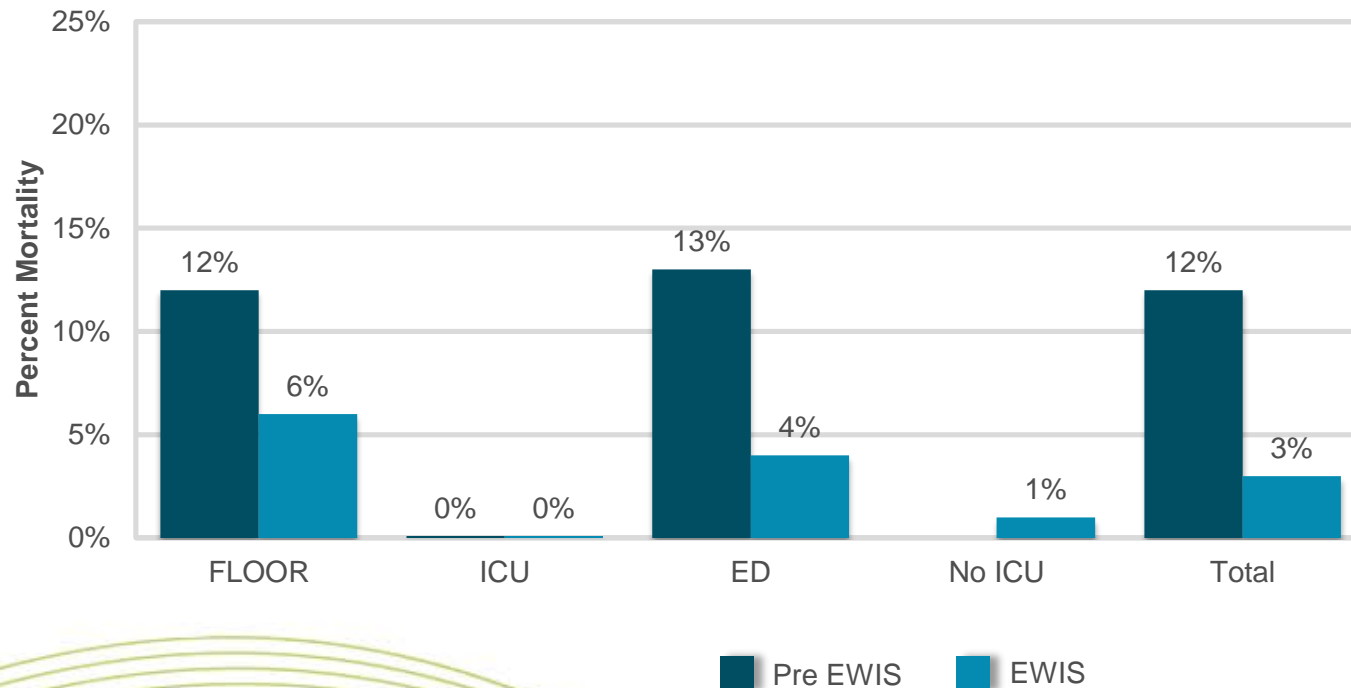
Severe Sepsis vs Septic Shock

Percentage of patients by severe sepsis vs septic shock at presentation time zero, by location
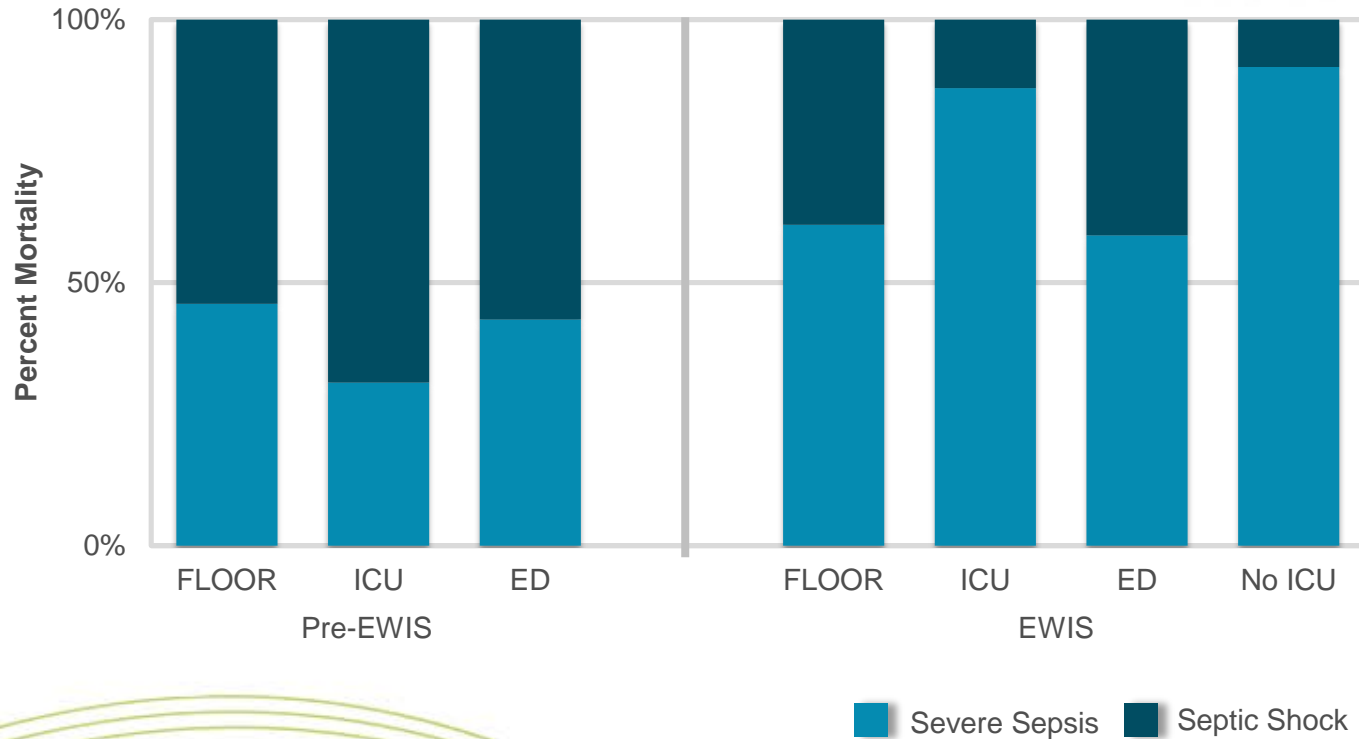
Mortality Trend by Location

Mortality by Location at Presentation Time Zero who subsequently meet septic shock criteria within 24 Hours
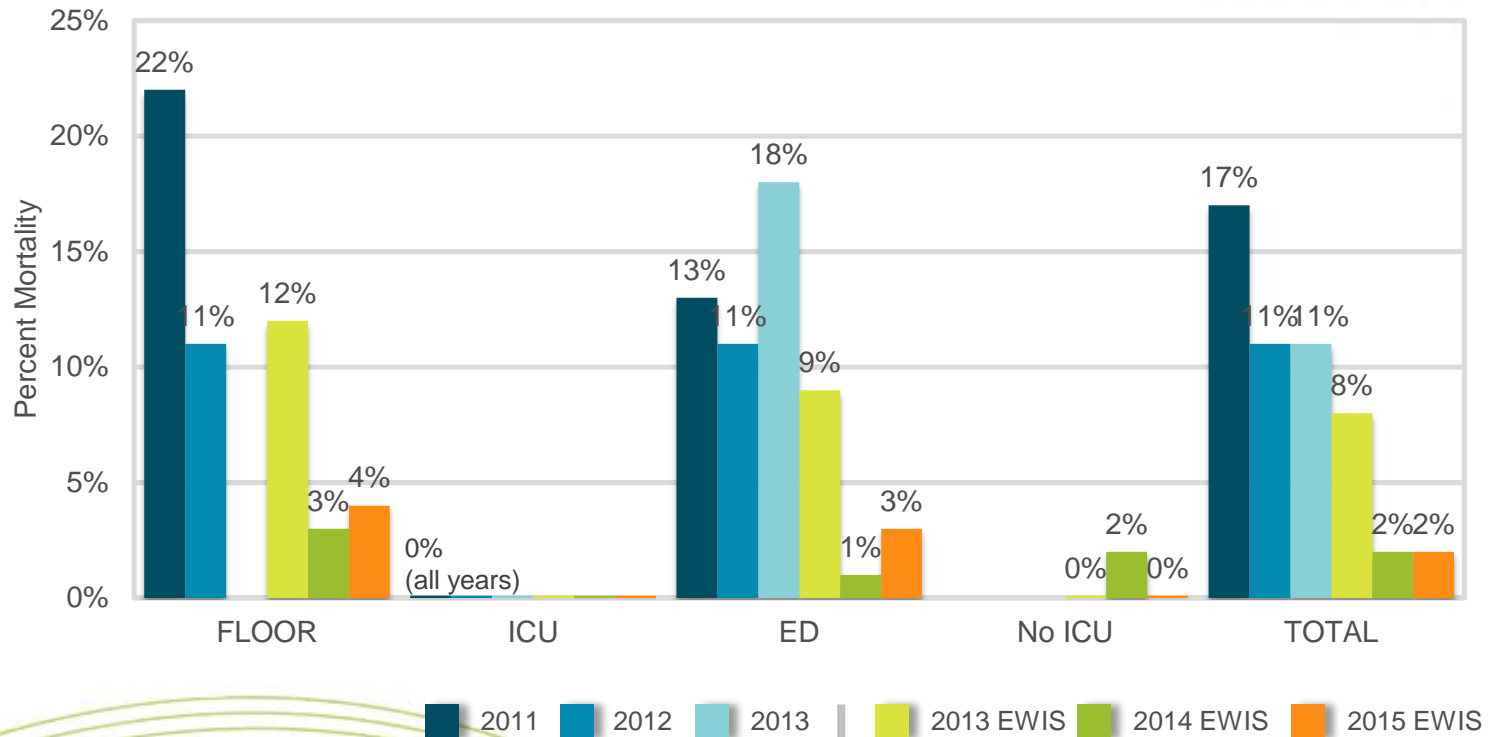
Multi-Patient Surveillance

- Allows a single workstation to view patient activity, HR, RR, Temp, ECG waveform

- Enables eAcute dedicated 'sitter' to continuously monitor patients identified as being high risk for falls, pressure ulcers, clinical deterioration, etc.

- Goal is to reduce bad events and the associated costs

Situational Patient Awareness Response Center (SPARC)

eTelemetry / eSitting / Alarm Management

- 91% telemetry alarm reduction across 96 beds in 6 months
- National Patient Safety Goal on Alarm Management NPSG.06.01.01
- Improves the safety of clinical alarm systems

Mercy Virtual: ConnectNow

Mercy✝Virtual

ConnectNow

Connecting patients and providers
regardless of their locations.

Mercy Virtual

Telestroke Locations

33 hospitals

4 commercial non-Mercy
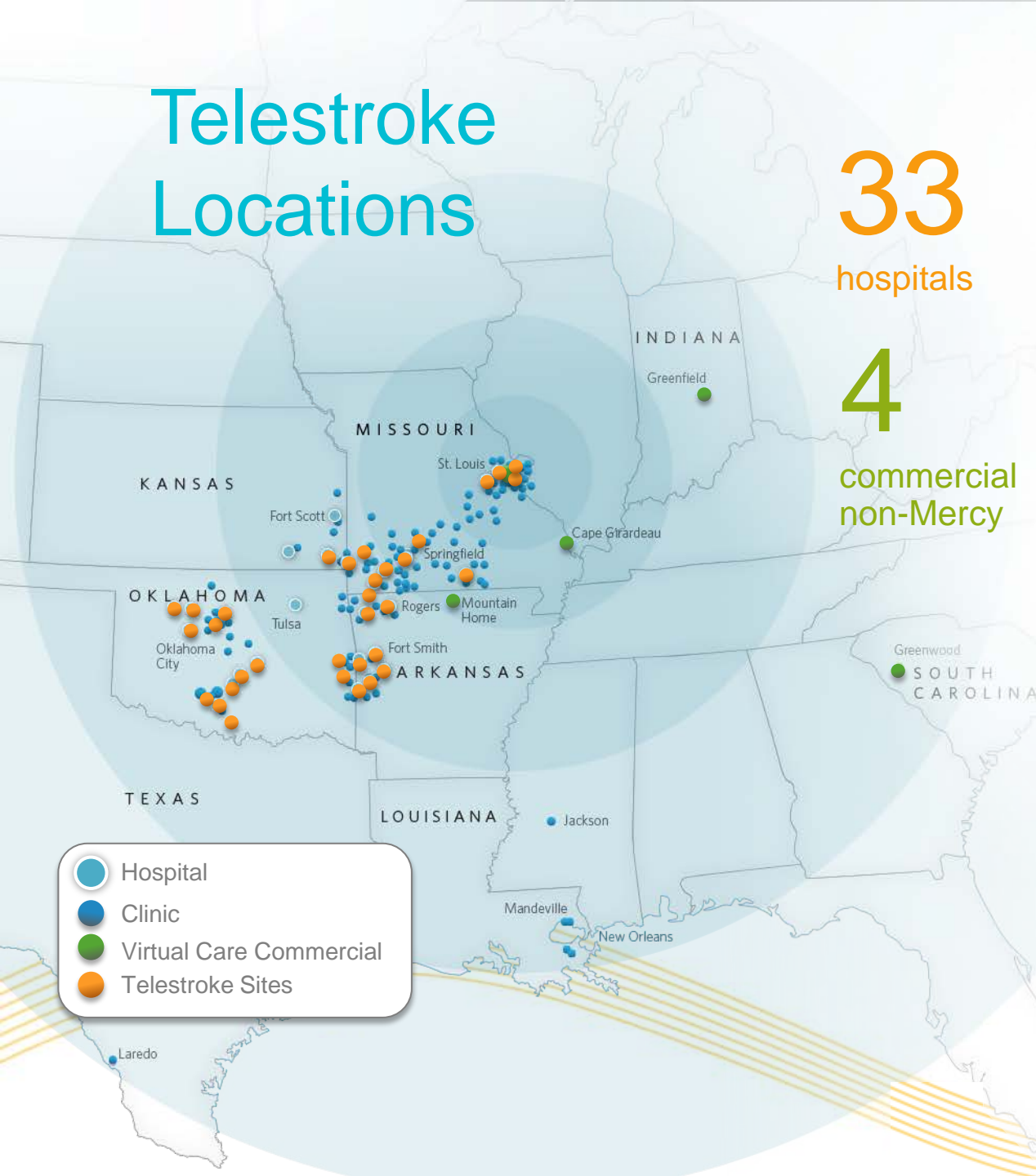
Legend:
- Hospital
- Clinic
- Virtual Care Commercial
- Telestroke Sites

City	State	Live
Bella Vista	AR	●
Berryville	AR	●
Booneville	AR	●
Ft. Smith	AR	●
Ozark	AR	●
Paris	AR	●
Rogers	AR	●
Waldron	AR	●
Columbus (No CT Scan)	KS	
Aurora	MO	●
Carthage	MO	●
Cassville	MO	●
Jefferson	MO	●
Joplin	MO	●
Lebanon	MO	●
Mountain View	MO	
Springfield	MO	●
St. Alexius	MO	●
St. Louis	MO	●
Washington	MO	●
Ada	OK	
Ardmore	OK	●
Poteau (Eastern OK Medical Center)	OK	●
El Reno	OK	●
Guthrie (Logan County)	OK	●
Healdton	OK	●
Kingfisher	OK	●
Marietta (Mercy Hospital Love Cnty)	OK	●
Oklahoma City	OK	●
Sallisaw (Sequoyah Memorial Hospital)	OK	●
Sulphur (Arbuckle Memorial Hospital)	OK	
Tishomingo	OK	●
Watonga	OK	●

A Patient's Journey

- Alteplase/tPA only FDA approved drug treatment for stroke

- 3.0-4.5 hr treatment window

- Patients treated with tPA within 90 minutes have increased odds of short and long-term improvement

- Treated patients have lower long-term costs because of lower long term disability

- Only 1%-3% of stroke patients receive tPA when they have an acute stroke

CT SCAN

TELEMEDICINE CART

NEURO SPECIALIST IS NOTIFIED

PATIENT RETURNS TO ROOM

EMERGENCY ROOM

NEURO SPECIALIST IS READY

Mercy Virtual
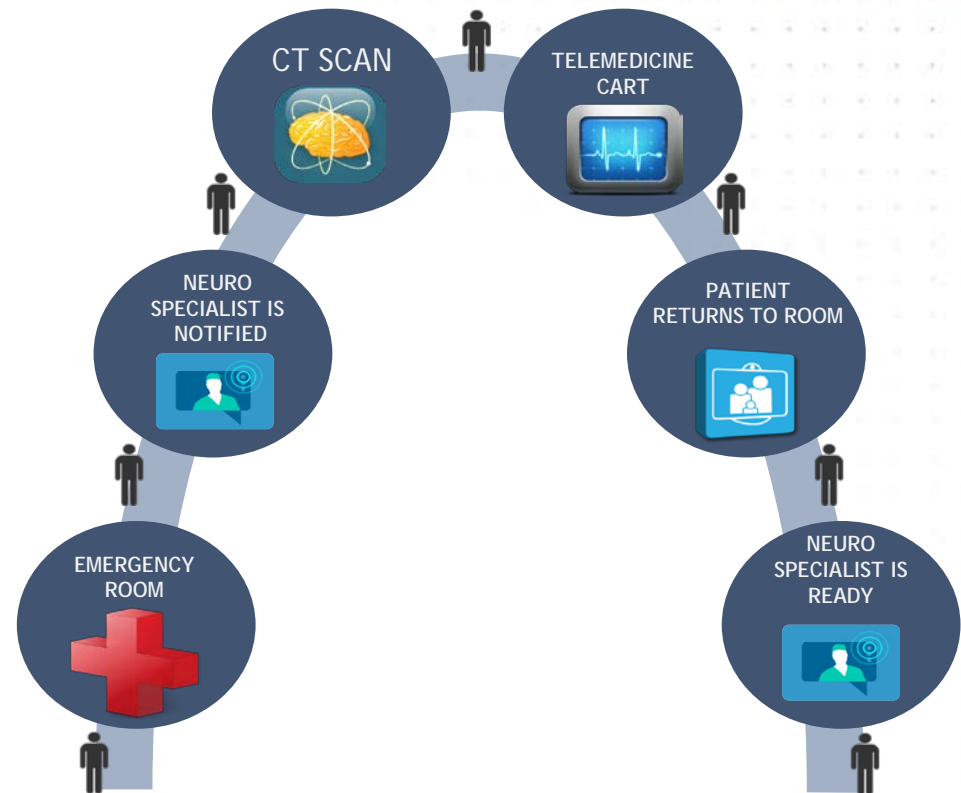
Our Initial Results

Acute Ischemic Stroke Patients Receiving Alteplase
2010 – October 2013

Facility	Annual ED Volume 2013	Epic Go-live	2010*	2011*	2012	2013**	Avg. monthly telestroke consults 2013 (>1350 visits)
Hot Springs, AR	31,000	Sep-10	2	6	21	20	20
Springfield, MO	51,000	Jan-09	n/a	21	41	48	20
Lebanon, MO	20,000	May-11	n/a	1	4	6	7
Rogers, AR	22,000	Mar-08	1	4	13	23	28
Fort Smith, AR	38,000	Sep-10	0	2	18	8	13
Washington, MO	25,000	Jul-09	0	1	7	9	12

*Partial Year
**Partial Year – Data complete through October 2013 discharges

Source: Epic Electronic Health Record Charge and
Medication Administrations Record data

Program Highlights

- Specialty access
- Co-worker education
- Community education & awareness
- Stroke certification support & education

Mercy Virtual

Mercy Virtual: CareEngage

Mercy✝Virtual

CareEngage

Comprehensive population management services, leveraging integrated care management capabilities with an expanding portfolio of technology; providing enhanced access, improved health status while lowering healthcare costs.

CareEngage

Circular cycle labels (clockwise): Define Population ▸ Stratify Risks ▸ Identify Care Risks ▸ Engage Patients ▸ Manage Care ▸ Measure Outcomes

Surrounding labels:
- Employer & Payer Relationships
- Patient-centered Care Planning
- Data Analytics, Reporting & Predictive Modeling
- Utilization Management
- Disease Registries
- Disease Management
- Care Management/ Social Work Full Continuum
- Remote Monitoring
- Primary Care Team Access
- Pharmacotherapy
- Evidence-based Clinical Guidelines
- Health & Wellness
- Managed Behavioral Health
- Patient Education
- Nurse On Call

Mercy✝Virtual

42

Nurse On Call

- 24/7/365 access

- Extension of primary care

- Highly specialized nurses

- Advice on right level of care

- Emergency Department (ED) redirection rate

  - Pediatrics 46%

  - Adults 21%

- Decreased physician after-hours calls by 70%

Mercy Virtual

eVisits

Interactive patient/provider access online and via mobile app

Engagement with MyMercy
*Increase since last quarter

PATIENT VISITS	↑	1,726,131 7.4%
MOBILE VISITS	↑	538,050 4.87%
TIME ON SITE		5:43

FY2014, Q2, Oct – Dec, 2013

eVisits per Month

Month	Value
Jan	118
Feb	81
Mar	104
Apr	72
May	84
Jun	101
July	143
Aug	197
Sept	248
Oct	316
Nov	363
Dec	485
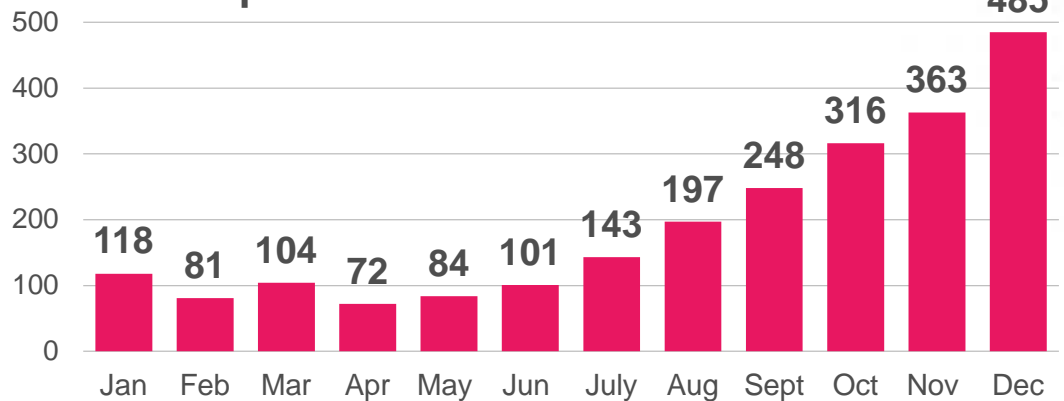
Total MyMercy Account Registrations 512,136

Mercy Virtual
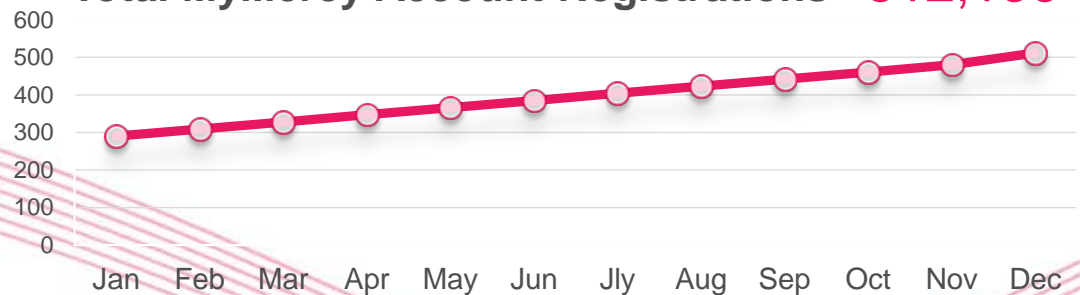
Home Telemonitoring System of Care

Patient at Home
Takes vital signs and customized surveys with monitoring devices

Secure Data Infrastructure
With specialized algorithms, data server processes clinical data into manageable information with bi-directional data communication with electronic health records.

Multi-Disciplinary Care Team
Management by exception and fully integrated medical records streamlines operations, improves efficiency, and increases patient throughput.
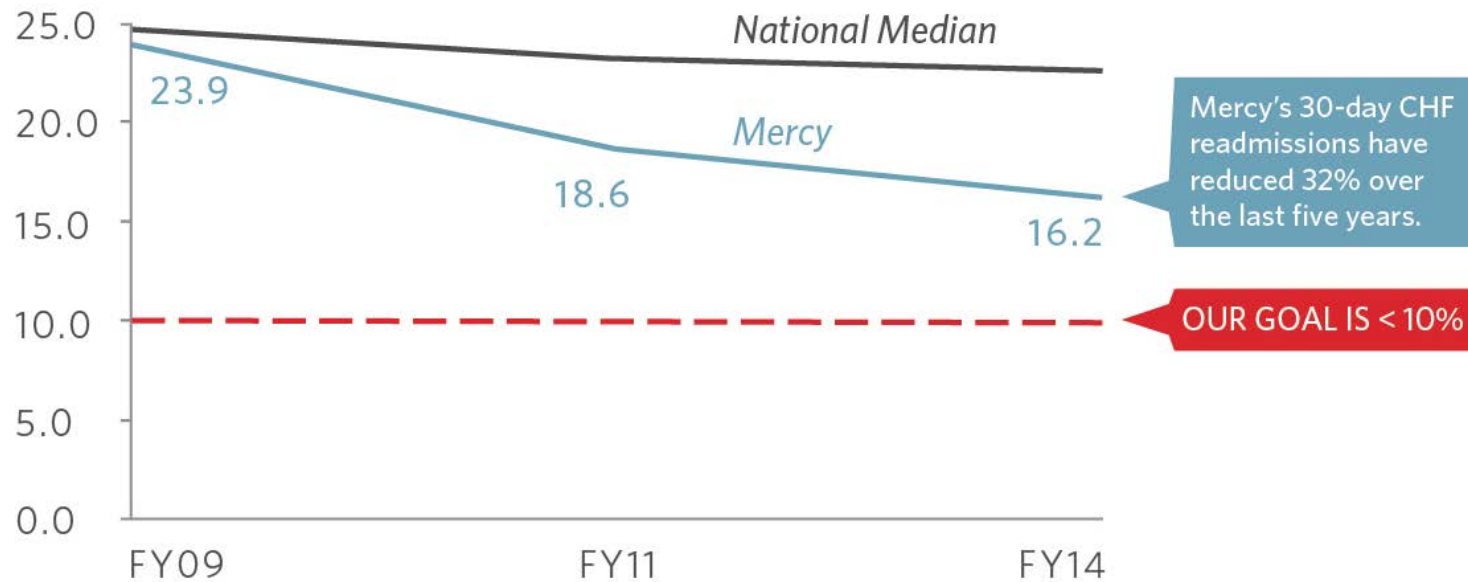
Telehealth Nurse
Specialized clinical software streamlines workflow, improves efficiencies, and allows for earlier patient intervention.

▶ Improved clinical outcomes
▶ Reduced acute care hosptalizations

Mercy✝Virtual

CHF Readmissions

Heart Failure Readmission Rate Trends
National vs. Mercy, 2009 to current

National Median

23.9

Mercy

18.6

16.2

Mercy's 30-day CHF readmissions have reduced 32% over the last five years.

OUR GOAL IS < 10%

25.0
20.0
15.0
10.0
5.0
0.0

FY09   FY11   FY14

Sources: CMS Medicare Hospital Quality Chartbooks 2012 & 2013; Mercy Care Management Informatics
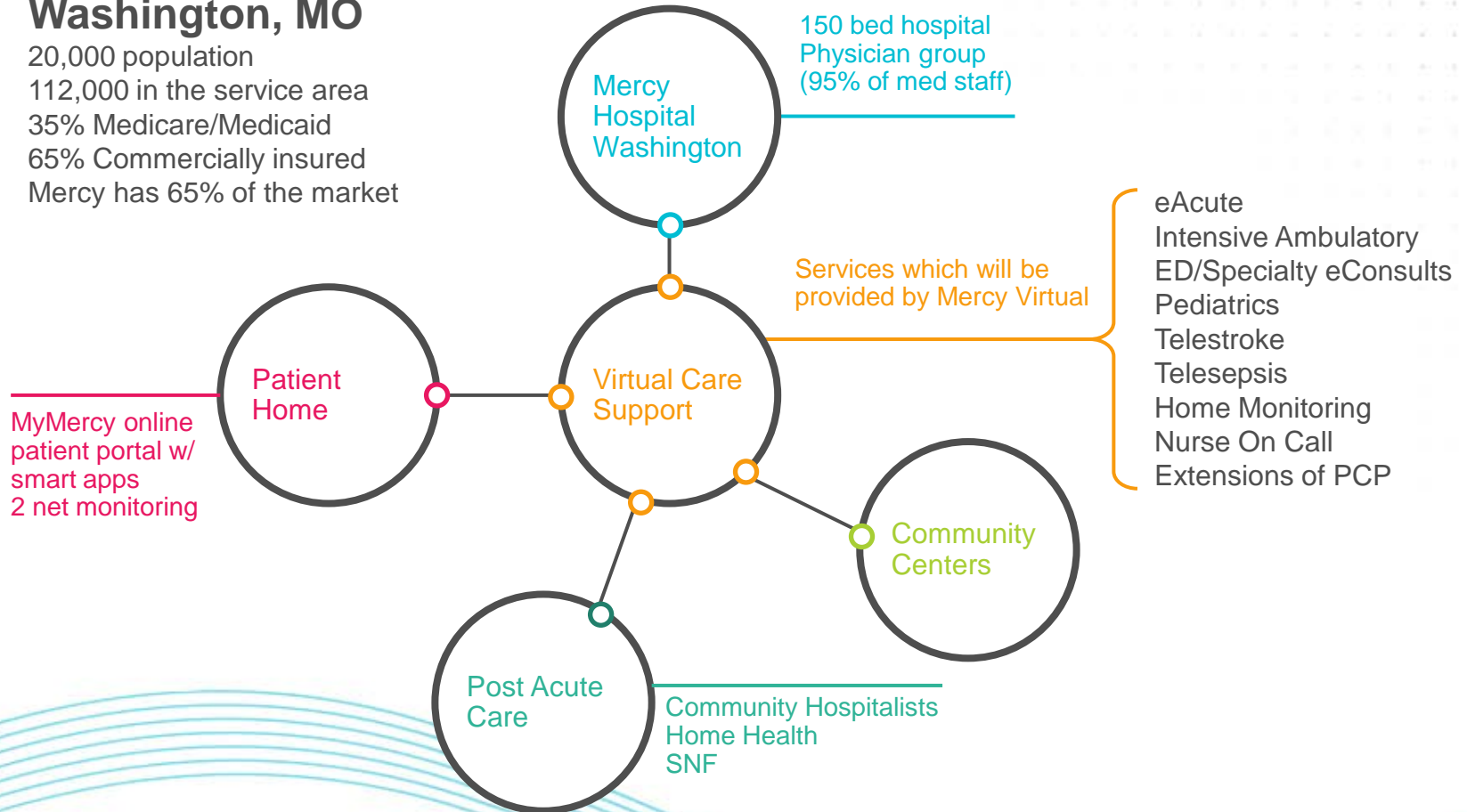
Mercy Virtual

Mercy Virtual By-the-Numbers

Acute Care Facilities	29
Acute Care Beds	2431
Critical Care Units	30
Critical Care Beds	458
Emergency Rooms	29
Sepsis Patients Impacted	15,632
Care Management Lives	335,000
eClinic Patient Sites	32
Co-Workers	330

Mercy Virtual

Virtual Care Center

Mercy✝Virtual

The Virtual Village (Noah's Ark)

Washington, MO
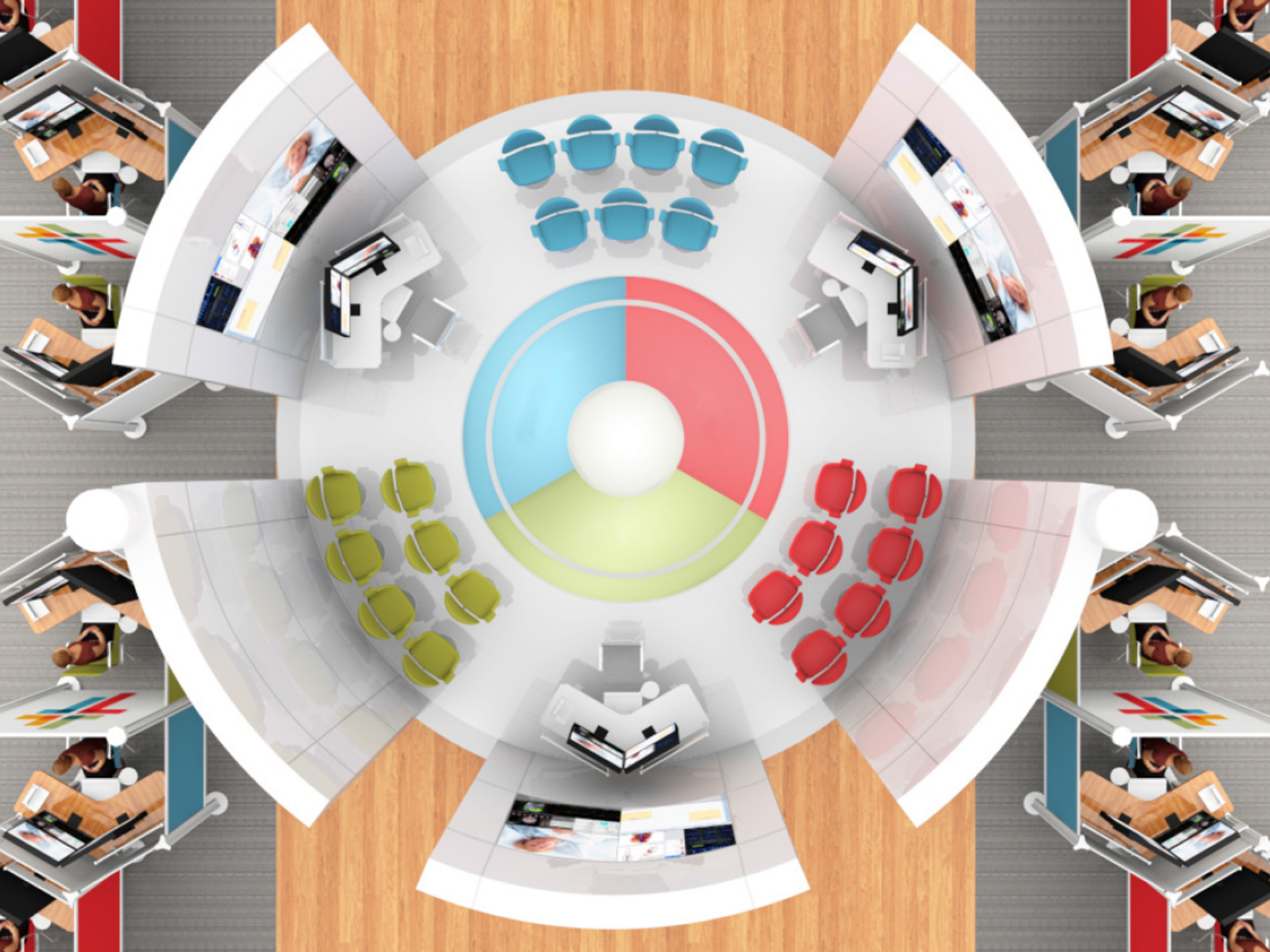20,000 population
112,000 in the service area
35% Medicare/Medicaid
65% Commercially insured
Mercy has 65% of the market

Mercy Hospital Washington

150 bed hospital
Physician group
(95% of med staff)

Patient Home

MyMercy online
patient portal w/
smart apps
2 net monitoring

Virtual Care Support

Services which will be
provided by Mercy Virtual

eAcute
Intensive Ambulatory
ED/Specialty eConsults
Pediatrics
Telestroke
Telesepsis
Home Monitoring
Nurse On Call
Extensions of PCP

Community Centers

Post Acute Care

Community Hospitalists
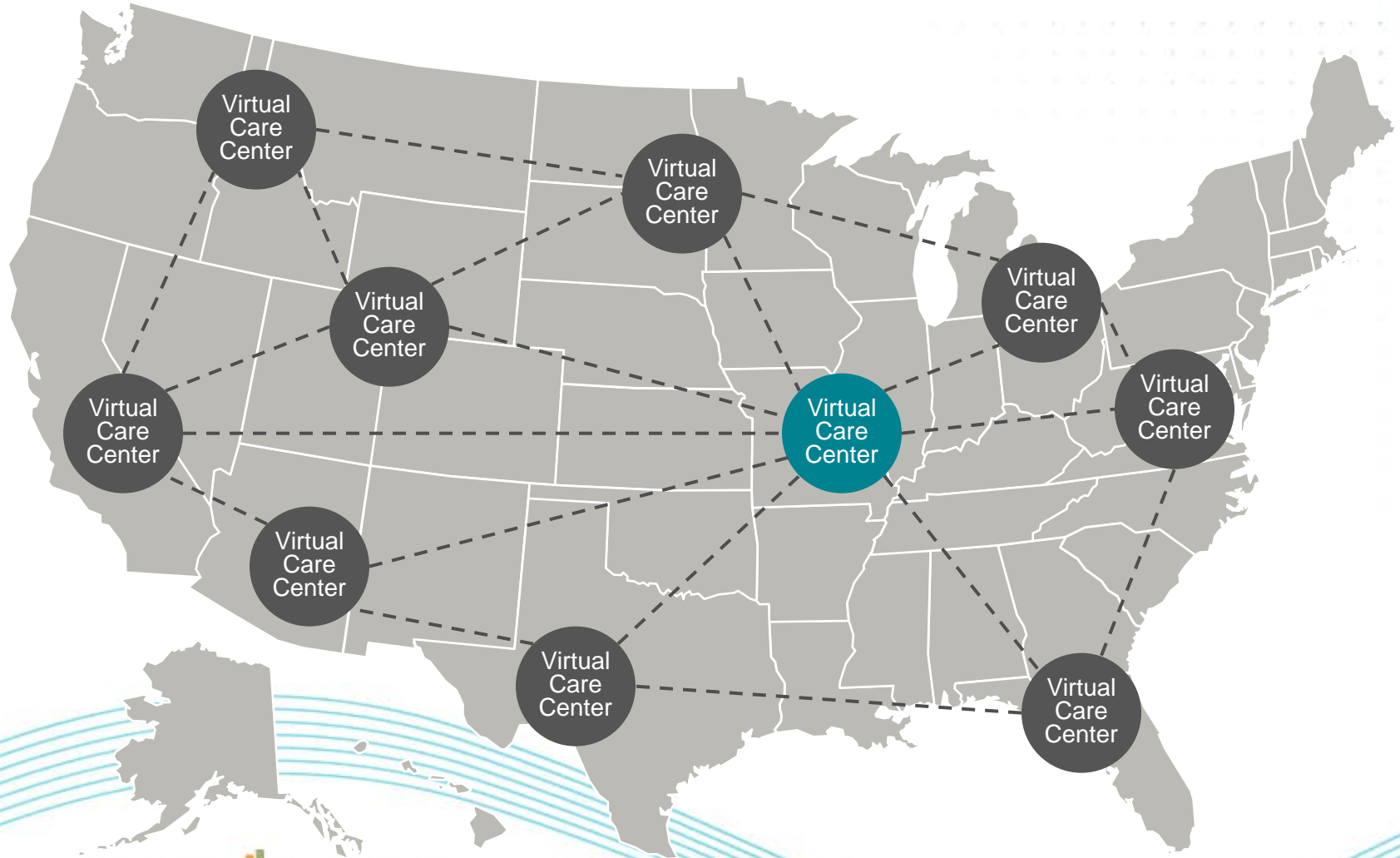Home Health
SNF

Mercy Virtual

Vision: Interdependent National Consortium of Like-Minded Health Systems

Thank you.

For nearly a decade, Mercy has been pioneering telehealth solutions.

Mercy✝Virtual