



**eHEALTH INITIATIVE**  
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# **National Council on Chronic Disease and Technology:**

**Mayo Clinic's Tele-ICU &  
Clinical Management Apps: Creating  
Partnerships Between Providers and Patients**

**Wednesday, November 20, 2013**

**2:00 – 3:00 PM ET**

# Agenda

- Welcome and introduction
- Roll call
- Presentations:
  - Sean Caples, D.O., Medical Director, Mayo Clinic
  - Sharon Silow-Carroll & Barbara Smith, Health Management Associates
- Discussion/Questions

# Reminder

*Please mute your line  
when not speaking  
(\* 6 to mute, \*7 to unmute)*

# Reminder

*This call is being recorded*



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The **National Council on Data & Analytics** will meet **IN PERSON** on January 28 before the 2014 Annual Conference in Orlando, FL!

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- *Leveraging Analytics to Support Population Health*
- *Privacy and Security: Challenges and Best Practices*
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# Overcoming Integration Roadblocks on the Road to Accountable Care

Webinar: Is Your ACO's Data Secure and Integrated?

November 26, 2:00 PM ET

[www.ehidc.org/events/webinars](http://www.ehidc.org/events/webinars)

- Speakers include:
  - Jim Youkin, Director, Information Technology  
**Geisinger Health System**
  - John Haughton, MD, Chief Medical Information Officer, **Covisint**
  - Dave Miller, Chief Security Officer, **Covisint**





# Co-Chair

The Council is chaired by:

- **Matthew Holland**  
Executive Director  
Government Services  
WebMD





# **Enhanced Critical Care Services by Mayo Clinic**

**(e-ICU; Tele-ICU)**

**Sean M. Caples, D.O.  
Medical Director**

# Critical Care Needs

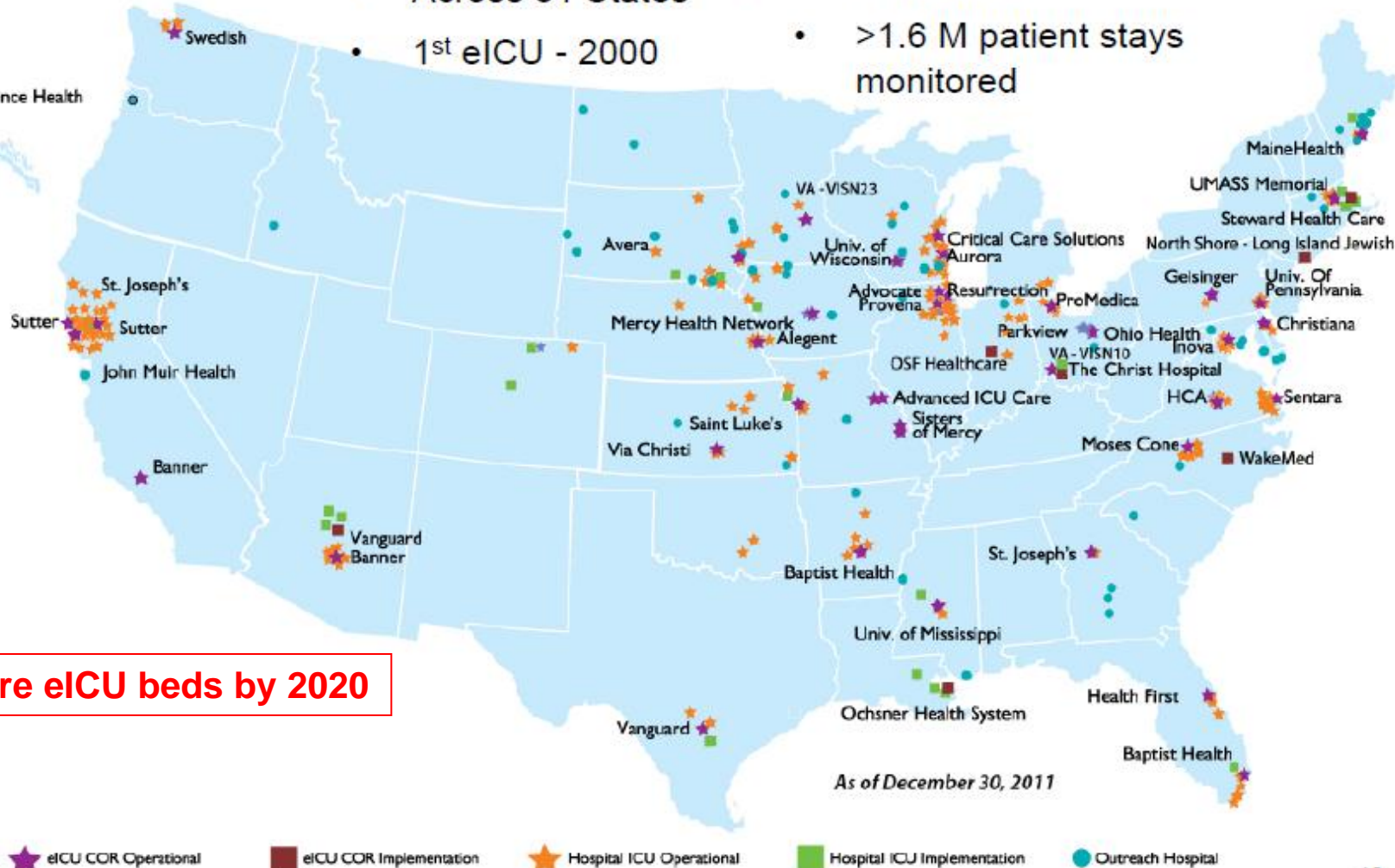
- > 5 million pts/yr
- 7% of national health care expenditures
  - 1% GDP
- 2000-2020:
  - >65yr age group: 50% increase
  - By 2020, 35% shortfall in intensivist staffing needs

# Bridging the Gap: Tele-ICU

- Provision of care to critically ill patients by remotely located specialists
  - Intensivists
  - CC RN's
  - Processes (EBM, bundles, charting)
  - Culture
- Core concept: integration of patient care across a regional network (MC Health System)

# eICU Programs

- 300+ hospitals
- 40+ health systems
- Across 31 States
- 1<sup>st</sup> eICU - 2000
- ~~~X~~0% of adult ICU beds
- Monitoring >500,000 patient stays/year
- >1.6 M patient stays monitored





Minnesota

Wisconsin

- ~14 beds
- 2 intensivists; N.P.
- Driving quality
- Developing referral relationship with Fairmont

- ~20 beds
- 2 intensivists; NP/PA
- Cardiac surgery

- Clinic
- ★ Hospital and Clinic
- ◆ Management Services Agreement
- Physician Services Agreement

- Hospitalists
- Varying comfort with vents
- Limited/no dialysis

- ~12 beds
- 2 intensivists
- Family medicine residents

The colors on the map represent locations which operate under the same management structure.



# Mayo Clinic's Enhanced Critical Care:

- Enables *supplemental* monitoring and care of ICU patients in MCHS hospitals
- Remote capabilities include:
  - Continuous software (Philips) data analysis
  - Near real-time physiologic monitoring
  - Interventions via direct order entry
  - EMR interaction
  - Live audio/video interaction

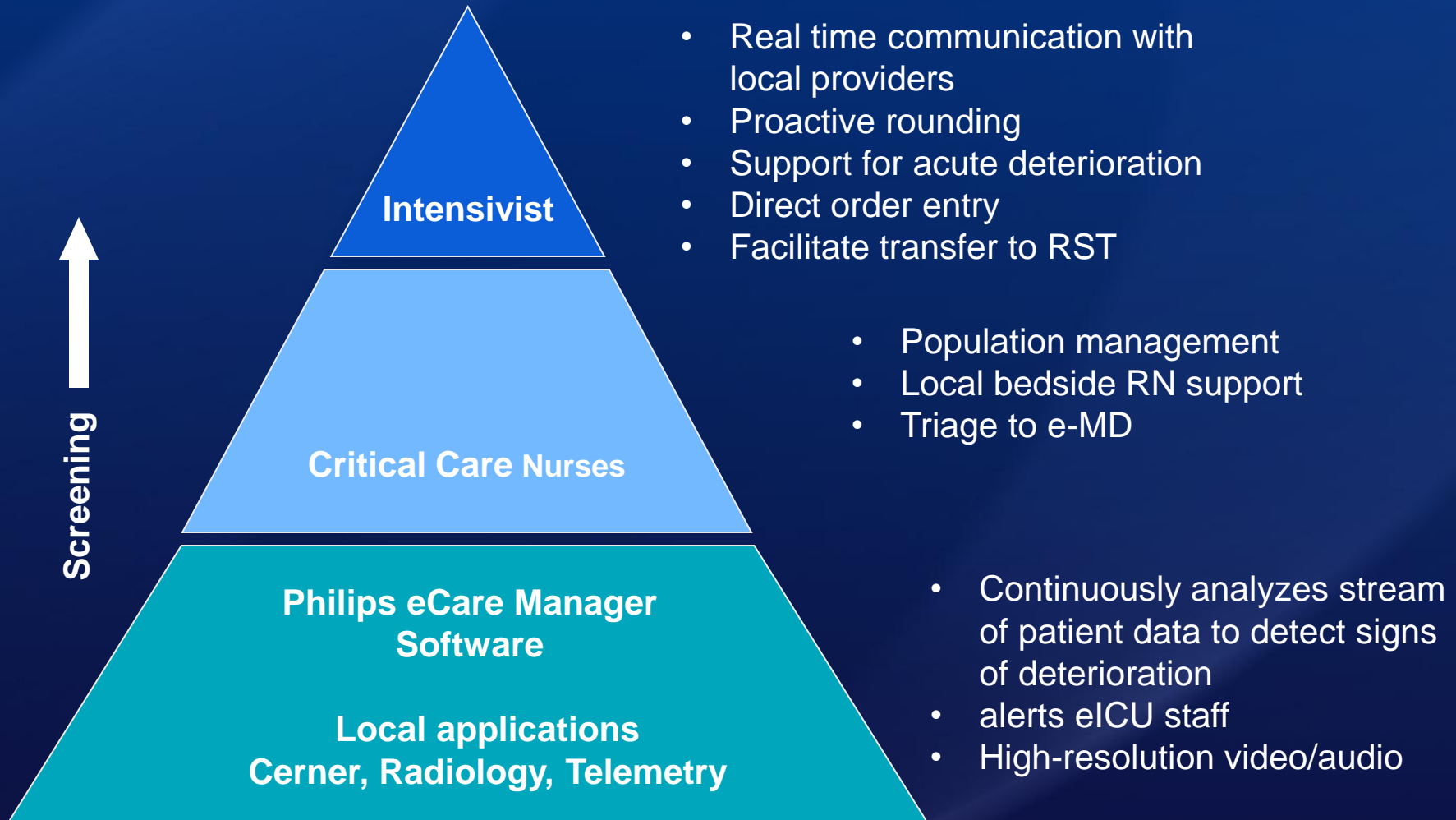
# Why Enhanced Critical Care?

- Safety
  - Increased access to specialists
  - Reduced complications
- Outcomes
  - Reduced mortality
  - Reduced length of stay
- Staff
  - Increased provider/RN communication
  - Increased staff satisfaction



# Tele-ICU

## Leveraged care model



Cardiovascular



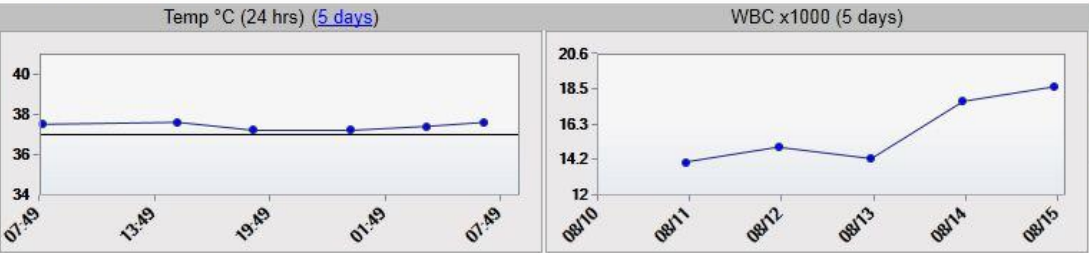
Infectious Disease

Antimicrobials

- bacitracin Oint - 1 gm packet (08/12)
- bacitracin Oint - 1 gm packet (08/12)
- ceFAZolin 1 gm/50 mL Inj (08/07)
- levoFLOXACIN 500 mg/100 mL Inj (08/16)
- mupirocin 2% Nasal Oint - 1 gm (Bactroban) (08/12)
- nineracillin-taz 2 25 nm/Iso-osmotic 50 ml (08/13)

Lines, Tubes, Drains (LTD)

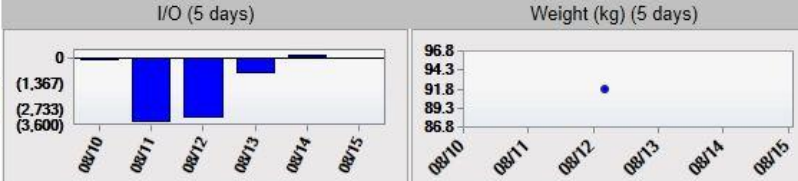
- PICC right basilic vein Ins.: (08/12)
- Arterial (2) right radial artery Ins.: (08/07)
- Central Venous right internal jugular vein Ins.: (08/07)
- Urinary Catheter urethra Ins.: (08/07)



GCS	ICP	Max ICP (24 hr)	Paralysis
n/a	n/a	n/a	n/a

Pulmonary Vent Data				
Airway				
Intubated/oral ETT				
Vent				
Ventilated - with no daily extubation trial				
Monitor Data	O2 Sat	100	RR	0
ABG:	pH	PaCO2	PaO2	HCO3
	7.4	37	138	22
	08/15 06:00	FiO2	PaO2/FiO2	Rate
	40	345	n/a	500
VENT:	Mode	TV mls/kg	RR	FiO2
	VC+	9.7	n/a	40
08/15 04:36	PEEP	Plat Press	PS	PC
	5	n/a	n/a	n/a

Renal			
Na	K	Cl	HCO3
139	3.8	102	n/a
BUN	CREATININE	UO - 6 Hrs	
77	3	1130	
Volume Status		n/a	



Hematology				
HGB	PLT	PT	INR	PTT (Secs)
9.1	115	n/a	n/a	n/a

Gastrointestinal			
ALB	BILI	AST	ALT
2.5	1	50	n/a
NUTRITION		GLUCOSE	Insulin Drip
NPO		124	8 u/hr



15			1505	CrCl	H	N/A	
12			1512	H	INT	N/A	
14			1513	CrCl	INT	N/A	
10			1507	H	INT	N/A	
7			1524	CrCl	2.22 D		
7			1525	N/A			
6			1503	0.65 D			
6			1520	CrCl	H	INT	X
5			1523	INT	12.9 D		
4			1504	INT	2.97 D		
4			1510	H	X		
4			1521	H	0.12 D		
1			1514	CrCl	X		
0			1511	X			
0			1522	CrCl	X		



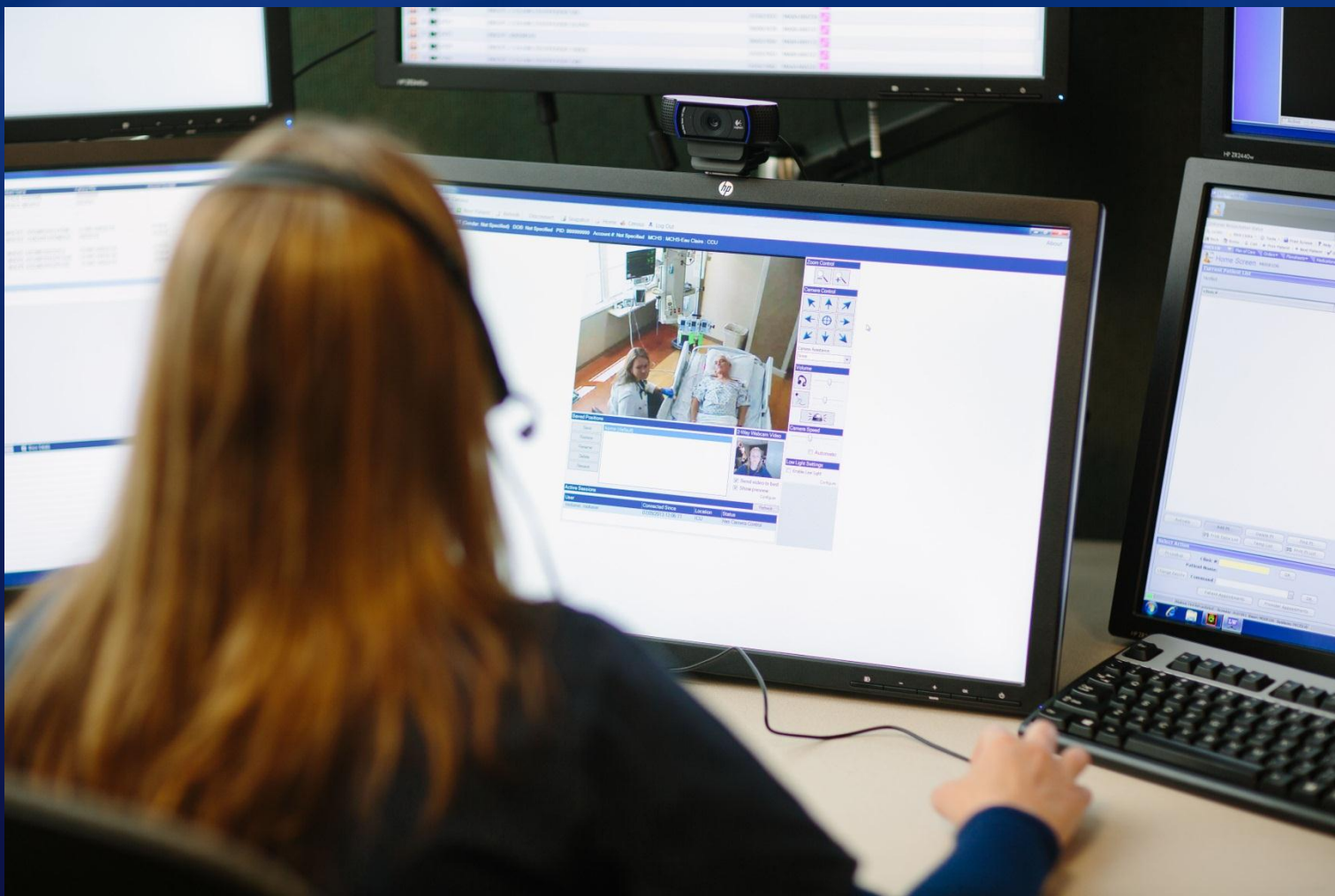
# Sample Room



# eICU Clinical Operations Room (COR)









# Collaboration Across the MCHS

- Clinical Committees
  - Intensivist, hospitalist, NP/PA, RN, supportive
- Practice/Process Flow
- Administrative Collaboration
- Buy-in across the campuses (media, PR, ...)



# Basic Principles

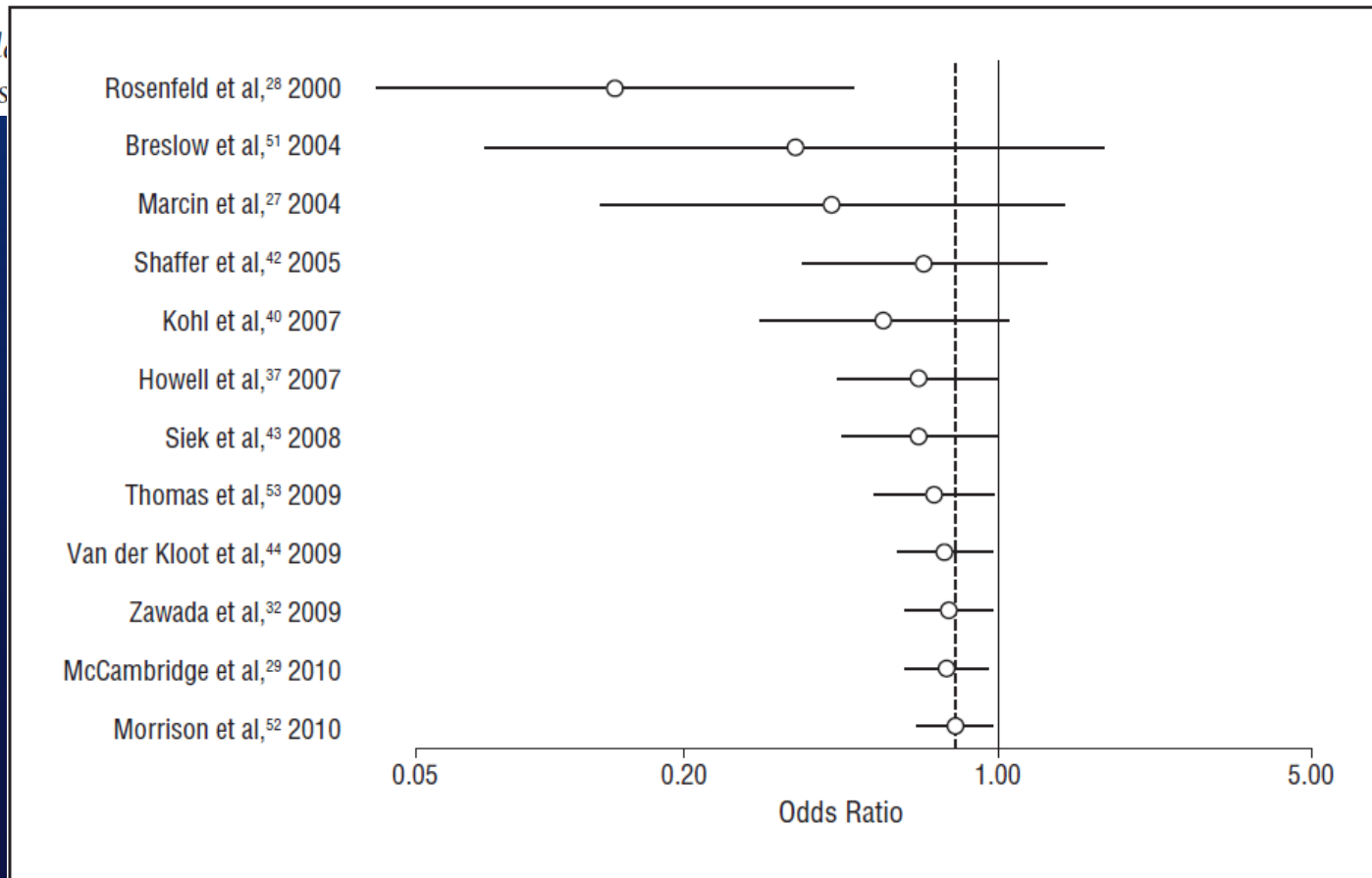
- Standardization of best practices across network
- Additional layer of safety, monitoring, response
- Leverage RST critical care resources and expertise across MCHS
- Refine the transfer process
- Supplement, not replace, bedside care
  - Ultimate authority with bedside clinician
- No opt out: all adult pts monitored in the ICU will be admitted to eICU

# Impact of Telemedicine Intensive Care Unit Coverage on Patient Outcomes

## *A Systematic Review and Meta-analysis*

Lance Brendel  
Comilla Sass

, MPH;



**Figure 4.** Cumulative influence of study on meta-analysis of intensive care unit mortality. Horizontal lines depict 95% confidence intervals; vertical dashed line, the pooled odds ratio of 0.80.

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

Lilly, et al. *JAMA*, 2011

- The largest study of Tele-ICU in an academic medical center
- 6,290 patients in 7 ICU's Univ of Mass.
- 3 Med, 3 Surg, 1 CV
- Two years study period (2005-2007)

- Reduced mortality
  - 13.6% vs. 11.8%
- Reduced Hospital LOS
  - 13.3 days vs. 9.8 days

# How Did Tele-ICU Make These Changes?

- Addition of Intensivist Coverage
- Better “off hours” Coverage
- Improve Best Practice Compliance
- Process Standardization
- Enhanced Vigilance
- Software Enhancements

# **Consumer Clinical Management Apps: Promise and Challenges**

Sharon Silow-Carroll

Barbara Markham Smith

Health Management Associates

Presentation to eHealth Initiative  
National Council on Chronic Disease & Technology  
November 20, 2013

# Overview

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- Review of consumer “clinical management apps”
  - What are they?
  - What is their potential for promoting care and health outcomes & reducing costs and disparities?
    - Focus on asthma and diabetes
  - What are the challenges to broader use?
- Issue Brief, November 2013 supported by The Commonwealth Fund, [www.cmwf.org](http://www.cmwf.org)

# Consumer health app market growing rapidly

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- Mobile device applications for smart phones, tablets, etc.
  - Not focusing on *provider* mobile technologies such as EICU
- Health app market est. at \$700m in 2012 expected to double in 2013
- Lifestyle apps: calorie counters, diet, exercise, general health information
- Clinical management apps:
  - Connect patients with clinicians, medical records
  - Help manage chronic conditions
  - May provide diagnostic and medical device functions
- Evidence on impact remains very limited



# Patients want mobile health options to...

	Total %	Smartphone or Tablet Owner %	Take Rx Med for Chronic Condition %
Ask my doctor questions	37	43	41
Book doctor appointments	37	45	40
Check effects/side effects of medicine	36	42	39
Receive diagnostic test results	35	40	40
Get reminders to refill Rx	31	37	36
Get reminders to take my medication	24	29	26
Get reminders for exercise, smoking cessation, wellness programs/activities	23	28	21

Source: Harris Interactive/HealthDay Poll, May 2013,  
[http://www.harrisinteractive.com/vault/Medical%20Apps%20HI-HealthDay%20Poll%20for%20HI%20website\\_061813.pdf](http://www.harrisinteractive.com/vault/Medical%20Apps%20HI-HealthDay%20Poll%20for%20HI%20website_061813.pdf)

# Safety net groups have better-than-expected access to mobile devices & health apps (2012)

	White, Non-Hispanic	Black, Non-Hispanic	Hispanic
Percent of cell phone owners within each group who use their phone to look up health or medical information	15% (2010) 27%	19% (2010) 35%	25% (2010) 38%
Percent of cell phone owners within each group who send or receive texts	79%	80%	85%
Percent of cell phone owners within each group who receive health or medical information via text	7%	11%	6%
Percent of U.S. adults within each group who have a smartphone	42%	47%	49%
Percent of smartphone owners within each group who have software applications on their phones to track or manage health	19%	21%	15%

\*All data are from 2012 unless otherwise noted. Based on Pew Internet/California HealthCare Foundation Health Surveys: Aug. 9 - Sept. 13, 2010, N-3001 adults; Aug. 7- Sept. 6, 2012, N-3013 adults age 18 and older.

Source: S. Fox and M. Duggan, "Mobile Health 2012: Half of Smartphone Owners Use Their Devices to Get Health Information and One-Fifth of Smartphone Owners Have Health Apps," Pew Internet and American Life Project, Pew Research Center and California Healthcare Foundation, Nov. 8, 2012.

# Developers, prominent health systems, and government promoting use

- Single-function clinical management apps
  - Promoted by developers
  - E.g., dermatology diagnostic apps enable the user to take a picture of a mole and transmit it to a diagnostic site to determine if it appears to be malignant or benign; range in accuracy
- Comprehensive medical management apps
  - Mainly used by integrated health systems w/ health plans (Group Health Cooperative, Kaiser Permanente, Geisinger)
  - Secure access to medical records, lab & test results; email and/or text clinicians, request Rx refills, report & track symptoms; schedule appts.
    - Kaiser members had 12 m+ email communications w/ their docs (2011)
    - Geisinger testing mobile Cardiac Rehab app for med reminders, education, track activity, relay concerns; may reduce hospital/clinic visits
- FCC's Lifeline program expanding to provide smartphones and messaging between Medicaid members and providers/health plans (limited regions)

# Asthma apps relay information to providers to target interventions

- E.g., mobile Bluetooth device snaps onto inhaler to track use, identify triggers
  - Data transmitted to physicians
  - Personalized feedback to patients re: triggers
  - Early results show 50% decline in patients with “uncontrolled asthma”
  - Developer\* partnering with providers, payers, and foundation (CHCF) to expand utilization
- E.g., smart phone survey app for asthma patients on managing condition; low scores trigger nurse phone call
  - Intended to reduce ER visits & admissions (Geisinger)

\*Asthmapolis/Propeller Health

# Diabetes apps monitor and transmit data

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- Enhanced blood glucose monitors
  - Device attaches to monitor, collects levels, transmits to provider, gives feedback to patient
- Diabetes management apps
  - Sends data & allows interaction with case managers, physicians
  - Receive real-time coaching, alerts
  - Data may get entered into repository, “diary,” EHR
- Limited evidence, but early results show better A1c levels, lower ER visits and hospitalizations (58% in 12 mos.), better patient-provider interactions

# Challenges hamper development and adoption

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- Financial/reimbursement
  - Start up and ongoing equipment, software, and training costs
  - Lack of reimbursement to providers
- Technical
  - Platform interface issues; lack of automatic transmission to EHRs (concerns about adding to patient records)
- Patient and provider reservations
  - Privacy concerns
  - Generational divide
- Oversight/regulatory uncertainty at state and federal levels

# Takeaways

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- Clinical management apps offer promise to improve care & clinical outcomes and/or achieve savings
  - Extensions of proven interventions
  - Discovery of new strategies/interventions
  - Targeting low-income & minority patients may reduce disparities
- Objective evaluation needed to assess safety, outcomes, cost-effectiveness
  - FDA and state insurance oversight may slow market entry but promote provider and consumer comfort and adoption
  - ROI evidence essential to promote insurer/employer/public payer reimbursement, integration with EHRs, & broader health system use

# For more information

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[www.cmwf.org](http://www.cmwf.org)



# Questions?



# Thank you!

- See you at the in person meeting in January!

