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2019

Nov 15th, 1:00 PM

Telehealth in Critical Care: Quality and Cost Outcomes

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Robbie, Michael; Cole, Stephanie; Abodunde, Bukola; and Coustasse, Alberto, "Telehealth in Critical Care: Quality and Cost Outcomes" (2019). *Faculty Research Day*. 6.

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TELEHEALTH IN CRITICAL CARE: QUALITY AND COST OUTCOMES

Robie & Cole, Abodunde, Coustasse | LCOB Research Day | November 15, 2019



Introduction

- Telemedicine/ Telehealth is becoming VERY popular (American Well is used by i.e. Cleveland clinic, Anthem, Cerner, Medtronic, United Healthcare, and many more)
- VA (FY 2018) and Teladoc hit 1 telemedicine million visits
- Used also to increase market share by hospital chains
- More than 800,000 strokes, (1 every 40 sec) in the US (tele stroke)

Introduction



ICU Admissions

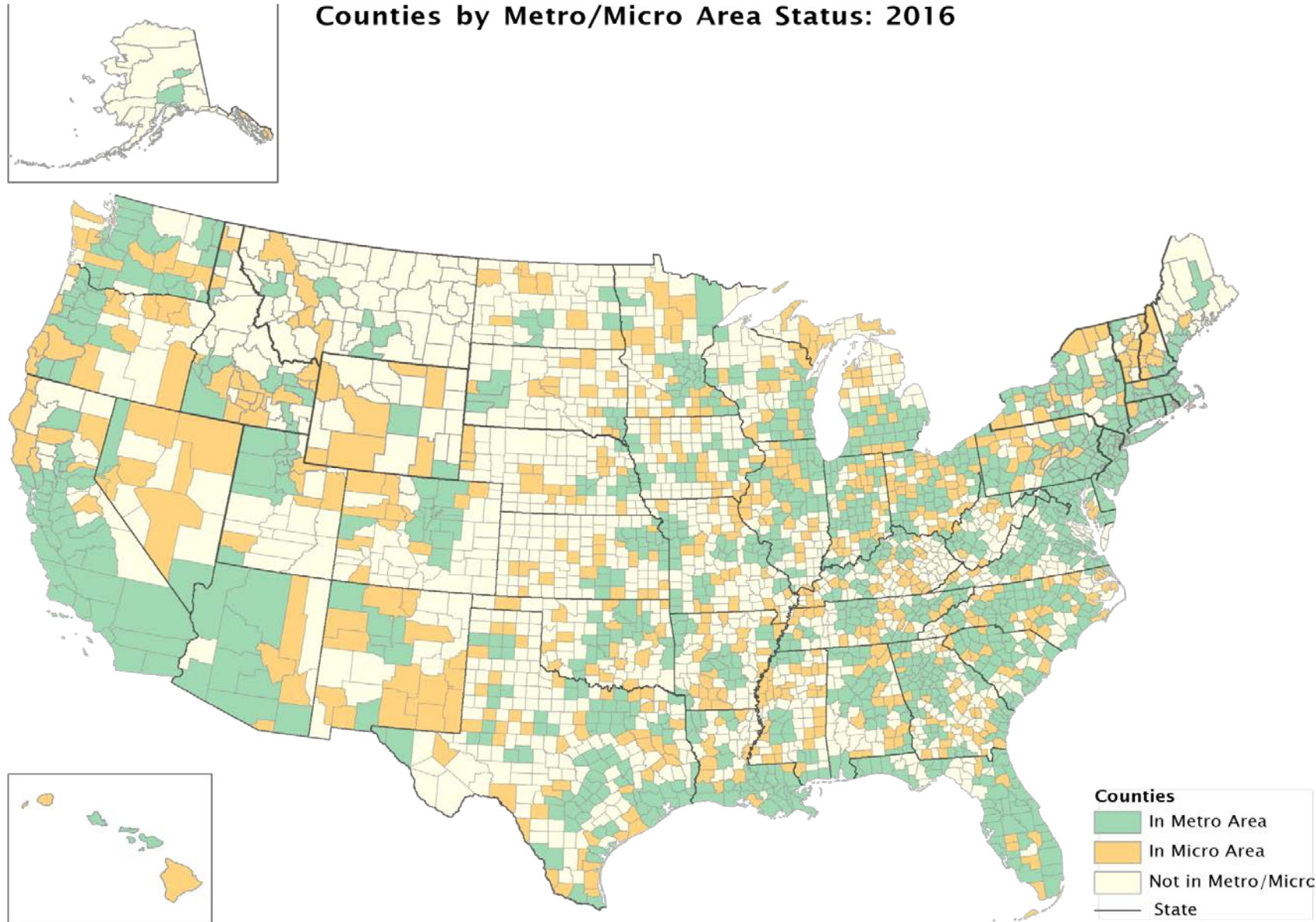
- 4 million U.S. ICU admissions annually
- \$80 billion annually
- 20% of deaths that occurs in the hospital
- 2.5 times more costly

Who goes to the ICU?

- 26.9 % of hospital stays involve an ICU stay
- 93.3% are respiratory patients with ventilator support



Counties by Metro/Micro Area Status: 2016



Rural Areas

19.3% of U.S. population lives in a rural area. Rural areas have higher than average health care workforce shortages which limits accessibility to health care services

Note: Metropolitan and micropolitan statistical areas defined by the Office of Management and Budget as of Jul. 2015, using U.S. Census Bureau county boundaries effective as of Jan. 2013

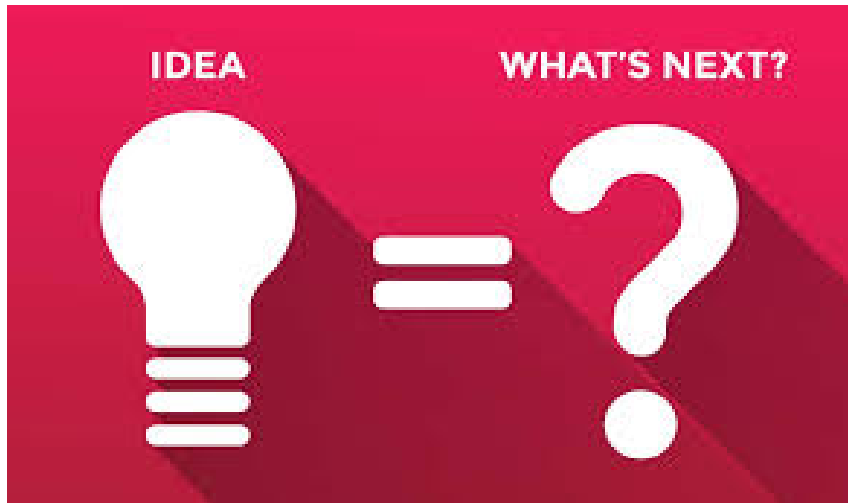
Source: U.S. Census Bureau, Small Area Income and Poverty Estimates (SAIPE) Program, Nov. 2017

The Red Flags

- Due to aging population usage increasing
- Intensivist shortage rural areas
- Significant difference by rural and urban hospitals



Leap Frog Group



- Fortune 500 companies and Robert Wood Johnson Foundation
- ICU intensivists who provide care exclusively in the ICU have 24-hour coverage

Telehealth and ICU

- Telehealth
 - Only 17% of hospitals utilized in 2016
 - \$2-\$5 million set up costs
- Reimbursement model changes



Purpose

The purpose of this study was to assess the potential for the implementation of telehealth in the ICU to determine its impact on quality of care and overall healthcare costs.

Methodology

The primary hypothesis of this study was that telehealth would be linked with lower ICU LOS and hospital mortality rates among critically ill patients.

Methodology

- Databases searched: PubMed, EBSCO, ProQuest, Google, and Google Scholar
- Keywords: 'telehealth' or 'telemedicine' or 'tele-ICU' and 'critical care' or 'clinical quality' or 'mortality rates' or 'financial impact' or 'cost' or 'cost savings'
- Literature review: 40 total articles found; 23 used

Clinical Impact

➤ Mortality

➤ Length of Stay



Clinical Impact: Mortality

- Large Community Hospital
 - 7.9% to 3.8%
- Medicare billing data of those that implemented
 - 12.1% showed reduction
 - 81.1% no significant change
 - 6.1% worst mortality



Clinical Impact

- Decreasing medication errors,
- Increasing patient safety when adopted and implemented in hospitals.

Clinical Impact: Length of Stay

- ICU stay -1.26 days
- Hospital -0.6 days



Financial Impact: Outlay

- Cost of Implementation
- First-year operational cost



EXAMPLE

1. VHA
2. Sentara Health care

Cost Category	Monitoring Facility (74 beds)	Hospital 1,2 ICU (23 beds)	Hospital 2 (10 beds)	Hospital 3 (6 beds)	Hospital 4 (16 beds)	Hospital 5 (5 beds)	Hospital 6 (5 beds)	Hospital 7 (9 beds)	System Total (8 ICUs, 74 beds)	% of Grand Total
Hardware/Upgrades	331,593.79	185,493.62	80,649.40	48,389.64	129,039.04	40,324.70	40,324.70	72,584.46	928,399.35	11
CIS Software	N/A	444,175.24	115,263.67	66,736.05	228,495.50	77,519.97	69,712.65	115,263.08	1,117,166.16	12
Telemedicine Software	414,000.00	167,533.60	73,982.00	47,889.20	113,121.20	41,336.00	31,366.00	67,458.80	956,686.80	10
Installation Fees	780,867.00	276,775.20	72,864.00	72,864.00	72,864.00	72,864.00	72,864.00	72,864.00	1,494,826.20	16
Equipment and Network	43,323.59	261,624.29	53,676.84	30,087.57	107,063.44	50,561.57	58,236.79	84,978.85	689,552.94	8
Technology Total	1,569,784.38	1,335,601.95	396,435.91	265,996.46	650,583.18	282,636.24	282,504.14	413,149.19	5,196,691.45	57
Physician Fees (p/year)	1,576,800.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,576,800.00	18
Nursing Fees (p/year)	1,295,987.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,295,987.00	15
Technical Fees (p/year)	136,664.00	...	...	...	...	...	...	...	136,664.00	1
Managerial Fees (p/year)	384,744.00	...	...	...	...	...	...	...	384,744.00	5
Industry Training	...	14,256.00	8,298.00	8,298.00	14,256.00	8,298.00	8,298.00	8,298.00	70,002.00	...
Nonindustry Training	5,000.00	...	...	...	...	...	...	...	5,000.00	...
Travel Expenditures	35,000.00	...	...	...	...	...	...	...	35,000.00	...
Staffing Total	3,434,195.00	14,256.00	8,298.00	8,298.00	14,256.00	8,298.00	8,298.00	8,298.00	3,504,197.00	39
CIS Site Design Prep	120,858.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	120,858.00	...
Tele-ICU Site Design Prep	26,635.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	26,635.00	...

Financial Impact: Costs

Industry Associated Costs

- Software
- Equipment
- Staffing
- Miscellaneous

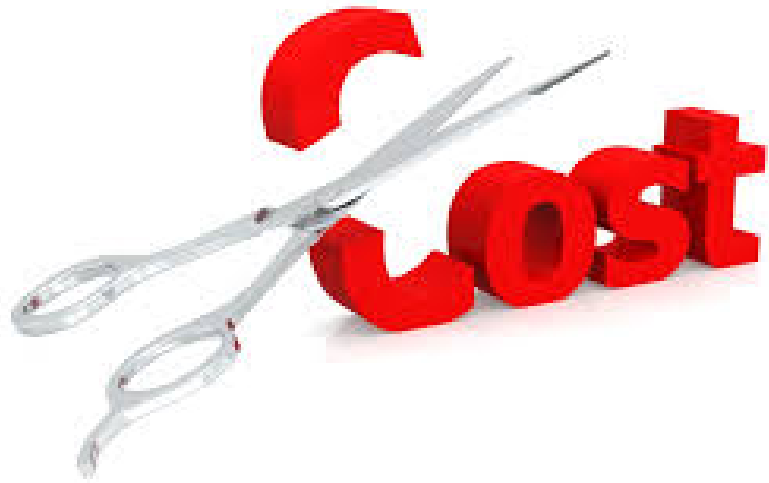


Table 1. Tele-intensive care unit cases studied, implementation costs, and outcomes			
Institution	Setting	Implementation costs (US dollars)	Major results/outcomes
Sentara Healthcare	Sentara Healthcare, ^a academic tertiary care medical center with 5 ICUs, 103 critical care beds	1 million	Decreased ICU LOS by 17%; decreased hospital mortality by 26.4% ^{33,36}
New England Healthcare Institute and Massachusetts Technology Collaborative	University of Massachusetts Memorial Medical Center, academic hospital with 5 adult ICUs, 130 beds, 7000 ICU patients	7.12 million	Decreased ICU LOS (from 13.3 to 9.8 days); decreased mortality from 13.6% to 11.8%; recovered costs of implementation; lowered rates of complications ³⁶
Resurrection Health Care	Community hospitals with 14 ICUs, 182 critical care beds Pre- and postimplementation design; preimplementation: n = 2034 patients; postimplementation: n = 2134	7 million	6 months after implementation: 38% decrease in ICU LOS, approximately \$3 million in cost savings ^{37,38}

^a Includes both Sentara Norfolk General Hospital and Sentara Hampton General Hospital.
ICU = intensive care unit; LOS = length of stay.

Financial Impact: Savings

Savings to Medicare



Financial Impact: Savings

Decrease in Length of Stay



Conclusion

- The benefits of telehealth are still encouraging in both the financial and clinical areas.
- In a specialty such as critical care with increasing demand, telehealth could be a viable option for struggling critical care programs.

OVERSOUND