2-17-2020

Are we asking right questions? Mode of Intensivist model delivery and Patient Length of stay

Chintan Bhatt
Baptist Health South Florida, ChintanB@baptisthealth.net

02.17.2020

Are we asking right questions ? Mode of Intensivist model delivery and Patient Length of stay

Chintan Bhatt MBBS, MPH

Rojas L, Armaignac D, Bhatt C, et al. Research Snapshot Theater: Quality And Patient Safety VII 1359: Exploring LOS of tele-intensivist delivery model with and without 24/7 bedside intensivists. *Critical Care Medicine.*2020;48:34. Supl1
doi:10.1097/01.ccm.0000618768.07027.72.CCM

Society of Critical Care Medicine
The Intensive Care Professionals

Baptist Health South Florida

Critical Care Congress
#CCC49

FIU
Robert Stempel College of Public Health & Social Work

Disclosure

No conflict of interest to disclose

Disclaimer

The author(s) of the presentation appearing in front of you is/are solely responsible for the content thereof; The research snapshot presentation shall not constitute or be deemed to constitute any representation by the Baptist Heath South Florida or Florida International University or any organization the data presented therein are correct or sufficient to support the conclusions reached or that the experiment design or methodology is adequate.

Background

Leapfrog group's standard of critical care recommendation

- 24/7 coverage of a board certified intensivist in all ICUs (Leapfrog Factsheet: ICU physician staffing)

Amendment: Intensivist providing critical care by Telemedicine- will satisfy the guideline recommended by the leapfrog group if implemented properly

In, 2015, American Hospital Association Annual Survey suggests of all acute care hospitals (2814) only 50% had intensivists., however 75% of ICU bed had intensivist coverage. (Crit Care Med. 2019;47(4):517-525)

Gap

Current literature comparing patient outcomes with

- Intensivist with no intensivist (*JAMA*. 2002;288(17):2151–2162) (*Crit Care Med*. 2013;41(10):2253–2274)
- Intensivist with other specialist like hospitalists (J. Hosp. Med. 2012 March;7(3):183-189)
- Daytime versus Nighttime intensivist (N Engl J Med 2012; 367(10):971–972),(Crit Care Med. 2015 43(11):2275-82) (N Engl J Med. 2013;368(23):2201–2209)
- Alternative to Intensivist in different type of ICU(open versus closed) (Curr Opin in Anaes 2019 32(2):123–128

Role of Tele-ICU

- Evidence of consistent quality and efficiency outcomes (Crit Care Med. 2016 Feb;44(2):265-74)
- Lowering the cost of patient care (Mil Med. 2017;182(5):e1702-e1707)
- Tele-ICU beds account for 11% of total ICU beds in US (Arch Intern Med 2011; 171:498-506)

Currently there are no outcomes research on critical care provided by 24/7 Bedside Intensivist versus Tele-Intensivist.

Objective of the study

To compare 24/7 Bedside Intensivist versus Tele-Intensivist critical care delivery models and examine the difference in Length of stay using conventional and innovative statistical methods.

Study Setting

12 ICUs from 5 hospitals were selected from a non teaching, not for profit, health system in south Florida from Oct 2016- June 2019.

19519 cases discharged from ICU between Oct 2016- June 2019 were selected for the study

Study Design

Retrospective Cohort design using Health System's EHR data between Oct 2016-June 2019

Dependent Variable: ICU length of stay, Hospital length of stay (days)

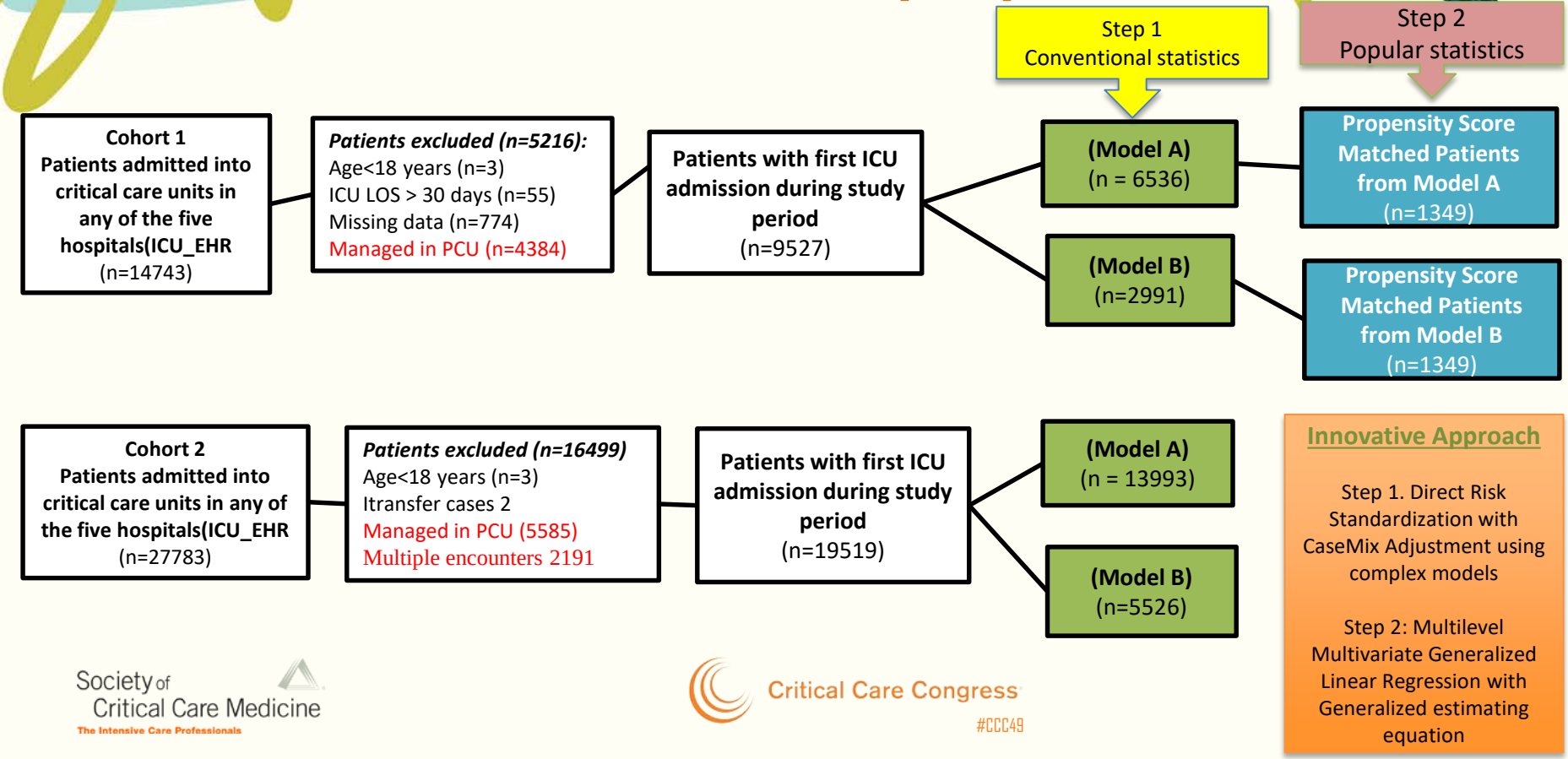
Independent Variable:
Model A: Intervention Group: presence of 24/7 Bedside Intensivist with standard of care universal to health system ICU Tele-Critical Care intensivist model

Model B: Only standard of care – Tele intensivist model of delivery.

Prognostic Risk score: used APACHE IVa predicted ICU LOS and Predicted Hospital LOS

Covariates: Case Mix index, APACHEIVa Admitting diagnosis, Gender, Age, Race/Dethnicity, ED level of acuity, discharge disposition. Annualized ICU volume, Annualized hospital volume, Pre-ICU-Los, Post-ICU discharge LOS

Flowchart & Analytic plan



Innovative Approach

Step 1. Direct Risk Standardization with CaseMix Adjustment using complex models

Step 2: Multilevel Multivariate Generalized Linear Regression with Generalized estimating equation

Society of Critical Care Medicine
The Intensive Care Professionals

Critical Care Congress
#CCC49

Patient Characteristics of two CCModels

Characteristics		OVERALL	CCD MODEL A	CCD MODEL B	Difference¥
Number of patients	N	19519	13993(71.7%)	5526(28.3%)	
Age	Mean(95% CI)	67.28 (66.24-67.88)	67.66 (67.37-67.94)	66.34 (65.84-66.84)	<0.001
	IQR (25 %-75%)	57-81	57-81	54-82	
Gender	Female	9620(49.3%)	6713(49.3%)[a]	2907(49.3%)[a]	0.987
	Male	9899(50.5%)	7280(50.7%)[a]	2619(50.7%)[a]	
Race/ethnicity	White	4013(20.6%)	2929(19.6%)$_a$	1084(20.6%)$_a$	<0..001
	Black	1937(9.9%)	1414(10.1%)$_a$	523(9.5%)$_a$	
	Hispanic	10905(56.3%)	7874(54.8%)$_a$	3031(55.9%)$_a$	
	Other	2664(12.7%)	1776(16.1%)$_a$	88816.1%)$_b$	
APS	Mean(SE)	41.82(0.15)	42.66(0.18)[a]	39.68(0.28)[a]	<0.001
APACHE IVa Score	Mean(SE)	55.19(0.17)	56.19(0.20)[a]	52.65(0.31)[a]	<0.001
APACHE IVa Predicted ICU Mortality	Mean	0.125(0.001)	0.133(0.001)	0.105(0.001)	<0.001
	Median	0.062	0.066	0.054	<0.001
	Interquartile Range	0.123	0.135	0.100	<0.001
APACHE IVa Predicted Hospital Mortality	Mean	0.125 (0.001)	0.133 (0.001)	0.105 (0.001)	<0.001
	Median	0.062	0.066	0.054	<0.001
	Interquartile Range	0.123	0.135	0.1	<0.001
APACHE IVa Diagnosis	Non-operative	12282(62.9%)	7900(56.5%)	4382(79.3%)	<0.001
	Operative	7233(37.1%)	6089(43.55)	1144(20.7%)	
APACHE system diagnosis	Cardiovascular	5179(26.5%)	3703(26.5)[a]	1476(26.7%)[a]	<0.001
	Sepsis	3013(15.4%)	2172(15.5%)[a]	841(15.2%)[a]	
	Respiratory	2789(14.3%)	1976(14.1%)[a]	813(14.7%)a	
	Neurologic	2613(13.4%)	1871(13.4%)[a]	742(13.4%)a	
	Digestive	1573(26.5%)	1136(26.7%)[a]	437(26.5%)a	
	Metabolic	999(5%)	725(5.1%)[a]	274(5%)a	
Prior admission Emergency Department Visit	Yes	17079(87.5%)	11757(84%)	5322(96%)	<0.001
ICU admission ≤24hrs of Hospital Admission	Number cases (%)	13482(69.1%)	9247(66.1%)	4235(76.6%)	<0.001
Pre-ICU-LOS	Mean (SE) days	1.91(0.05)	2.20 (0.71)	1.12 (0.05)	<0.001
Mechanical Ventilator	(%)	5191(26.6%)	4154(29.6%)	1037(18.7%)	
	Mean (SE) days	3.76 (0.069)	3.71(0.078)	3.98(0.142)	0.107

Society of Critical Care Medicine
The Intensive Care Professionals

Summary of Results

	Unadjusted outcomes Mean (SE)			General Linear Model			Propensity Score Matching			Generalized Linear model with repeated measures Fixed factor + Random effect		
	Model A Mean (SE)	Model B Mean (SE)	Difference P value	Model A Mean (SE)	Model B Mean (SE)	Difference	Model A Mean(SE)	Model B Mean(SE)	Difference P Value	Model A LS Mean 95% CI	Model B LS Mean (95% CI)	Difference LS Mean 95% CI
ICU LOS (Days)	3.17 (0.03)	2.37 (0.04)	<0.001	2.95 (0.12)	1.96 (0.09)	<0.001	3.2(0.11)	2.5(0.99)	<0.001	3.1407 (3.0621-3.219)	2.588 (2.4817-2.6946)	**0.5525 (0.4413-0.6638) <0.001**
Hospital LOS (Days)	9.8(0.08)	7.2(0.09)	<0.001	10.1(0.02)	7.4(0.03)	<0.001	10.9(0.44)	7.4(0.2)	<0.001	9.056 (8.89-9.221)	7.31 (7.09-7.54)	**1.73 (1.503-1.974) <0.001**

Final model of each analytical study, multiple models were assesses with variation in variables

Society of Critical Care Medicine
The Intensive Care Professionals

Critical Care Congress
#CCC49

Conclusion

- Difference in length of stay (ICU & Hospital)among provided by A 24/7 bedside intensivist providing Critical care with presence of standard of care and Standard of care only (tele-intensivist) was0.55 i.e one half day which achieved statistical significance using complex modelling.

- Conventional and popular utilized technique did show statistical difference they accompanied with several limitation of not adjusting for case mix index and poorly fitted models with small number of matched cases.

- Nonfederal, nonacademic, not for profit ,Multicenter, single health system's study findings cannot be generalized to the whole teleICU population so research studies using multisystem data, utilizing randomizatized control trial is recommended,

- Tele-intensivist model is an intensivist model of care should be included as best practices

Thank you/Questions

Continued discussion on other outcomes

Exploring Mortality in Tele-Intensivist Delivery Models With and Without 24/7 Bedside Intensivists: Tuesday, February 18, 2020 - 8:45 AM - 9:45, am