

10-24-2017

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Recommended Citation

Ferd, MD Candidate, Polina; Karp, MUSA, David; Zebrowski, PhD Candidate, Alexis; and Carr, MD, MA, MS, Brendan G., "Assessing Variability in End-of-Life Intensity of Care After Out-of-Hospital Cardiac Arrest" (2017). *CwiC Posters*. 36.

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Assessing Variability in End-of-Life Intensity of Care After Out-of-Hospital Cardiac Arrest

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Introduction

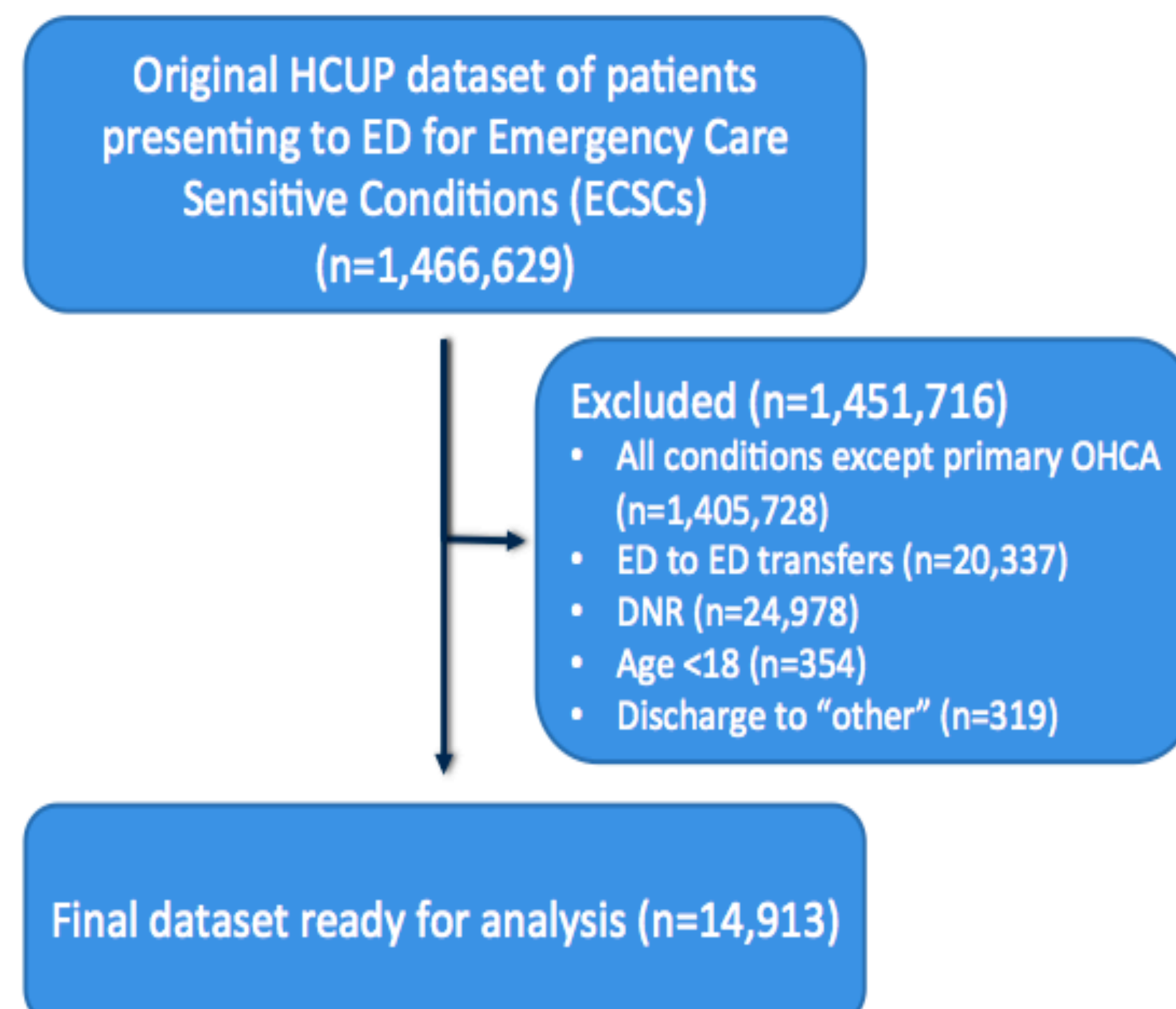
Out of hospital cardiac arrest (OHCA) affects over 300,000 Americans per year.¹ Many factors affect the outcomes and overall OHCA survival in a community; some of these include an individual's characteristics such as age, co-morbid conditions, availability of an AED on scene, time to CPR, and the characteristics of the hospital they are treated at.^{1,2} Directly following resuscitation from cardiac arrest, the individual is at risk of developing numerous problems caused by sequelae of ischemic injury sustained during the arrest. The national average rate of survival to discharge is only 10%.^{2,3} Many of these factors are modifiable and provide an opportunity to improve outcomes. In our project, we focus on life-sustaining procedures administered by hospitals upon receiving and admitting individuals experiencing OHCA.

We used previously validated measures as defined by Barnato et al as "life sustaining end of life (EOL) measures":⁴

- Intubation and mechanical ventilation
- Tracheostomy
- Gastrostomy tube insertion
- Hemodialysis
- Enteral/parenteral nutrition
- CPR

Methods

- Retrospective cohort analysis using databases from Agency for Healthcare Research and Quality
 - Healthcare Cost and Utilization Project (HCUP)^{5,6}
 - State Emergency Department Database (SEDD) and State Inpatient Database (SID)
 - New York State claims data from 2013
 - Adult (≥18) patients with primary diagnosis of OHCA
- Descriptive stats were performed using Stata version 15.0 with previously validated EOL procedures. We compared the final dispositions of patients that received each individual EOL procedure compared to those who did not. The aim was to identify any trends that were worth exploring more in future work. We then systematically evaluated each procedure and outcome breakdown in order to take note of any variables to expound on in order to best examine the affect of EOL intensity of care on OHCA outcomes.



Results

Table 1. EOL indicator variables

Procedures	ICD-9 codes	CPT codes	HPCS codes
Intubation and mechanical ventilation	96.04, 96.05, 96.7x	31500	E0450 E0460 E0461 E0463 E0464
Tracheostomy	31.1, 31.21, 31.29	31600	A7520, A7521
Gastrostomy tube insertion	43.2, 43.11, 43.19, 43.2, 44.32	43750	B4087
Hemodialysis	39.95	90935, 90937	E1510
Enteral/parenteral nutrition	96.6 and 99.15	44015	B4102, B4103, B4104, B4149, B4150, B4152, B4153, B4154, B4157, B4158, B4159, B4160, B4161, B4162, B4164, B4168, B4172, B4176, B4178, B4180, B4185, B4189, B4193, B4197, B4216, B4220, B4222, B4224, B5000, B5100, B5200
CPR	99.60, 99.63	92950	Not found

Figure 1. Frequency of EOL procedure by age

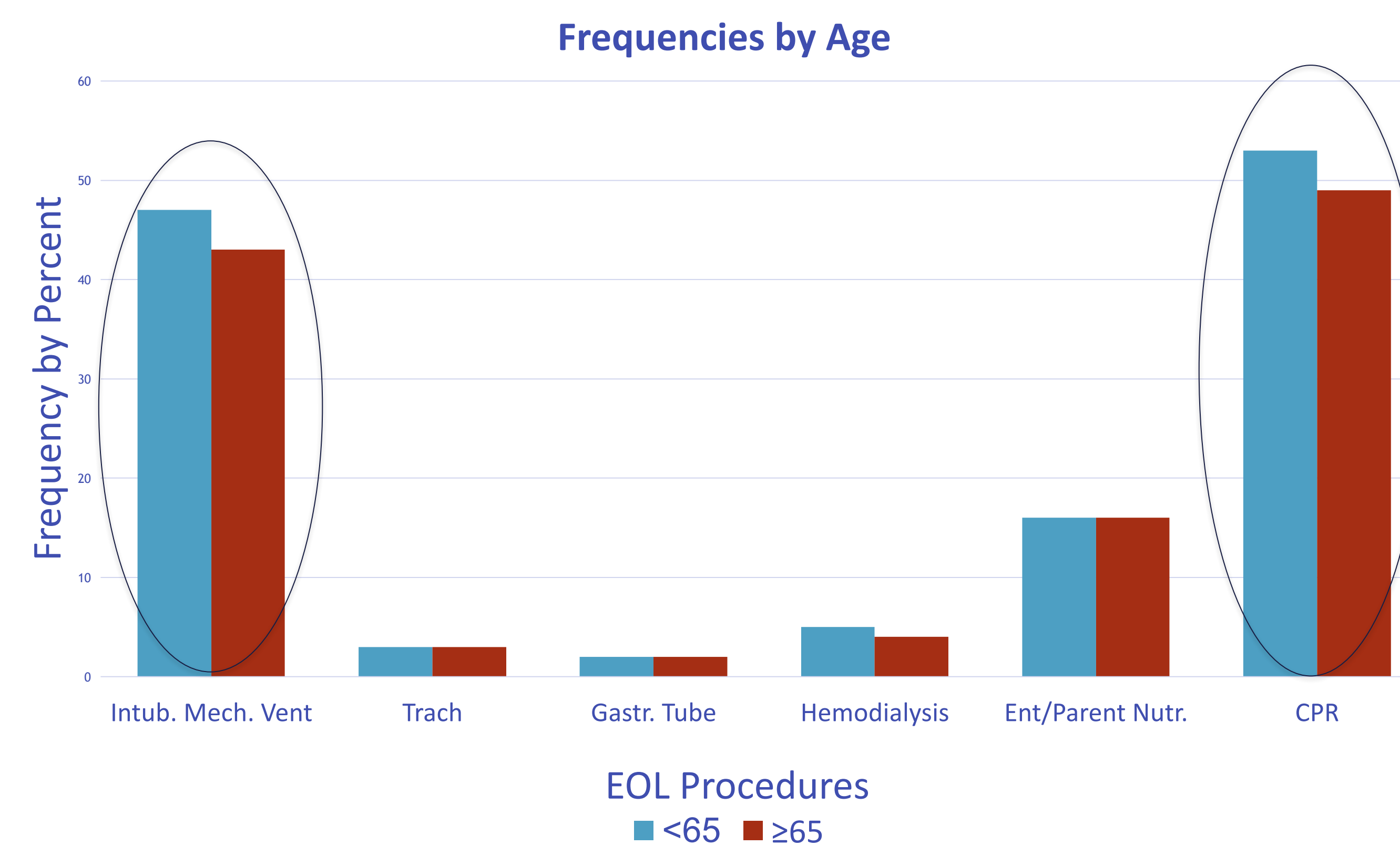


Table 2. Sub-analysis of the impact of age on disposition by intubation and mechanical ventilation

Outcome	Intubation and Mechanical Ventilation, n (%)				Total
	Age <65		Age ≥65		
	N	Y	N	Y	
Discharged Home	430 (14)	551 (11)	331 (12)	211 (6)	1,523 (10)
Discharged with Home Health Care	40 (1)	80 (2)	159 (6)	145 (4)	424 (3)
Discharged to Skilled Nursing Facility	32 (1)	117 (2)	320 (11)	577 (15)	1,046 (7)
Died in Hospital	2,689 (84)	4,368 (85)	2,002 (71)	2,861 (75)	11,920 (80)
Total	3,191 (100)	5,116 (100)	2,812 (100)	3,794 (100)	14,913 (100)

Discussion

As previously mentioned, end of life intensity has not been thoroughly studied in this patient population.

Atul Gawande once wrote that:

“25% of all Medicare spending is for the 5% of patients who are in their final year of life, and most of that money goes for care in their last couple of months.”⁷

Families and their health care teams are able to have conversations regarding EOL treatments when patients are experiencing a chronic medical illness, but this becomes more difficult with emergent conditions such as stroke, MI, trauma and cardiac arrest.

This preliminary analysis of EOL procedure frequencies in patients experiencing OHCA provides insight into the differences in outcome by life sustaining procedure. This work has also informed future directions we want to take in further examining EOL intensity of care and it's impact on outcomes in this patient population.

End of life care not only affects the healthcare system, but also patients and loved ones' wishes and preferences.

Future Steps

It is imperative that further research is done to improve the efficiency and effectiveness of our healthcare system's treatment of OHCA, and the wellbeing of our patients. In our future studies, we will:

- Adjust for variables such as comorbidities, OHCA etiology, race and SES using multivariate regression
- Interviewing specialists to expand to other emergency care sensitive conditions: stroke, sepsis, STEMI and trauma
- Examine hospital characteristics (cardiac arrest center, teaching hospital, cath lab, hypothermia protocol, etc.)
- Examine differences in outcomes by region
- Ultimately, use Medicare data to look at outcomes post-discharge

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