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10-25-2019

### Impact of Telemedicine on Mortality, Length of Stay, and Cost among Patients in Progressive Care Units: Experience from a Large Healthcare System

Donna Lee Armaignac

*Baptist Health South Florida*, donnaar@baptisthealth.net

Anshul Saxena

*Baptist Health Medical Group*, anshuls@baptisthealth.net

Muni Rubens

*Miami Cancer Institute*, MuniR@baptisthealth.net

Carlos Valle

*Baptist Health South Florida*, CarlosValle@baptisthealth.net

Lisa-Mae Williams

*Baptist Health South Florida*, lisamaesw@baptisthealth.net

*See next page for additional authors*

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#### Citation

Armaignac, Donna Lee; Saxena, Anshul; Rubens, Muni; Valle, Carlos; Williams, Lisa-Mae; Veledar, Emir; and Gidel, Louis, "Impact of Telemedicine on Mortality, Length of Stay, and Cost among Patients in Progressive Care Units: Experience from a Large Healthcare System" (2019). *All Publications*. 3287. <https://scholarlycommons.baptisthealth.net/se-all-publications/3287>

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**Authors**

Donna Lee Armaignac, Anshul Saxena, Muni Rubens, Carlos Valle, Lisa-Mae Williams, Emir Veledar, and Louis Gidel

# Impact of Telemedicine on Mortality, Length of Stay, and Cost among Patients in Progressive Care Units: Experience from a Large Healthcare System

Donna Lee Armaignac, Anshul Saxena, Muni Rubens, Carlos Valle, Lisa-Mae Williams, Emir Veledar, Louis Gidel

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## Background

- Telemedicine has transformed care delivery in intensive care units (ICUs)
- However, due to increasing patient load affecting functionality of intensive care units (ICUs), there is an increasing need for step-down units, such as progressive care units (PCUs)
- While there are many studies about the effects of telemedicine in ICU, currently there are no studies on the effects of telemedicine in PCU settings

## Purpose

- To determine whether telemedicine intervention (TPCU) can affect hospital mortality, length of stay (LOS), and direct costs for progressive care unit (PCU) patients, compared to PCU patients without telemedicine intervention (NTPCU)

## Method

- Retrospective study of adult patients admitted to the PCU at BHSF between 2011-2016. See Table 1.
- Statistical Analyses: General linear mixed models on overall and propensity score matched samples, survival analyses

TABLE 1. Characteristics of Telemedicine Progressive Care Unit and Nontelemedicine Progressive Care Unit Patients (n = 16,091)

Characteristics	Nontelemedicine Progressive Care Unit (n = 8,000)	Telemedicine Progressive Care Unit (n = 8,091)	p
Age (yr), mean (95% CI)	63.4 (62.9–63.8)	71.1 (70.7–71.4)	<0.0001
Age groups, n (%)			
18–40	964 (12.3)	441 (5.5)	<0.0001
41–65	2,437 (31.2)	2,000 (24.7)	
66–85	3,392 (43.4)	4,033 (49.8)	
≥ 86	1,018 (13.0)	1,617 (10.0)	
Gender, n (%)			
Male	3,724 (48.5)	4,000 (49.4)	<0.001
Female	4,276 (53.5)	4,091 (50.6)	
Race, n (%)			
White	2,206 (27.6)	2,077 (25.7)	<0.0001
Black	843 (10.5)	577 (7.1)	
White-Hispanic	4,541 (56.8)	5,060 (62.5)	
Black-Hispanic	87 (1.1)	75 (1.0)	
Other	323 (4.0)	301 (3.7)	
APR-DRG severity of illness, n (%)			
Minor = 1	1,214 (15.2)	671 (8.3)	<0.0001
Moderate = 2	2,145 (26.9)	2,243 (27.8)	
Major = 3	3,123 (39.1)	3,615 (44.7)	
Extreme = 4	1,502 (18.8)	1,548 (19.2)	
APR-DRG risk of mortality, n (%)			
Minor = 1	2,401 (30.1)	1,408 (17.4)	<0.0001
Moderate = 2	1,786 (22.3)	2,154 (26.7)	
Major = 3	2,419 (30.3)	2,980 (36.9)	
Extreme = 4	1,378 (17.3)	1,535 (19.0)	
Deaths, n (%)			
PCU	83 (1.0)	60 (0.7)	0.048
Hospital	410 (5.2)	342 (4.4)	0.013
Length of stay, mean (95% CI)			
PCU	3.2 (3.1–3.3)	2.6 (2.5–2.7)	<0.0001
Hospital	6.8 (6.6–6.9)	7.3 (7.2–7.5)	<0.0001

## Results

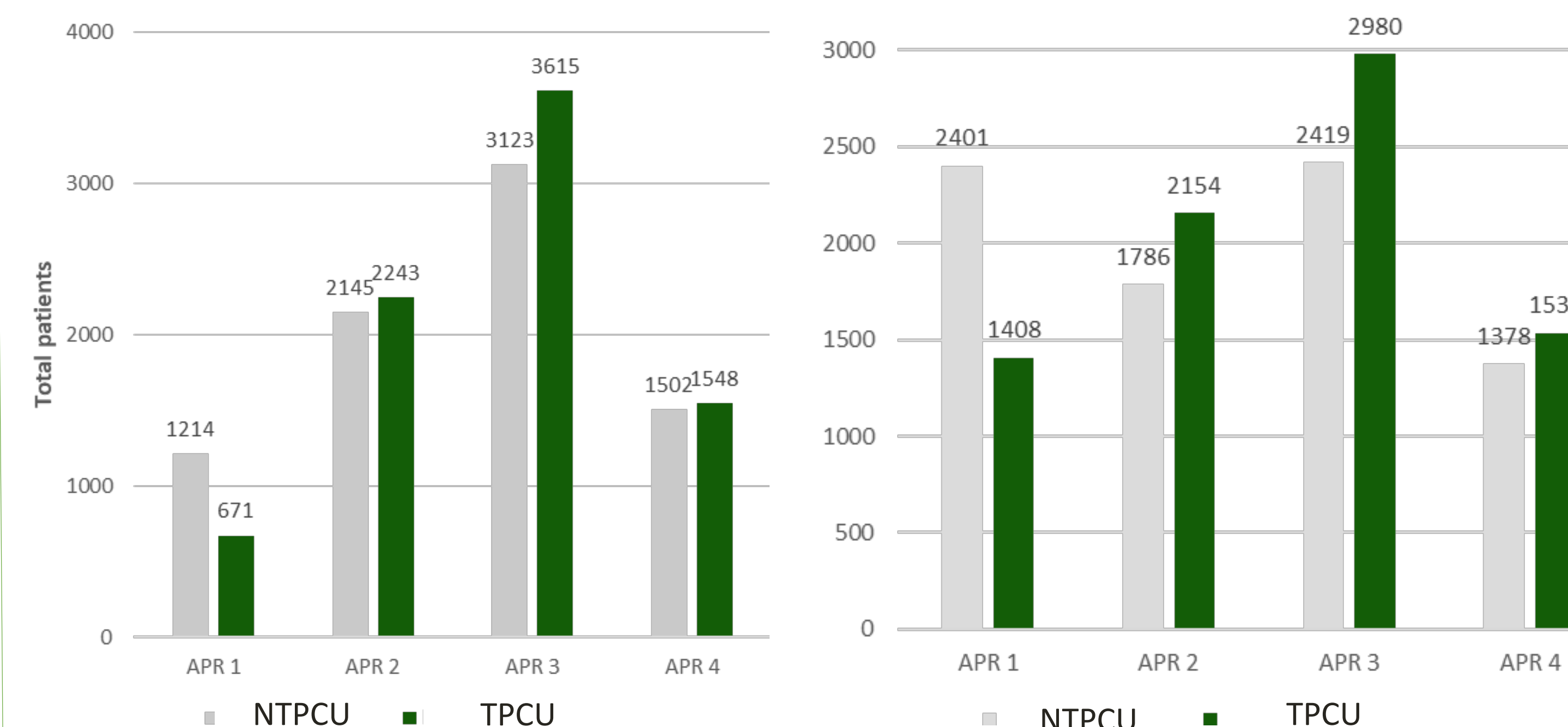


Figure 1. Differences in APR SOI

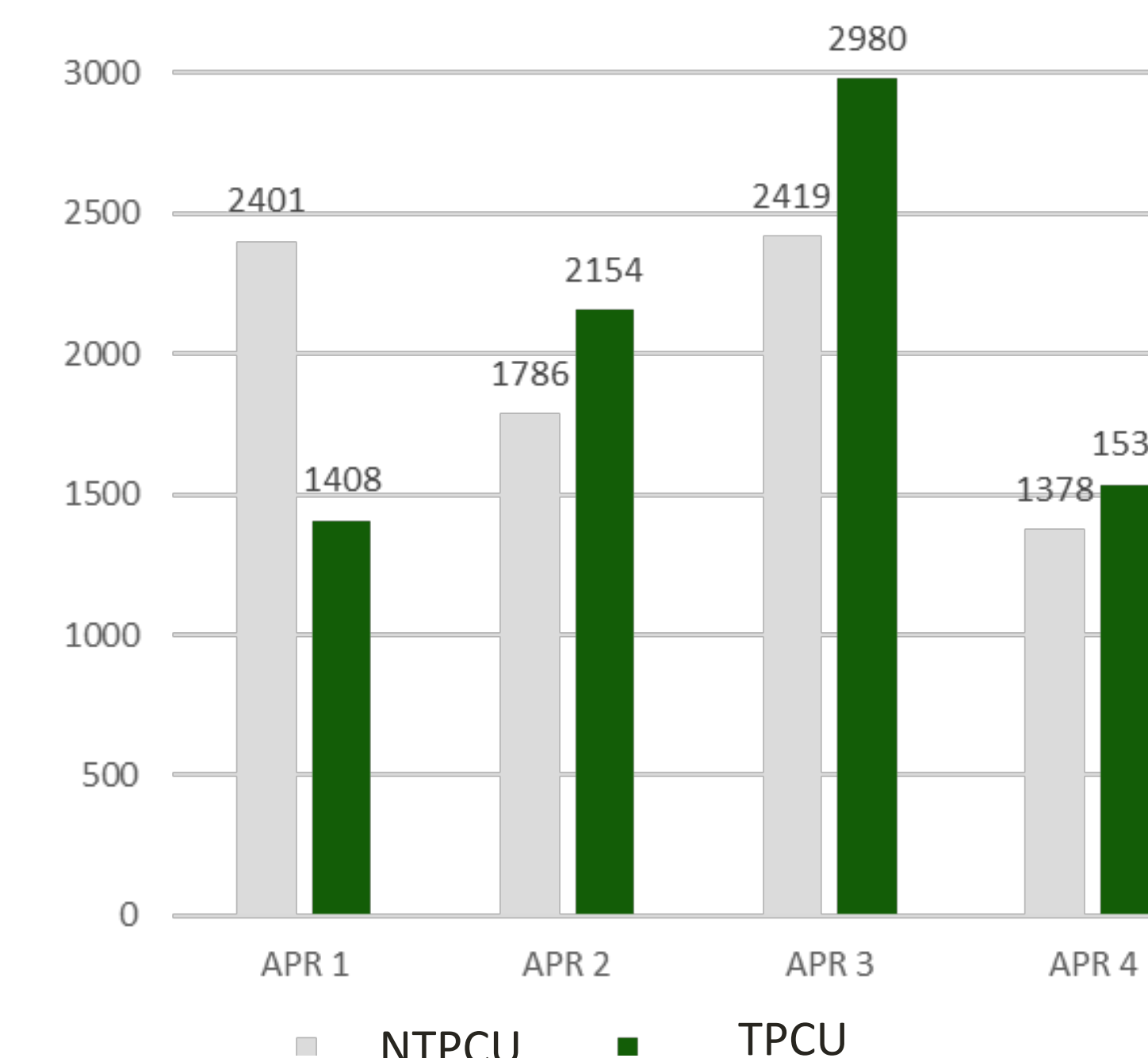


Figure 2. Differences in APR ROM

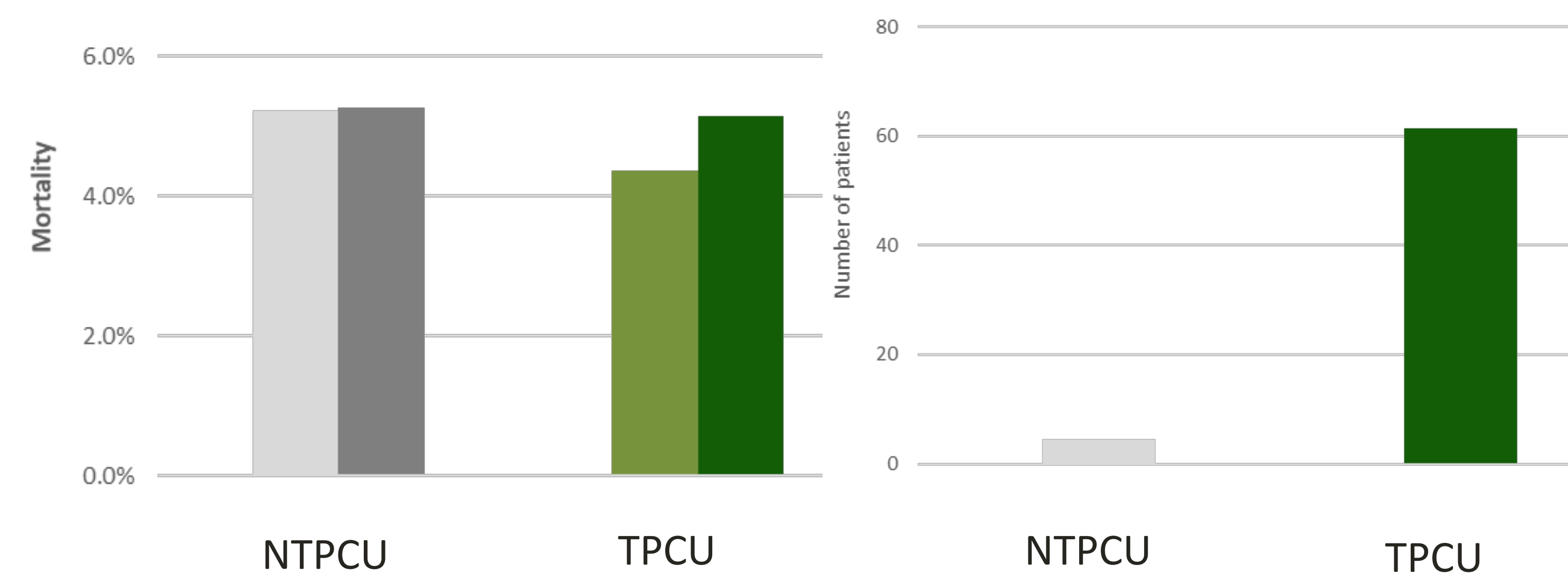


Figure 3. Actual mortality (first column) versus predicted mortality (second column)

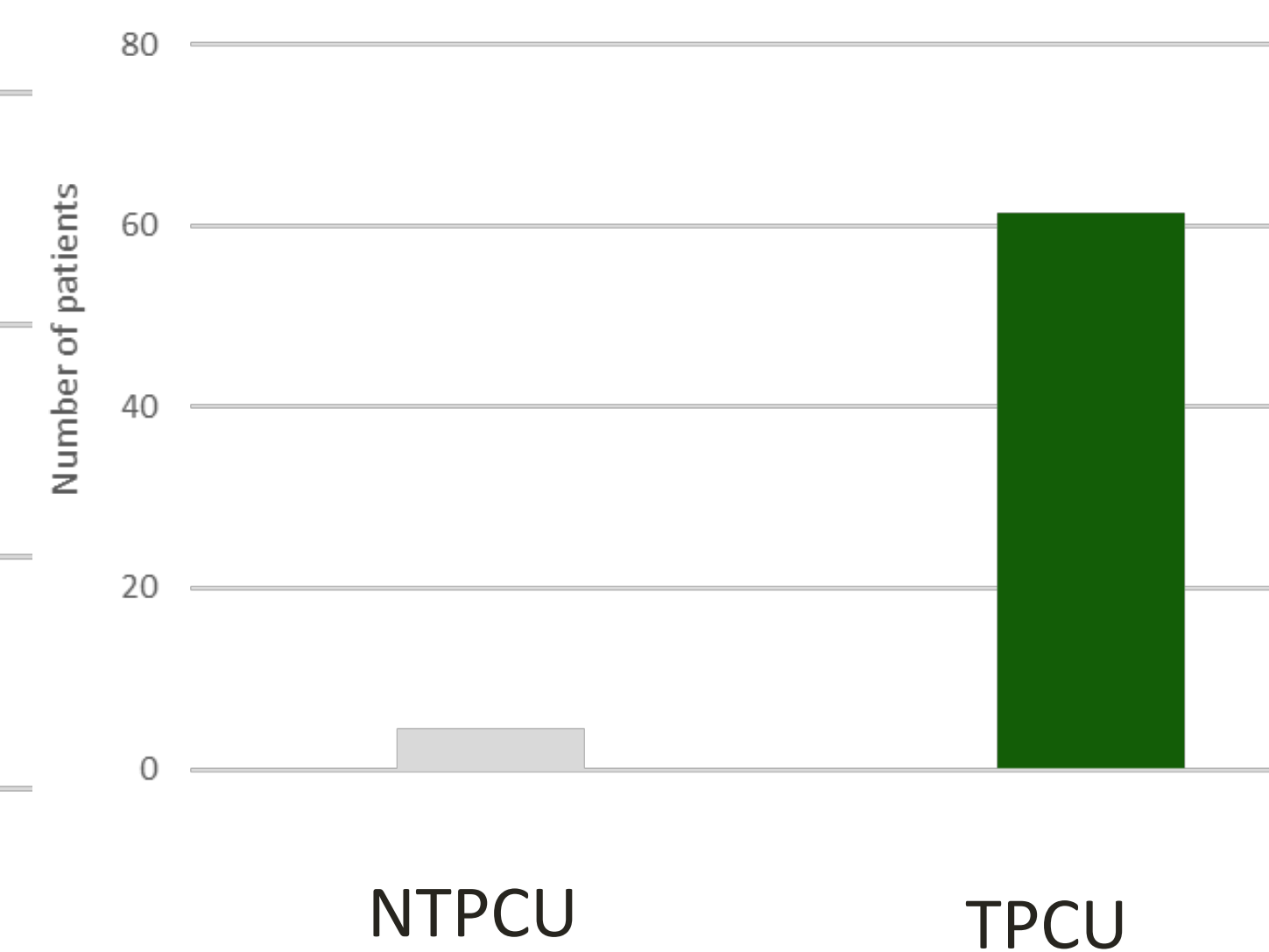


Figure 4. Lives saved in the hospital

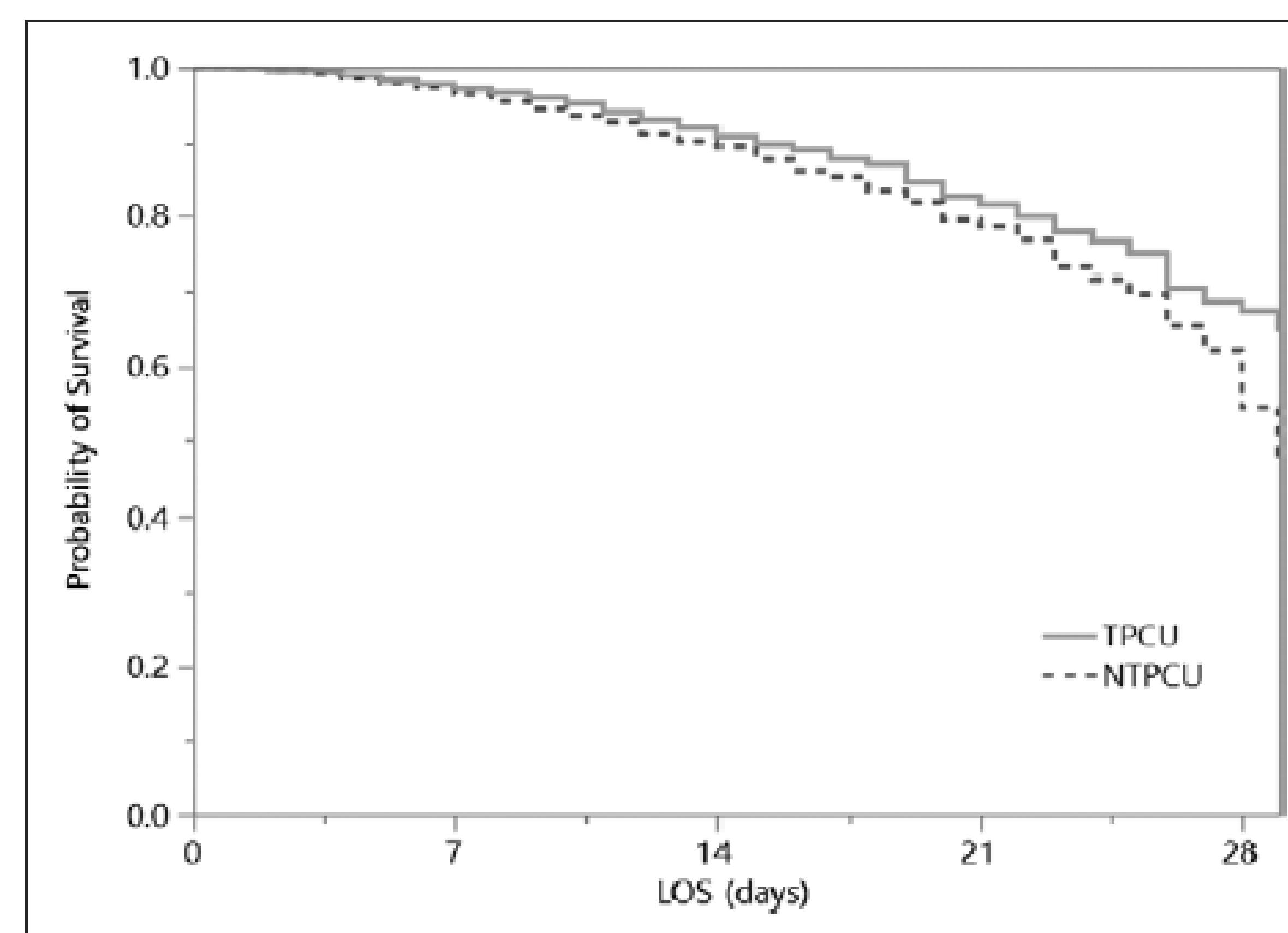


Figure 5. Survival curves for Cox proportional hazards model

## Results

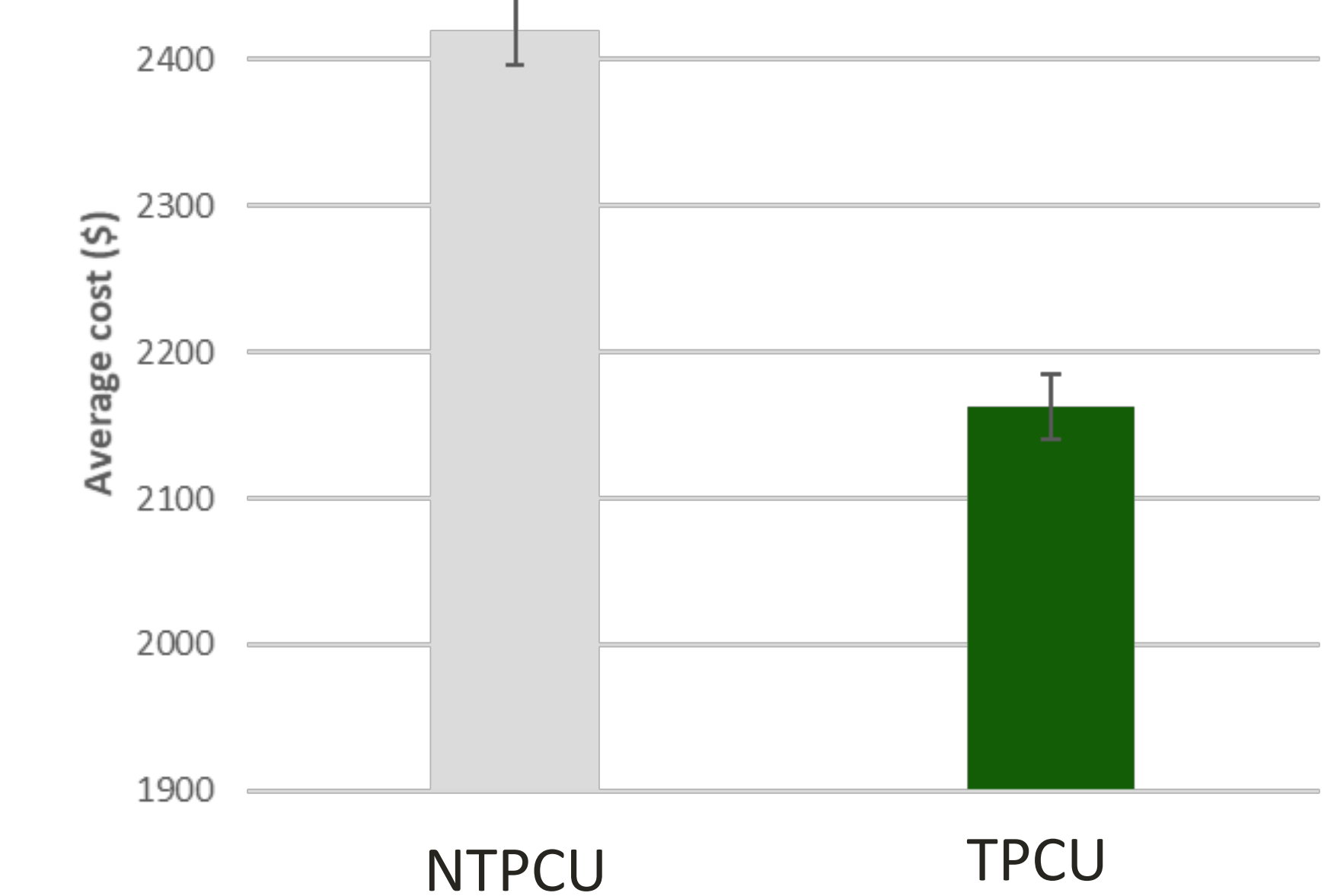


Figure 6. Average cost per day

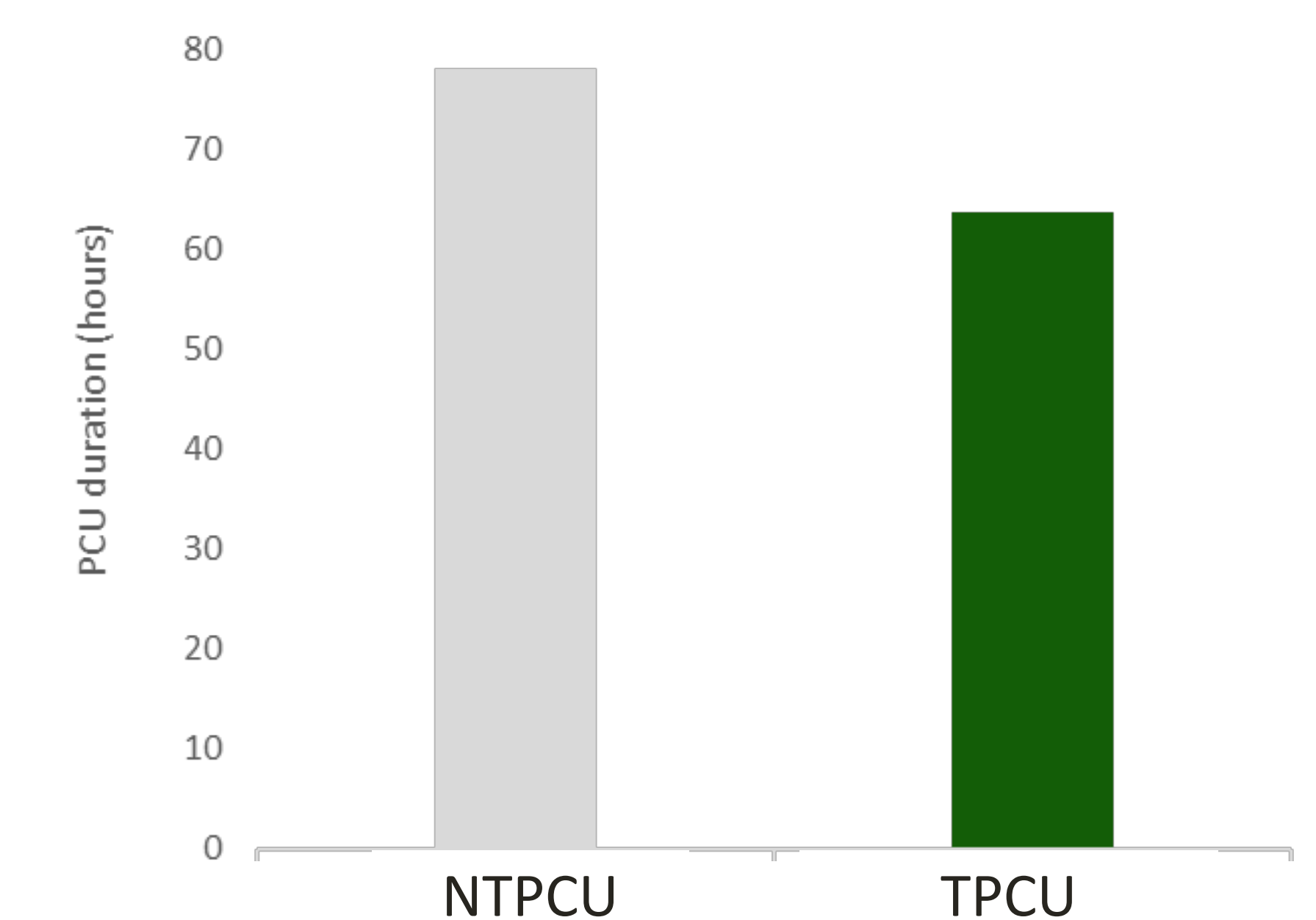


Figure 7. Average PCU LOS

## Conclusions

- Our study showed that TPCU intervention significantly decreased mortality in PCU and hospital and PCU LOS, despite the fact patients in TPCU were older and had higher disease severity and risk of mortality
- Increased post-PCU hospital LOS and total mean direct costs inclusive of telemedicine costs coincided with improved survival rates
- Telemedicine intervention decreased overall mortality and LOS within PCUs without substantial cost incurrences

## Reference

- Armaignac, D. L., Saxena, A., Rubens, M., Valle, C. A., Williams, L. M. S., Veledar, E., & Gidel, L. T. (2018). Impact of telemedicine on mortality, length of stay, and cost among patients in progressive care units: experience from a large healthcare system. *Critical care medicine*, 46(5), 728.