CHEST Online Supplement

Charge Reductions Associated With Shorter Time to Recovery in Septic Shock

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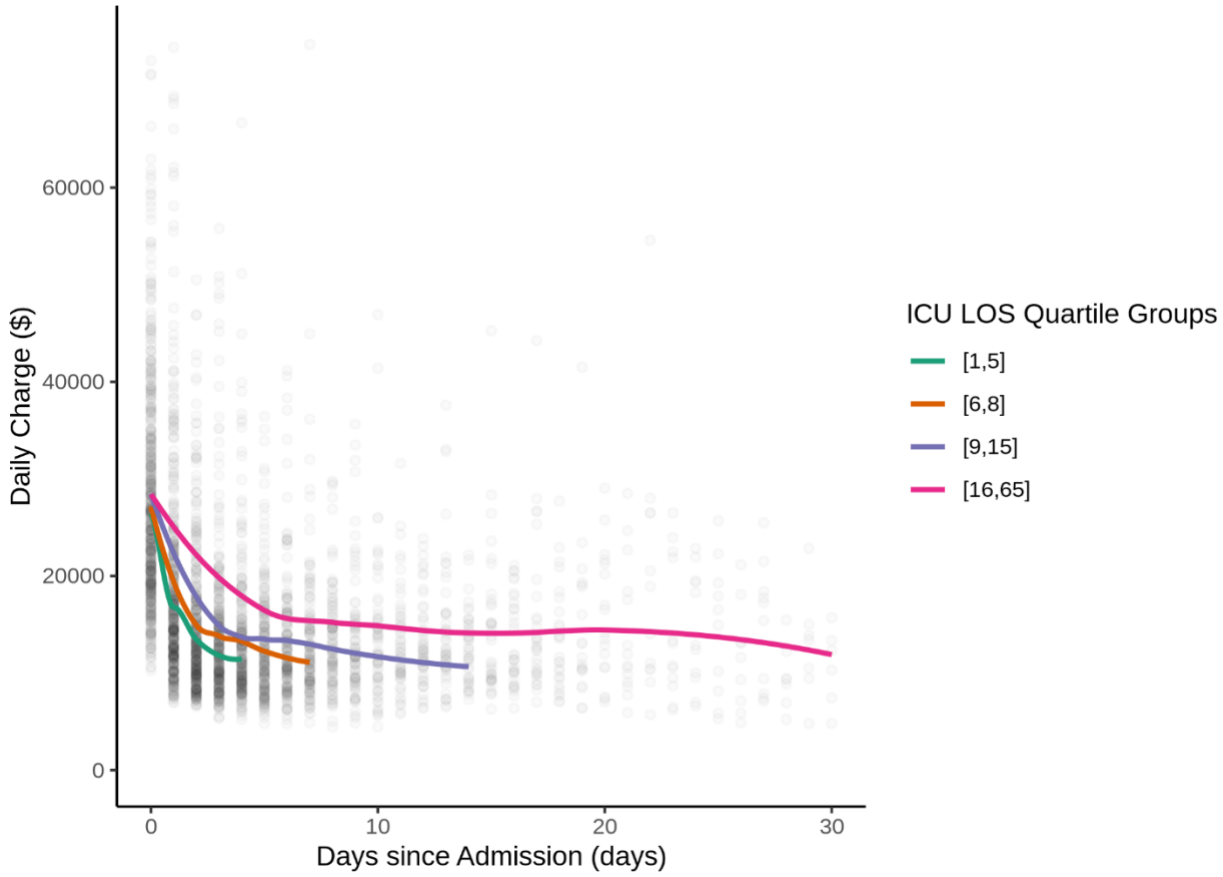
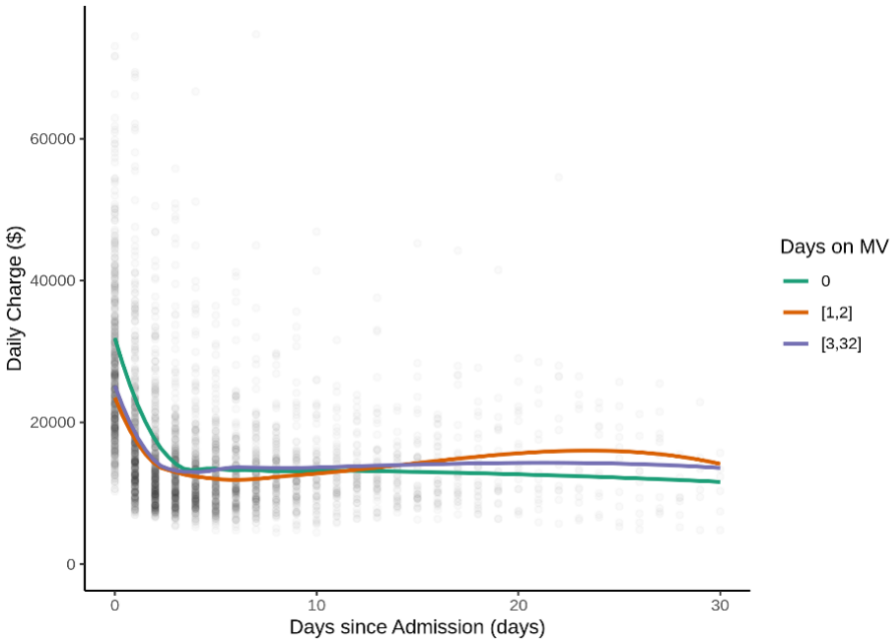
e-Figure 1. Trajectory plot of daily ICU charges by admission day stratified by quartile of ICU length of stay. The four lines in this figure are loess curves, with one line representing each of the 4 quartiles of patients in the study based on ICU length of stay. The range of ICU length of stay for each of the quartiles was: 1st quartile: 1-5 days; 2nd quartile: 6-8 days; 3rd quartile: 9-15 days; 4th quartile: 16-65 days. Daily charges decreased over time, with patients with shorter ICU length of stay (lower quartiles) experiencing faster reduction in daily charges than those with longer ICU lengths of stay.

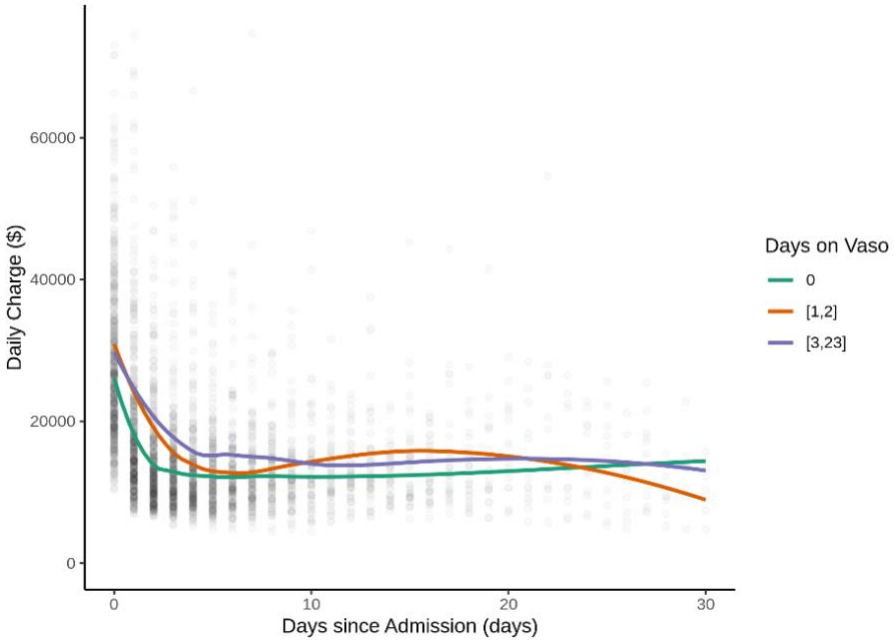


e-Figure 2. Trajectory plots of daily charges by admission day stratified by tertile of (A) duration of mechanical ventilation (1st tertile: 0 days; 2nd tertile: 1-2 days; 3rd tertile: 3-32 days), and (B) duration of vasopressor use (1st tertile: 0 days; 2nd tertile: 1-2 days; 3rd tertile: 3-23 days). Each line is a loess curve. Tertiles rather quartiles were used due to highly right-skewed distribution. Changes in daily charges over time did not drastically differ by tertile of duration of mechanical ventilation or vasopressor use.

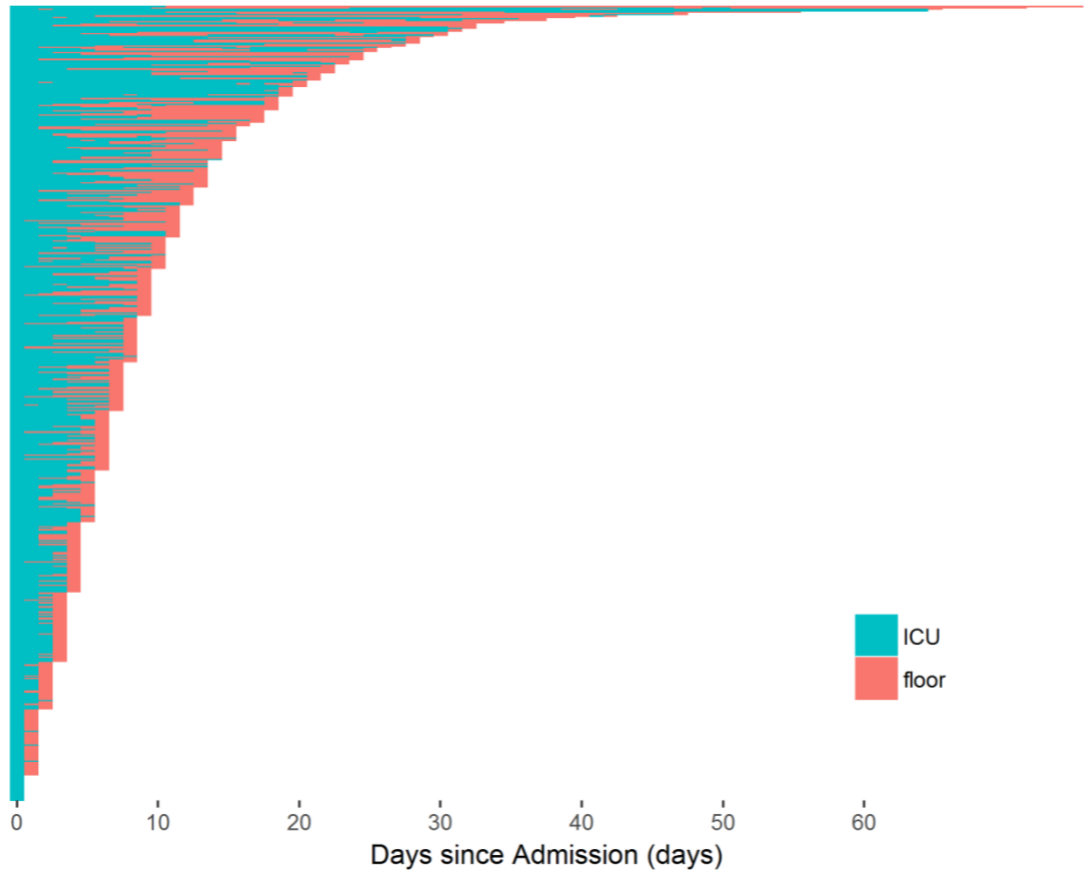
(A) MECHANICAL VENTILATION



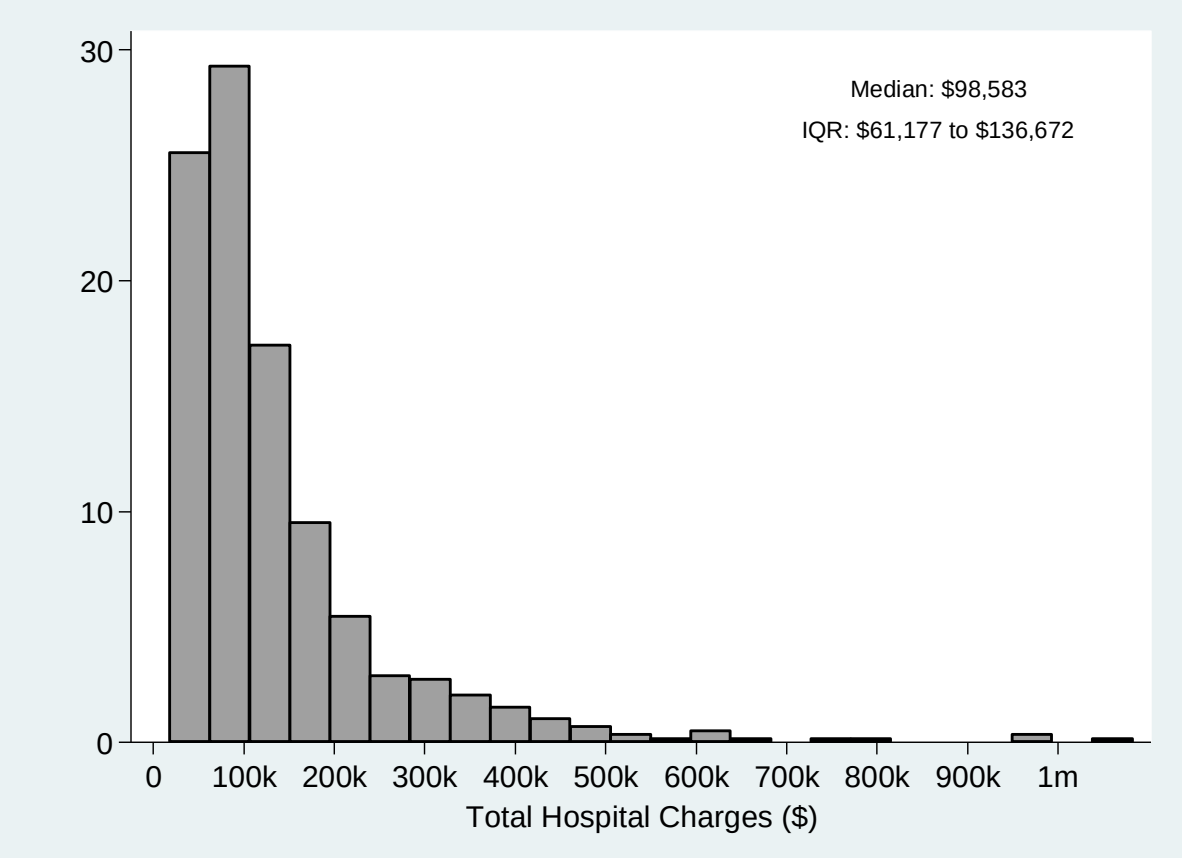
(B) VASOPRESSOR USE



e-Figure 3. Patient location (ICU or floor) by hospital day.



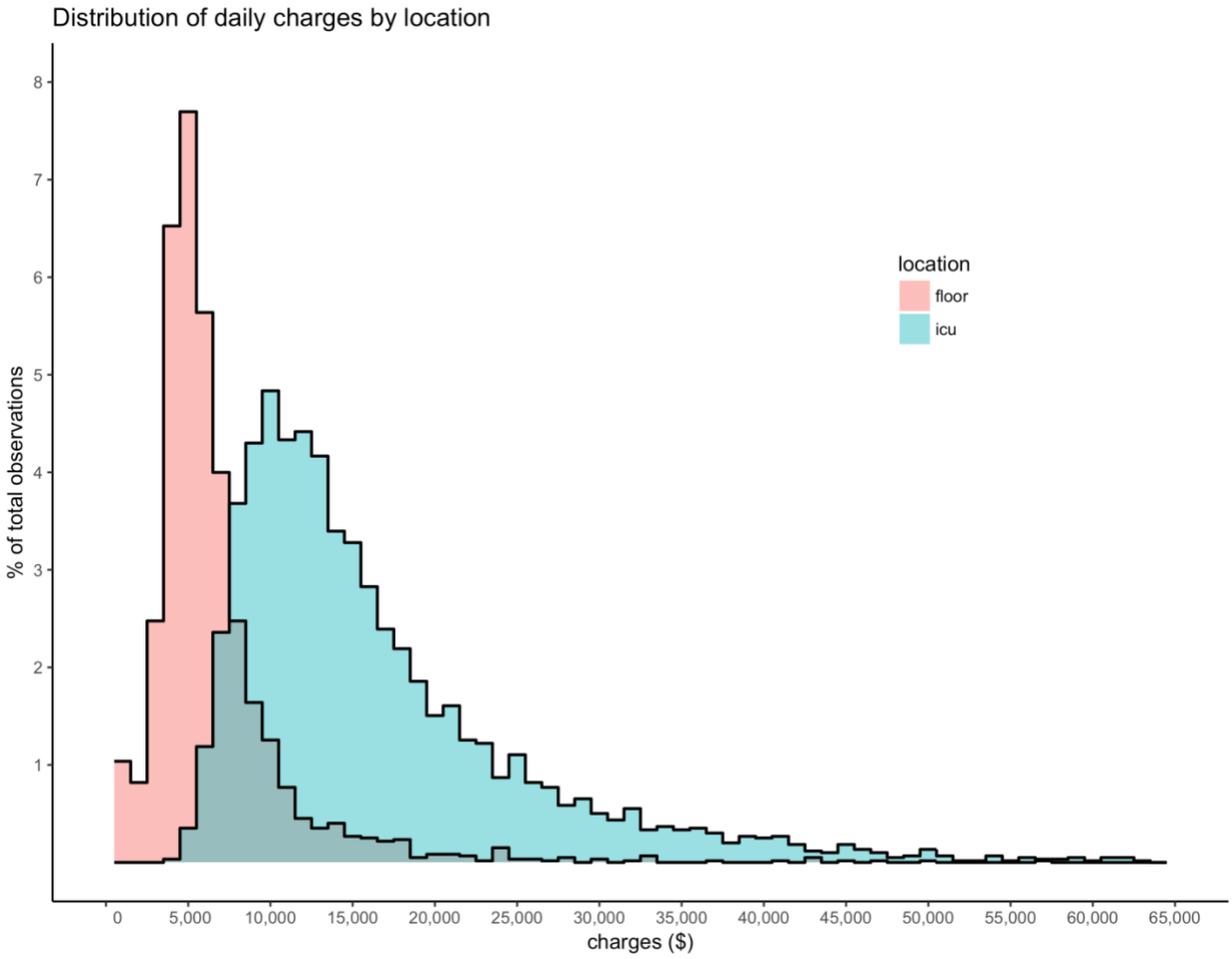
e-Figure 4. Histogram of total hospital charges for 587 hospitalizations for vasopressor-dependent septic shock.



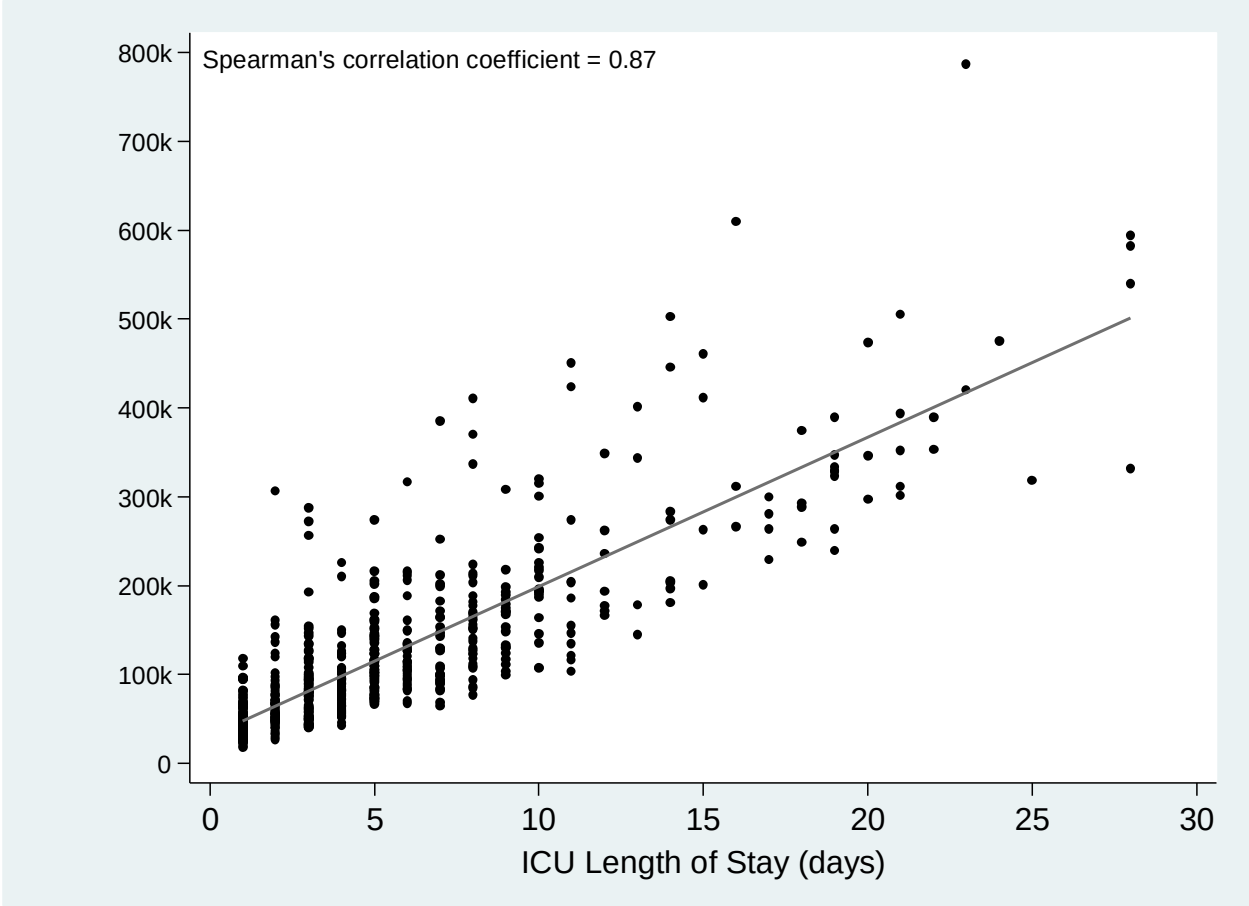
e-Table 1. Daily charges in the ICU by ICU day. These data are plotted in Figure 1.

ICU Day #	Daily Charge ($)		
	Median	**25th percentile**	**75th percentile**
1	25074	19427	32765
2	15660	11947	21511
3	12601	9884	17087
4	12150	9436	15599
5	11531	9183	14829
6	11660	8830	15613
7	11451	9396	15448
8	11422	9159	14919
9	12397	9992	15316
10	11663	9382	15061
11	12006	9512	15570
12	9978	9978	15757
13	10552	10552	15428
14	10569	10569	16118
15	9473	9473	14998
16	9306	9306	16962
17	9754	9754	16788
18	10013	10014	15693
19	9442	9442	16312
20	10285	10285	18995

e-Figure 5. Histograms of daily charges for ICU days and hospital floor days.



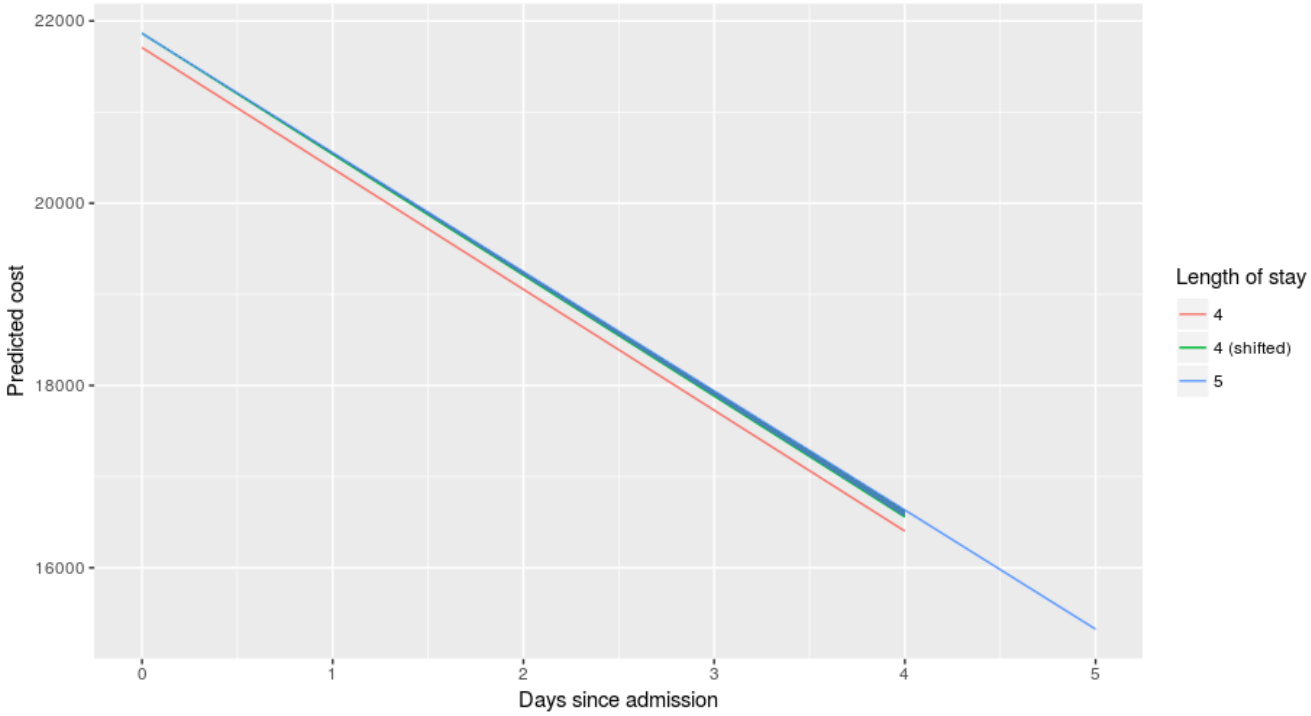
e-Figure 6. Correlation between total hospital charges and ICU length of stay. To improve clarity, the x-axis and y-axis were truncated at 30 days and $800k, respectively.



e-Table 2. Reductions in total hospital charges associated with a 1-day reduction in ICU length of stay, by ICU length of stay. These data are plotted in Figure 2. Total reductions were composed of reductions due to fewer days in the hospital and reductions due to lower daily charges.

Change in ICU Length of Stay	Charge reduction due to lower daily charges ($)	Charge reduction due to fewer days in hospital ($)	Total reduction in hospital charges (95% CI) ($)
2 days to 1 day	19	20012	20030 (19300, 20761)
3 days to 2 days	19	18823	18842 (18174, 19509)
4 days to 3 days	57	17671	17728 (17093, 18363)
5 days to 4 days	113	16558	16671 (16042, 17300)
6 days to 5 days	188	15482	15670 (15023, 16317)
7 days to 6 days	283	14444	14726 (14044, 15408)
8 days to 7 days	396	13443	13839 (13110, 14567)
9 days to 8 days	527	12480	13008 (12226, 13789)
10 days to 9 days	678	11555	12233 (11396, 13070)
11 days to 10 days	848	10668	11515 (10622, 12409)
12 days to 11 days	1036	9818	10854 (9905, 11803)
13 days to 12 days	1243	9005	10249 (9246, 11251)
14 days to 13 days	1469	8231	9700 (8646, 10755)
15 days to 14 days	1714	7494	9208 (8104, 10312)
16 days to 15 days	1978	6795	8773 (7621, 9924)
17 days to 16 days	2260	6133	8394 (7196, 9591)
18 days to 17 days	2562	5510	8071 (6828, 9314)
19 days to 18 days	2882	4923	7805 (6517, 9093)
20 days to 19 days	3221	4375	7596 (6262, 8930)

e-Figure 7. Depiction of charge reduction associated with shortening ICU length of stay from 5 days to 4 days. The total charge reduction associated with shortening from 5 days to 4 days is $16,671; this total is comprised of $16,558 from 1 fewer day in the ICU and $113 from lower charges daily during each of the days in the ICU (i.e., lower daily charges due to the patient not being as sick during the days he/she is in the ICU). On the plot below, the charge reduction associated with 1 fewer day in the ICU is represented by the y-intercept of the '5-line' at 4 days since admission ($16,558). The charge reduction due to lower daily charges during the 4 days the patient was in the ICU is represented by the shaded area between the '5-line' and '4 (shifted)-line' ($113).



e-Appendix 1: Supplemental Statistical Details

This section contains technical details on charge reduction calculations.

ICU LOS: Charge reduction associated with reducing one day of ICU length of stay was calculated from the following fitted daily charge model:

$$y(d|L) = 21073 - 1400 * d + 156 * L + 19 * d * L$$

where $y(d|L)$ is the daily charge for day d of an ICU stay of L days. This model allows initial day charges and changes in daily charges dependent on ICU length of stay which is observed in the trajectory plot. The total charges for an ICU stay of L days is $\sum_{d=1}^{L} y(d|L)$. The total charges for an ICU stay of $L-1$ days is $\sum_{d=1}^{L-1} y(d|L-1)$. Consequently, charge reduction due to one fewer day of ICU length of stay with L days is

$$\sum_{d=1}^{L} y(d|L) - \sum_{d=1}^{L-1} y(d|L-1) = y(d|L) + \sum_{d=1}^{L-1}\{y(d|L) - y(d|L-1)\},$$

which is comprised of two quantities, charge reduction due to one fewer day in ICU: $y(d|L)$ and charge reduction due to lower daily charges in each day from day 1 to day $L-1$: $\sum_{d=1}^{L-1}\{y(d|L) - y(d|L-1)\}$.

Mechanical Ventilation: Charge reduction associated with reducing one day of mechanical ventilation use was calculated from the following fitted total hospital charge model:

$$total\ hospital\ charges = \beta_0 + \beta_1 * days\ of\ MV\ use\ in\ ICU +$$
$$\beta_2 * ICU\ days\ without\ MV\ use\ in\ ICU + \beta_3 * days\ on\ hospital\ floor,$$

where β_1 is the parameter of interest.

Vasopressors: Charge reduction associated with reducing one day of vasopressor use was calculated from the following fitted total hospital charge model:

$$total\ hospital\ charges = \beta_0 + \beta_1 * days\ of\ Vs\ use\ in\ ICU +$$
$$\beta_2 * days\ without\ Vs\ use\ in\ ICU + \beta_3 * days\ on\ hospital\ floor,$$

where β_1 is the parameter of interest.

Renal Replacement Therapy

$$total\ hospital\ charges = \beta_0 + \beta_1 * use\ of\ rrt + \beta_2 * days\ in\ ICU + \beta_3 * days\ on\ hospital\ floor,$$

where β_1 is the parameter of interest.