

Readmission and Mortality Following Discharge from Inpatient Treatment for COVID-19 by Mechanical Ventilation Status In Early and Late Phases of the Pandemic

BACKGROUND

- Goal:** to examine the association between mechanical ventilation (MV) and readmission and mortality following discharge from the hospital among COVID-19 patients by phase of the pandemic.

METHODS

- Retrospective observational study using EHR data from patients hospitalized with COVID-19 in a large, academic health system from March 2020 through Jan 2021
- Patients were followed through June 2021. Patients who died during initial hospitalization were excluded.
- Sample was divided into those hospitalized early (March-June 2020) vs late in the pandemic (July 2020-Jan2021)
- Rates of readmission and all-cause mortality were compared between MV and non-MV samples using binary logistic regression, Kaplan-Meier curves, and Cox proportional hazards regressions
- Propensity score matching (PSM) was used to balance potential confounders
- Potential confounders that were not balanced (absolute standardized difference ≥ 0.10) following PSM were included as covariates.

RESULTS

- Rates of readmission (12.8% vs 9.4%, Chi-square $p<.001$) and all-cause mortality (4.5% vs 3.7%, Chi-square $p=0.01$) were higher earlier in the pandemic.
- Rates of readmission were higher among patients who received MV compared to those who did not in early and late phases of the pandemic.
- Mortality rates were higher among patients who received MV both early and late in the pandemic.
- Odds (95% CI) of readmission for MV vs non-MV: 3.56 (2.75-4.60)/9.85 (5.52-17.57) for early/late admissions with covariate adjustment in matched sample
- Odds (95% CI) of mortality for MV vs non-MV: 3.88 (2.62-5.73)/11.86 (5.65-24.90) for early/late admissions with covariate adjustment in matched sample

Figure 1. Kaplan-Meier Curve for Readmission

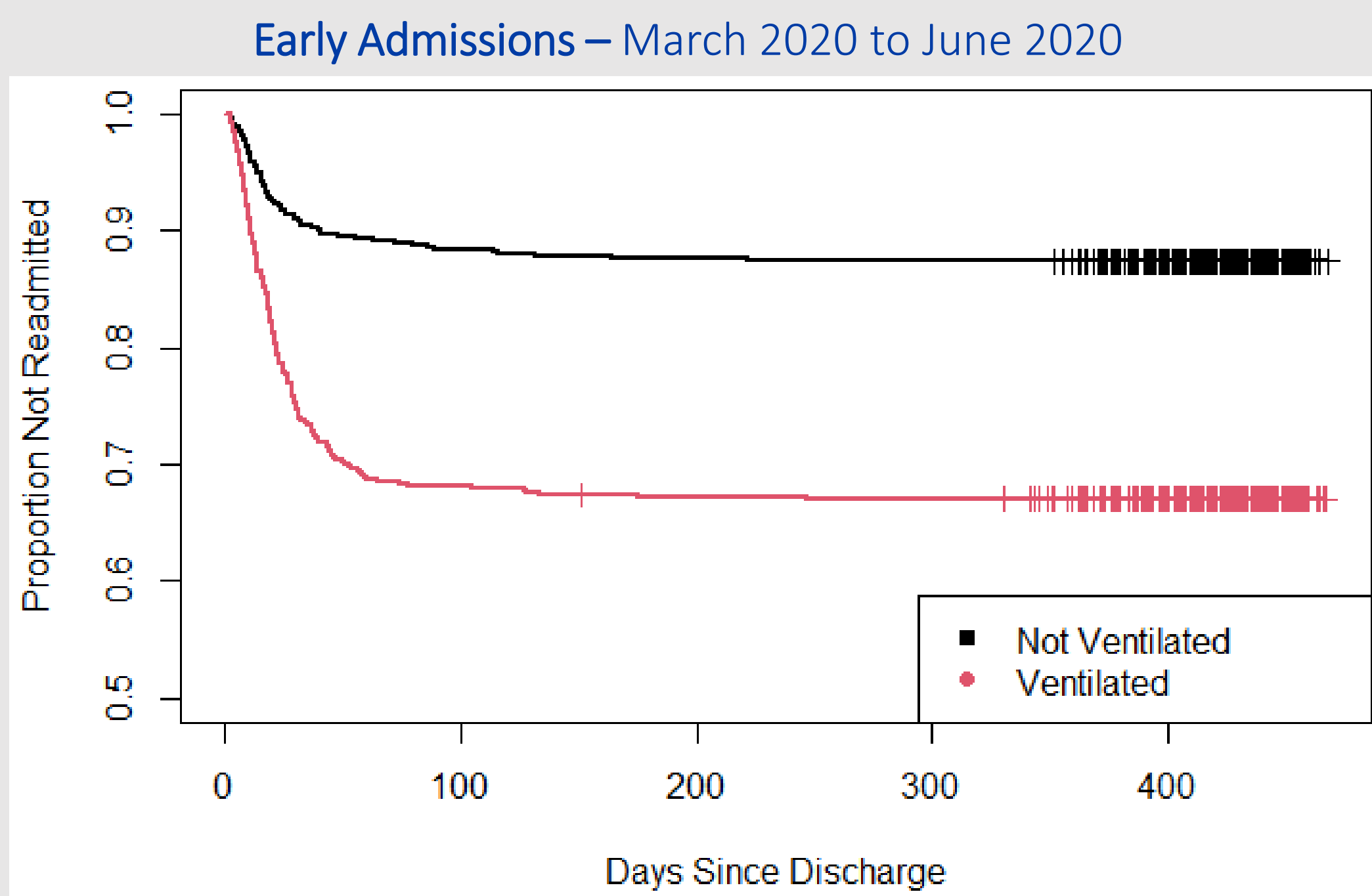
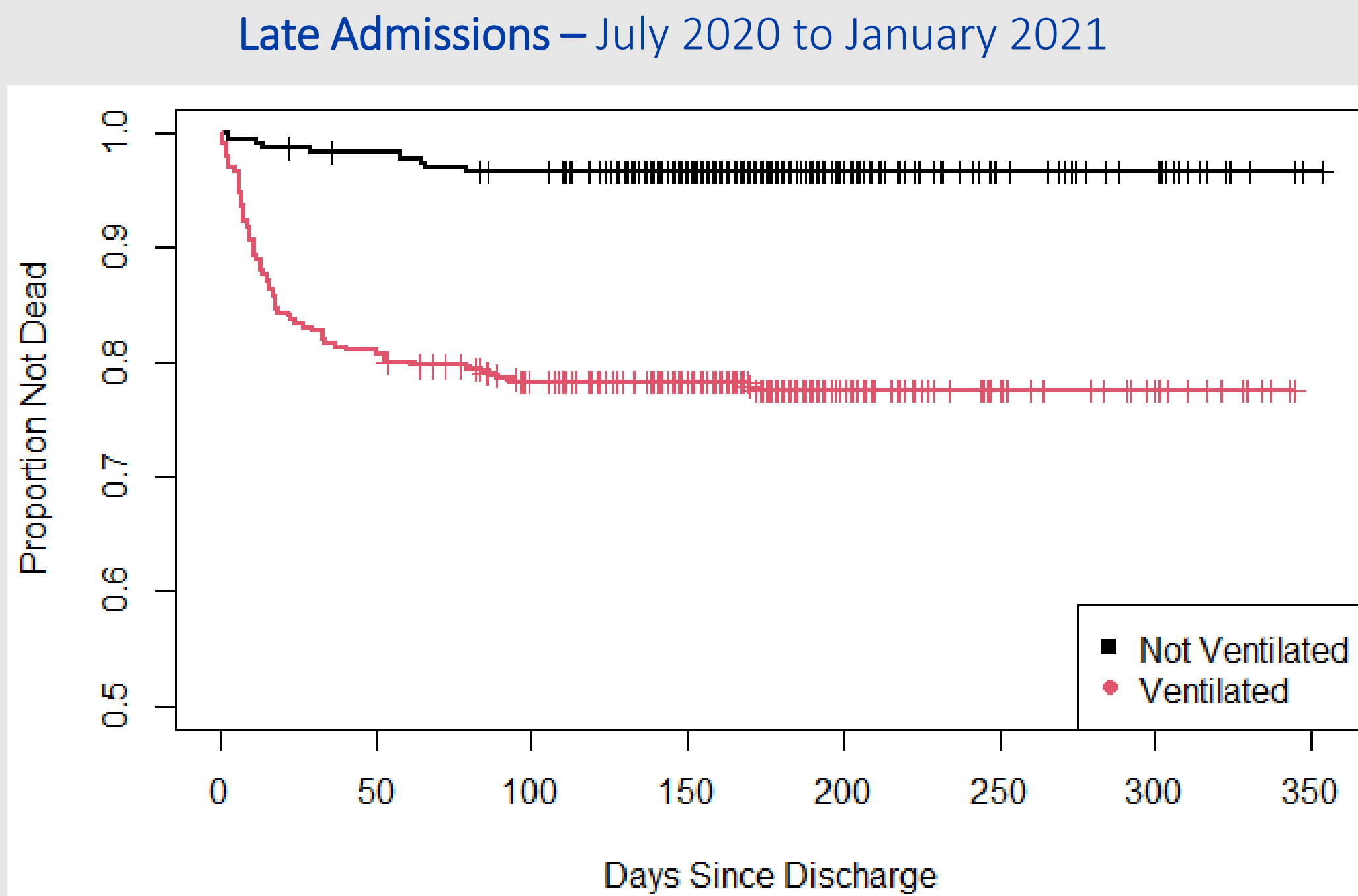
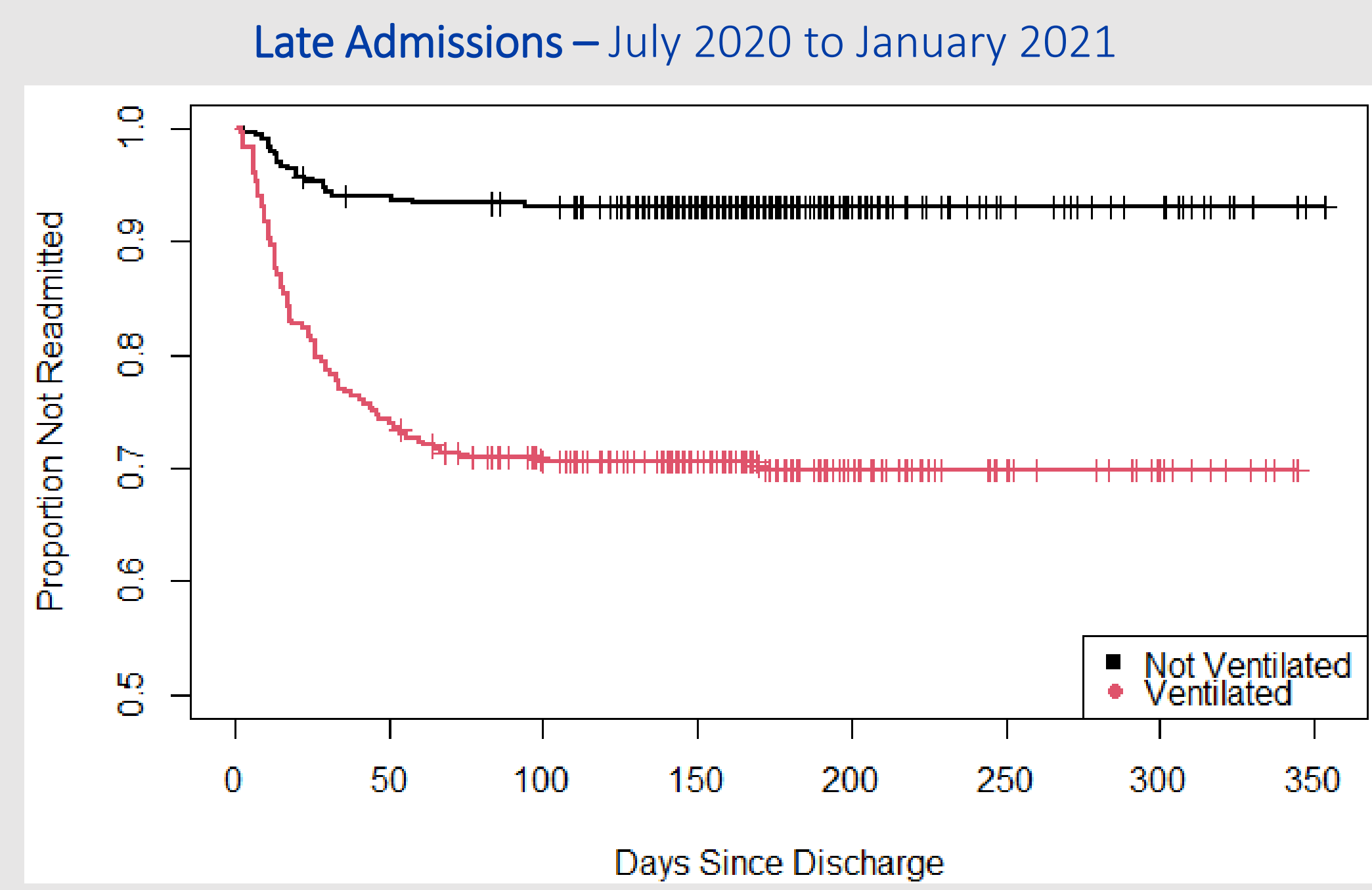
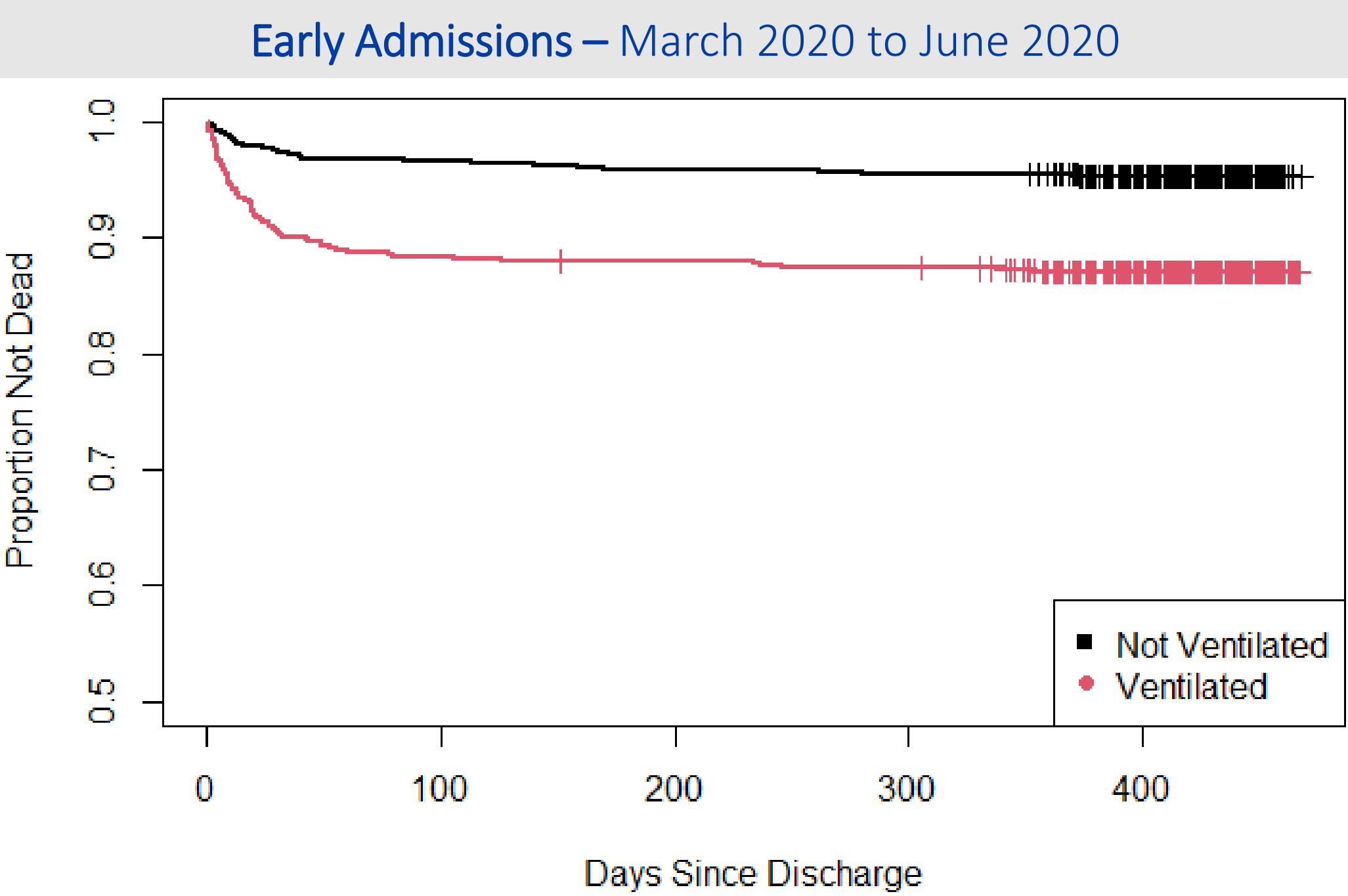


Figure 2. Kaplan-Meier Curve for Mortality



- Kaplan-Meier curves for readmission and mortality: a large proportion of events occur in first 100 days and level off over time
- Cox proportional hazards models showed the same pattern of results

DISCUSSION

- Rates of readmission and all-cause mortality were higher earlier in the pandemic.
- MV was more strongly associated with readmission and all-cause mortality later in the pandemic
- As treatment options for patients with COVID-19 expanded, it is possible that later in the pandemic, patients receiving MV were sicker.
- All patients who receive MV for COVID-19 should receive services and follow-up to prevent adverse outcomes after discharge.

Table 1. Sample Characteristics

Early Admission Sample			
Characteristics	Total (n=10,211)	Non-MV (n=9,381)	MV (n=830)
Readmission to Inpatient Care	1,305 (12.8%)	1,032 (11.0%)	273 (32.9%)
All-cause Mortality	461 (4.5%)	354 (3.8%)	107 (12.9%)
Month of Admission	March 2020	2,984 (29.2%)	2,574 (27.4%)
	April 2020	5,614 (55.0%)	5,252 (56.0%)
	May 2020	1,184 (11.6%)	1,142 (12.2%)
	June 2020	429 (4.2%)	413 (4.4%)
Age; Median (IQR)	62 (24)	62 (25)	61 (20)
Sex	Female	4,675 (45.8%)	4,383 (46.7%)
	Male	5,536 (54.2%)	4,998 (53.3%)
Race	White	3,805 (37.3%)	3,506 (37.4%)
	Black	2,198 (21.5%)	2,059 (21.9%)
	Asian	831 (8.1%)	761 (8.1%)
	Other/ Multiracial	2,866 (28.1%)	2,596 (27.7%)
	Unknown/ Missing	511 (5.0%)	459 (4.9%)
Ethnicity	Hispanic/ Latinx	2,252 (22.1%)	2,037 (21.7%)
	Non-Hispanic	7,302 (71.5%)	6,755 (72.0%)
	Other/ Unknown	657 (6.4%)	589 (6.3%)
Late Admission Sample			
Characteristics	Total (n=7,351)	Non-MV (n=7,050)	MV (n=301)
Readmission to Inpatient Care	689 (9.4%)	600 (8.5%)	89 (29.6%)
All-cause Mortality	274 (3.7%)	208 (3.0%)	66 (21.9%)
Month of Admission	July 2020	307 (4.2%)	295 (4.2%)
	August 2020	227 (3.1%)	217 (3.1%)
	September 2020	251 (3.4%)	238 (3.4%)
	October 2020	415 (5.6%)	399 (5.7%)
	November 2020	960 (13.1%)	919 (13.0%)
	December 2020	2,221 (30.2%)	2,138 (30.3%)
	January 2021	2,970 (40.4%)	2,844 (40.3%)
Age; Median (IQR)	65 (26)	65 (26)	67 (19)
Sex	Female	3,605 (49.0%)	3,495 (49.6%)
	Male	3,746 (51.0%)	3,555 (50.4%)
Ethnicity	White	3,792 (51.6%)	3,642 (51.7%)
	Black	1,033 (14.1%)	997 (14.1%)
	Asian	648 (8.8%)	606 (8.6%)
	Other/ Multiracial	1,639 (22.3%)	1,576 (22.4%)
	Unknown/ Missing	239 (3.3%)	229 (3.2%)
Insurance	Hispanic/ Latinx	1,159 (15.8%)	1,120 (15.9%)
	Non-Hispanic	5,862 (79.7%)	5,618 (79.7%)
	Other/ Unknown	330 (4.5%)	312 (4.4%)