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Relationship Between a State-Directed Lockdown on Non-COVID-19–related ICU Admissions and Mortality in a Multicenter Colorado Healthcare System

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OBJECTIVES: Colorado issued a month long statewide lockdown on March 26, 2020, during the initial surge of the COVID-19 pandemic. The impact of this mandate on non–COVID-19 ICU admission rates and outcomes is unclear.

DESIGN: We performed a retrospective analysis of all medical ICU admissions in the University of Colorado Health System in four predefined periods: 1) prepandemic (2 mo prior to lockdown period 1); 2) mandated lockdown from March 26 to April 26, 2020 (period 2); 3) between surges (period 3); and 4) nonmandated lockdown surge (between November 1, 2020, and March 31, 2021, period 4).

SETTING: Nonsurgical ICU admissions at the University of Colorado Health Systems, including 10 hospitals throughout Colorado.

SUBJECTS: All ICU admissions in four predefined time periods.

MEASUREMENTS AND MAIN RESULTS: We included 13,787 patients who were admitted during the four study periods. The 28-day mortality rates for non–COVID-19 ICU admissions following index ICU admission were 13.6%, 18.0%, 13.5%, and 16.0% across periods 1–4, respectively. However, the increased odds in non–COVID-19 ICU mortality during the mandated lockdown period relative to prepandemic 1 (odds ratio [OR], 1.39; 95% CI, 1.11–1.72; $p = 0.0.04$) was attenuated and nonsignificant after adjustment for demographics, comorbidities, diagnosis flags, and severity (OR, 1.15; 95% CI, 0.89–1.48; $p = 0.27$). Similar results were found in time-to-event analyses. The most common diagnosis in each time period was acute respiratory failure (ARF), and we found it to have increased during lockdown ($p < 0.001$), whereas sepsis admissions increased during and decreased after lockdown ($p = 0.004$). Admissions for alcohol withdrawal syndrome (AWS) increased during lockdown and 6 months afterwards ($p = 0.005$).

CONCLUSIONS: For non-COVID-19–related ICU admissions, mortality rate was similar before, during, and after Colorado's month long lockdown after confounder adjustment, including typical ICU admission flags. Primary admission diagnoses shifted throughout the predefined study periods with more admissions for severe critical diagnoses (i.e., ARF, sepsis, AWS) occurring during the mandated lockdown and nonmandated lockdown periods compared with the prepandemic and between surge period. This would suggest that the perceived increase in mortality during the lockdown for non–COVID-19 ICU admissions may be related to a shift inpatient demographics.

KEY WORDS: COVID-19; epidemiology; intensive care unit surge and strain; mandated state lockdown; death rate

Response to the COVID-19 pandemic resulted in dramatic alterations in usual care with reduced access to outpatient services and routine procedures. Along with adoption of social distancing measures (1, 2), healthcare systems worldwide appropriated new surge strategies to combat the

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KEY POINTS

- **Question:** Is there temporal variation in ICU admission diagnoses and mortality for non-COVID-19–related admissions during COVID-19 lockdown periods?
- **Findings:** Non–COVID-19 ICU admission diagnoses and in-hospital mortality demonstrate temporal fluctuations with surge and/or lockdown periods. During COVID-19 surge periods, we found an increase in ICU admissions for non-COVID–related respiratory failure and alcohol withdrawal. After adjustment, mortality did not differ significantly for ICU patients admitted for non–COVID-19 etiologies.
- **Meanings:** ICU admission diagnoses vary temporally with COVID-19 surge/lockdown periods for patients with non-COVID-19–related ICU issues. Future studies should aim to understand mechanisms for temporal variation in ICU diagnoses and care delivery.

tremendous increase in COVID-19 cases in order to allocate limited resources to acutely ill patients (3–5). An unintended consequence of these mitigation measures was an overall reduction in the utilization of medical care for non-COVID-19–related diseases, including acute coronary syndrome (6–9), heart failure hospitalizations (10), stroke admissions (11–13), non–COVID-19 emergency department visits (14–16), activation of trauma surgery (17), routine care for chronic medical conditions such as pulmonary hypertension (18) and liver disease (19), and psychiatric admissions (20). Coupled with this reduced hospital access, patients reported increased fear of COVID-19 exposure resulting in avoidance of healthcare systems contributing to delays in seeking care (21–24). It is possible that ICU admission diagnoses would not be affected during the lockdown given that patients with severe non–COVID-19 disorders would still necessitate hospital presentation and admission. However, "normal" behaviors during this tumultuous time were changed by a variety of factors; for example, hospital presentation hesitancy due to the perceived risk of contracting COVID-19 or less overall travelling behaviors and/or transportation access may reduce trauma emergencies. Further, it is possible that the excess strain placed on the healthcare system reduced resources available for non-COVID-19–related issues resulting in delayed recognition or care.

We posited that the reduction of healthcare access and delay in seeking care resulted in increased illness severity for non–COVID-19 conditions that may have increased non-COVID-19–related ICU mortality in the peripandemic period. Our primary research questions were 1) did the lockdown alter the types (i.e., diagnosis flags) and frequencies of patients admitted to the medical ICU compared with nonlockdown periods before and after and 2) did patients with similar diagnoses experience worse outcomes during the lockdown compared with the nonlockdown periods. To investigate these hypotheses, we analyzed our multi-hospital electronic medical record data for temporal trends in ICU admissions in the prepandemic period, during the state mandated lockdown period, and in the second nonmandated lockdown surge period. We used the natural experiment of the state-imposed lockdown to compare non-COVID-19–related mortality and admission diagnoses in ICU patients across the University of Colorado Hospital (UCH) system and to investigate whether mortality predictors differed before and after lockdown.

The dataset for this analysis was obtained from the University of Colorado Health Data Compass data repository comprising a retrospective cohort of ICU patients discharged between January 1, 2020, and March 31, 2021, across any of the UCH-affiliated hospitals. The University of Colorado Health System is a nonprofit, academic institution with over 10 hospitals throughout Colorado. It is the largest health system in Colorado and parts of Southern Wyoming and Nebraska that provides advanced care to the region. This study was deemed human subjects exempt given use of deidentified data (Category 4) the Colorado Institutional Review Board (IRB no. 20-1885, approval date: August 4, 2020). All study procedures were followed in accordance with the ethical standards of the responsible institutional committee on human experimentation and in accordance with the Helsinki Declaration of 1975.

Our primary research question aimed to define how mortality changed for patients with non–COVID-19 diagnoses in the ICU during COVID-19–related lockdown and subsequent pandemic surge periods. The primary covariate of interest (time of admission into the ICU) was divided into four periods: 1) pre lockdown: January 1, to March 25, 2020; 2) during lockdown: March 26, to April 26, 2020; 3) post lockdown (nonsurge): from April 27, to October 31, 2020; and 4) surge period without a lockdown order: November 1, 2020, to March 31, 2021. The "before lockdown" period of 2 months prior was chosen to establish a baseline of non–COVID-19 ICU admissions, considering our first confirmed case of COVID-19 in Colorado occurred on March 5, 2020. The "after lockdown" period of 6 months was chosen in order to provide sufficient follow-up time for our primary outcomes. Additionally, we evaluated the time period during the winter COVID-19 surge (period 4), which importantly did not have a lockdown mandate to assess whether similar patterns were observed in pandemic surge states without government-imposed lockdown.

The primary outcomes of interest were survival status and time. Other covariates relevant to our analysis included the following: 1) patient demographics (age, sex, race/ethnicity); 2) comorbidities (diabetes, asthma, interstitial lung disease [ILD], chronic obstructive pulmonary disease [COPD], obesity, hypertension, tobacco use disorder [TUD]/former smoking status, and alcohol use disorder [AUD]); 3) common ICU admission diagnosis flags based on previously published data looking at temporal trends in ICU admission data (acute respiratory failure [ARF], sepsis, myocardial infarction [MI], stroke, and alcohol withdrawal syndrome [AWS]); and 4) indicators of ICU severity including mechanical ventilation and vasopressor use. For analyses including race, races making up less than 2.2% of the sample (American Indian, Alaska Native, Asian, Native Hawaiian, and Pacific Islander) were collapsed into "Other." Although demographics and comorbidities are reported at patient-level, diagnosis and severity can vary across different ICU stays even within the same patient. Therefore, summary information for these variables was stratified by period of index (first) ICU admission, with marginal difference tested by nonparametric tests (Fisher exact test for categorical variables and Kruskal-Wallis test for continuous variables). Using Fisher exact test for categorical variables and Kruskal-Wallis test for continuous variables, we analyzed temporal trends in non–COVID-19 ICU patients with respect to the lockdown period.

In order to assess the impact of the lockdown on ICU mortality, we used two complementary outcome frameworks. First, we analyzed the 28-day mortality as a binary outcome using multivariable logistic regression, which estimates the effect of admission period on the odds of a patient dying within 28 days after their first ICU admission (i.e., odds ratio or OR). Second, we implemented a survival analysis approach, using time-to-death (following index ICU admission) as the outcome, censoring those who remained alive in the cohort on April 30, 2020, or at 90 days after their final hospital discharge. We used Cox regression in order to estimate the hazard ratios (HRs) in this setting. For both outcome definitions, we produce estimates for ORs or HRs depending on the model relative to a baseline of "pre lockdown," that is, the factor change in the odds or hazard of death for patients who were admitted to the ICU during lockdown, post lockdown, or during the second surge. We separately estimated changes in mortality relative to the lockdown period as well. In both outcome frameworks, each patient is treated as an independent observation and followed from their first admission into the ICU. Additionally, we hypothesized that changes in mortality may be partially explained by changes in patient characteristics and therefore adjusted for demographics, comorbidities, admission diagnosis, and illness severity markers.

In the analyses above, we followed each patient from their index ICU admission, effectively ignoring future readmissions. We recognize that some patients had multiple stays in the ICU during our study period, and in order to examine changes in mortality including these readmissions, we employed a sensitivity analysis that includes all ICU stays observed over the study period (index ICU admissions and readmissions). We present some additional descriptive statistics at the ICU admission level as a part of this sensitivity analysis. For each ICU admission, we observed the 28-day mortality (for patients with at least 28 d of follow-up). This indicator for 28-day mortality was modeled on the ICU-stay level using generalized estimating equations, inferences from which were assessed using robust SEs. Patients who were first admitted in one period and later readmitted in a different period were censored at the time of their next readmission, 90 days after the final discharge, or April 30, 2021 (whichever came first). In

TABLE 1.
Demographics on Index ICU Admission Stratified by Time Period

Cohort Characteristic	Pre Pandemic (*N* = 3,137)	Mandated Lockdown (*N* = 690)	Between Surge (*N* = 5,936)	Nonmandated Lockdown Surge (*N* = 4,024)	Total (*N* = 13,787)
Male, *n* (%)	1,805 (57.5)	395 (57.2)	3,443 (58.0)	2,333 (58.0)	7,976 (57.9%)
Age (yr), mean (SD)	61.0 (17.5)	58.9 (17.0)	59.6 (17.6)	60.4 (17.3)	60.1 (17.5)
Race/Ethnicity, *n* (%)					
White	2,423 (77.2)	521 (75.5)	4,591 (77.3)	3,077 (76.5)	10,612 (77.0%)
Hispanic[a]	398 (12.9)	86 (12.7)	757 (12.9)	521 (13.2)	1,762 (13.0%)
Black	226 (7.2)	59 (8.6)	375 (6.3)	294 (7.3)	954 (6.9%)
Multiple	128 (4.1)	26 (3.8)	244 (4.1)	160 (4.0)	558 (4.0%)
Other	360 (11.5)	84 (12.2)	726 (12.2)	493 (12.3)	1,663 (12.1%)
Socioeconomic, mean (SD)					
Income[b]	$65,409.5 ($21,432.9)	$66,087.3 ($22,283.6)	$65,672.9 ($22,007.0)	$66,179.6 (22,795.7)	$65,781.6 ($22,124.2)
College degree[c]	35.9 (16.7)	35.9 (16.4)	36.1 (16.8)	36.2 (17.0)	36.1 (16.8)
High school degree[c]	90.6 (7.7)	90.7 (7.9)	90.5 (7.9)	90.6 (7.8)	90.6 (7.8)
Death, *n* (%)	607 (19.3)	163 (23.6)	1,119 (18.9)	787 (19.6)	2,676 (19.4%)

Races making up < 2.2% of the sample (American Indian, Alaska Native, Asian, Native Hawaiian, and Pacific Islander) were collapsed into "Other."

[a]Missing $n = 30, 14, 83, 63$, respectively.

[b]Missing $n = 393, 79, 868, 545$, respectively.

[c]Missing $n = 380, 79, 849, 521$, respectively.

the unadjusted model, we assumed no effect of previous ICU admission on the odds of mortality, but in the adjusted models, we allowed for a different estimate for patients who had previously been admitted into the ICU (either 0, 1, or 2+ times).

RESULTS

Baseline Characteristics Stratified by Time Period

Our study included 13,787 patients admitted to an UCH ICU during the study period, comprising 3,137 (22.8%), 690 (5.0%), 5,936 (43.1%), and 4,024 (29.2%) index ICU admissions, respectively across the four study periods (Periods 1–4) **(Table 1)**. The majority of patients in our sample were male (57.9%), and the mean overall age was 60.1 ± 17.5 years. Most patients (10,612 [77.0%]) were White or Caucasian, whereas 954 (6.9%) were Black, 558 (4.0%) had multiple races listed, and 1,663 (12.1%) were reported as or collapsed into "Other." These results were roughly consistent throughout all time periods. Most patients had at least one documented comorbidity. Overall, the most frequent comorbidities were hypertension (*n* = 7,009 [50.8%]), diabetes (*n* = 4,191 [30.4%]), and former (*n* = 5,715 [41.5%]) and current TUD (*n* = 4,368 [31.7%]) (**Supplemental eTable 1**, http://links.lww.com/CCX/B89).

Temporal Shifts in Patient Characteristics and Mortality Risk Factors During the Surge Versus Nonsurge Time Periods

Patients had similar demographics across time periods (Table 1), and there were significantly higher proportions of comorbid diabetes and AUD during the lockdown and lower comorbid flags for asthma, ILD, COPD, and former smokers (Supplemental eTable 1, http://links.lww.com/CCX/B89). **Figure 1** shows the

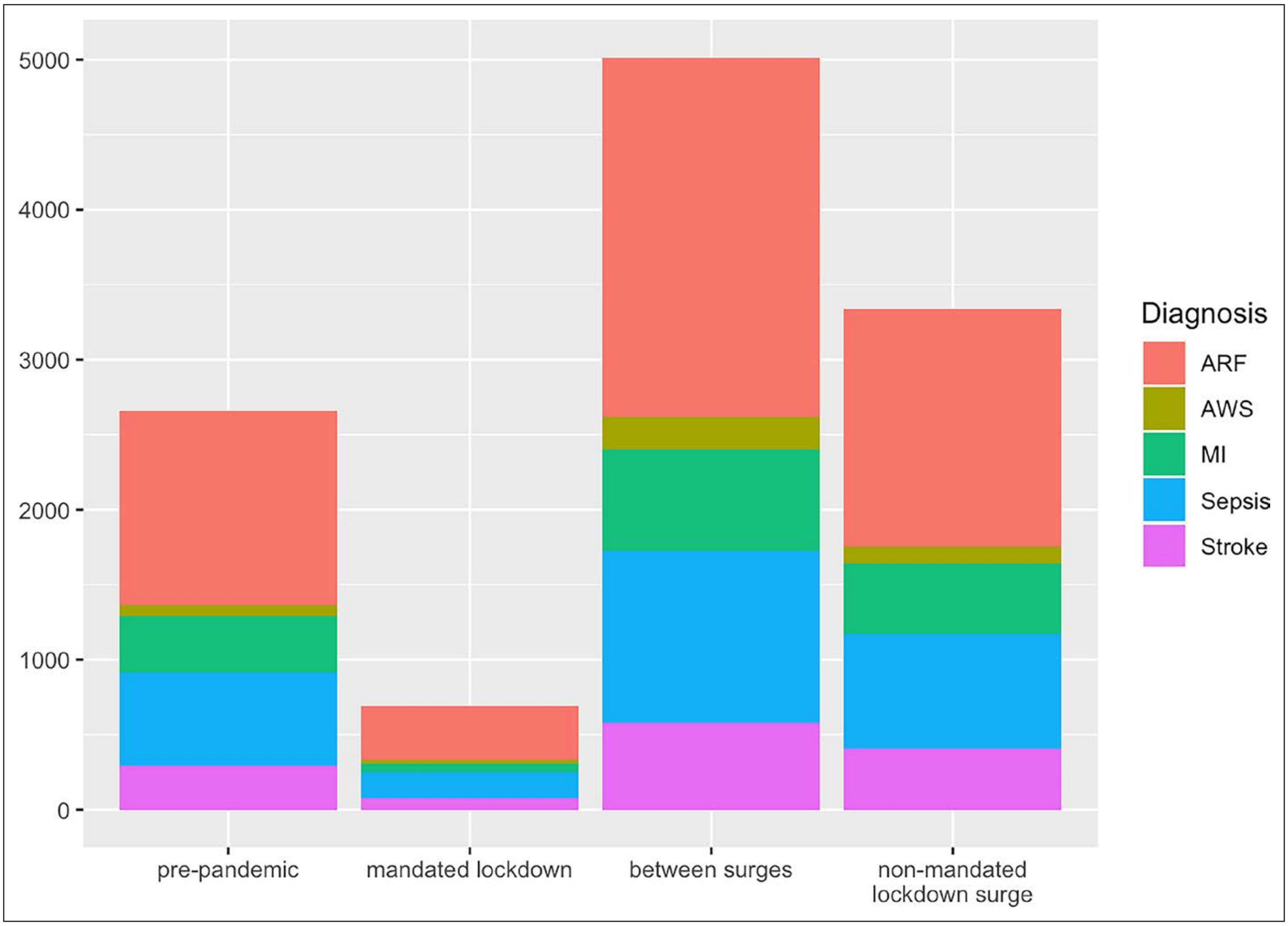

Figure 1. Temporal variation in non-COVID–related ICU admission diagnoses over the state mandated lockdown and subsequent surge periods. ARF = acute respiratory failure, AWS = alcohol withdrawal syndrome, MI = myocardial infarction.

temporal changes in admission flags at index ICU admission stratified by time period. ARF was the most common diagnosis flag (n = 5,629 [40.8%]) followed by sepsis (n = 2,715 [19.7%]). The most significant changes are as follows: 1) ARF increased during lockdown and reverted back to Period 1 levels ($p < 0.001$); 2) similarly, flags for sepsis increased during the lockdown and returned to baseline following it ($p = 0.004$); and 3) increased number of patients admitted with AWS during the lockdown and persistent up to 6 months following lockdown ($p = 0.005$). Rates of MI and stroke did not significantly change across the time periods although prevalence rates did fluctuate over the periods.

We did observe a change in illness severity over the measured time periods as expected by changes in care practices related to the pandemic. Use of mechanical ventilation was higher in the mandated lockdown period (Period 1) (49%) and lower in the postlockdown (32.4%) and subsequent surge periods (33.8%) ($p <$ 0.01). Conversely, vasopressor use was increased in the second nonmandated lockdown surge period (Period 4) (14.8%) relative to the earlier surge period with mandated lock down (Period 2) (10.3%) and the between surge period (Period 3) (10.8%).

Effect of Lockdown and Time From First Admission on Mortality in Non–COVID-19 Critically Ill Patients

Figure 2 shows the Kaplan-Meier curves for 28-day mortality stratified by index ICU admission lockdown period. Several models were used to assess for the effect of time period on 28-day mortality (**Supplemental eTable 2**, http://links.lww.com/CCX/B89). We evaluated the time period effect based on two reference points: 1) Period 1 (i.e., before pandemic/lockdown) and 2) Period 2 (i.e., 1 mo during lockdown). In unadjusted analyses, the risk of death was 39% higher during lockdown (95% CI, 11–72; $p = 0.004$) and 21% higher during the second surge period (95% CI, 6–38; $p = 0.005$) when compared with nonsurge periods. However, after adjusting for demographics, comorbidities, admission diagnoses, and severity flags, the odds of death were similar and not statistically significantly different across all period comparisons (**Table 2**). Similarly, the risk of death from first ICU admission rather than individual patient was also nonsignificant across all time periods after adjusting for demographics, comorbidities, admission diagnoses, and severity flags (Table 2).

Effect of Lockdown and Each Separate ICU Admission on Admission Diagnoses and Mortality

In our unadjusted sensitivity analysis examining all ICU admissions (including readmissions), we found that mortality was higher for ICU stays occurring during the surge periods (Periods 2 [mandated lockdown] and 4) than the prelockdown (Period 1) (**Supplemental eTable 3**, http://links.lww.com/CCX/B89). The odds of mortality were 44% higher in the mandated lockdown period (95% CI, 15–78; $p = 0.001$) (Period 2) and 29% higher in the subsequent surge period without mandated lockdown (95% CI, 12–47, $p < 0.001$) (Period 4). After controlling for demographics, diagnosis flags, comorbidities, and illness severity flags, these associations were attenuated to 22% (95% CI, 4–56; $p = 0.1$) and 20% (95% CI, 3–40; $p = 0.021$), respectively. In fully adjusted models, the risk of death remained higher in the nonmandated surge period (Period 4) (OR, 1.2; 95% CI, 1.03–1.4; $p = 0.02$) compared with the other time periods and the prelockdown period (reference: Period 1, pre lockdown) (**Fig. 3**). Readmission status including numbers of readmission was not associated with the increased risk of death, whereas illness

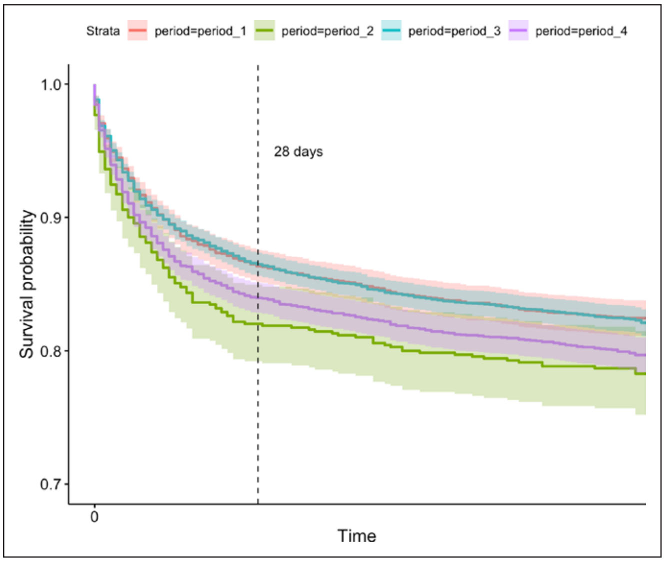

Figure 2. Time to death from first ICU admission (Kaplan-Meier curves stratified by time of first ICU admission). Lockdown periods were predefined as the following: pre = 2 mo prior to lockdown; during = March 26 to April 27, 2020; and after = 1.5 mo following the lockdown.

TABLE 2.
Adjusted Mortality Risks Based on Time Period and Time From First ICU Admission

	Pre Pandemic		Mandated Lockdown	
Reference Point	**OR (95% CI)**	***p***	**OR (95% CI)**	***p***
Association between time period of ICU admission and mortality				
Pre pandemic	Reference	Reference	0.8 (0.63–1.03)	0.08
Mandated lockdown	1.25 (0.97–1.59)	0.081	Reference	Reference
Between surge	0.96 (0.84–1.11)	0.60	0.77 (0.61–0.98)	0.03
Nonmandated lockdown surge	1.08 (0.93–1.25)	0.34	0.86 (0.68–1.1)	0.23
Association between time from ICU admission and mortality				
Pre pandemic	Reference	Reference	0.94 (0.79–1.12)	0.50
Mandated lockdown	1.06 (0.89–1.27)	0.50	Reference	Reference
Between surge	1.01 (0.91–1.12)	0.86	0.95 (0.80–1.12)	0.55
Nonmandated lockdown surge	1.09 (0.97–1.21)	0.13	1.02 (0.86–1.12)	0.79

OR = odds ratio.
Data presented as OR (95% CI) of risk of death based on the time from first ICU admission. (Periods 1 and 2 were both used as reference points. Period 1 = pre lockdown, Period 2 = during lockdown, Period 3 = 6 mo post lockdown orders lifted, and Period 4 = winter COVID-19 surge without lockdown restrictions.)

severity markers including need for mechanical ventilation and shock remained significantly associated with risk of death in the adjusted models.

DISCUSSION

Among ICU patients admitted during the initial COVID-19 pandemic surges (March 2020 to June 2020) across a multihospital, regional healthcare system in Colorado, we identified an association between admission period and mortality for critically ill patients admitted for non-COVID-19–related reasons when compared with similar ICU patients in the prepandemic period or during between surge periods. However, this association was primarily explained by a greater proportion of patients with admission diagnoses that historically portend worse prognoses, including ARF and sepsis, shifting patient demographics, and increased illness severity in the surge periods.

We identified temporal variation in admission diagnoses that corresponded to pandemic surge periods. During surge periods, we found that the proportion of patients admitted with admission diagnoses for non-COVID ARF, sepsis, and AWS increased significantly compared with the prepandemic and between surge periods. Conversely, we saw reductions in other admission diagnoses including those for MI and stroke during the surge/lockdown periods with subsequent increase in the between surge period. The presence of ARF or sepsis was highly associated with the increased risk of death independent of admission time period. Along with changes in the types of admissions, we saw temporal changes in admission patterns with marked variability in admission likelihood for patients with various comorbid conditions during the lockdown period. For example, admissions for patients with chronic lung comorbidities (e.g., asthma, ILD) decreased significantly during the surge periods while ICU encounters for AWS increased significantly in the same time periods. This may reflect changes in access to addiction treatment services during the lockdown periods and differential patient attitudes toward risk and subsequent exposure in those with underlying conditions.

The presence of an AUD remained associated with an increased risk of death in adjusted models in both surge periods. Patients with an identified AUD experienced a 20% increase in the risk of death in the mandated lockdown period and the nonmandated surge period even after adjustment for other confounding variables including demographics, comorbidities, admission diagnoses, and illness severity markers. This finding is consistent with prior studies demonstrating increased risk of acute respiratory distress syndrome and ICU-related death in patients with an AUD. We

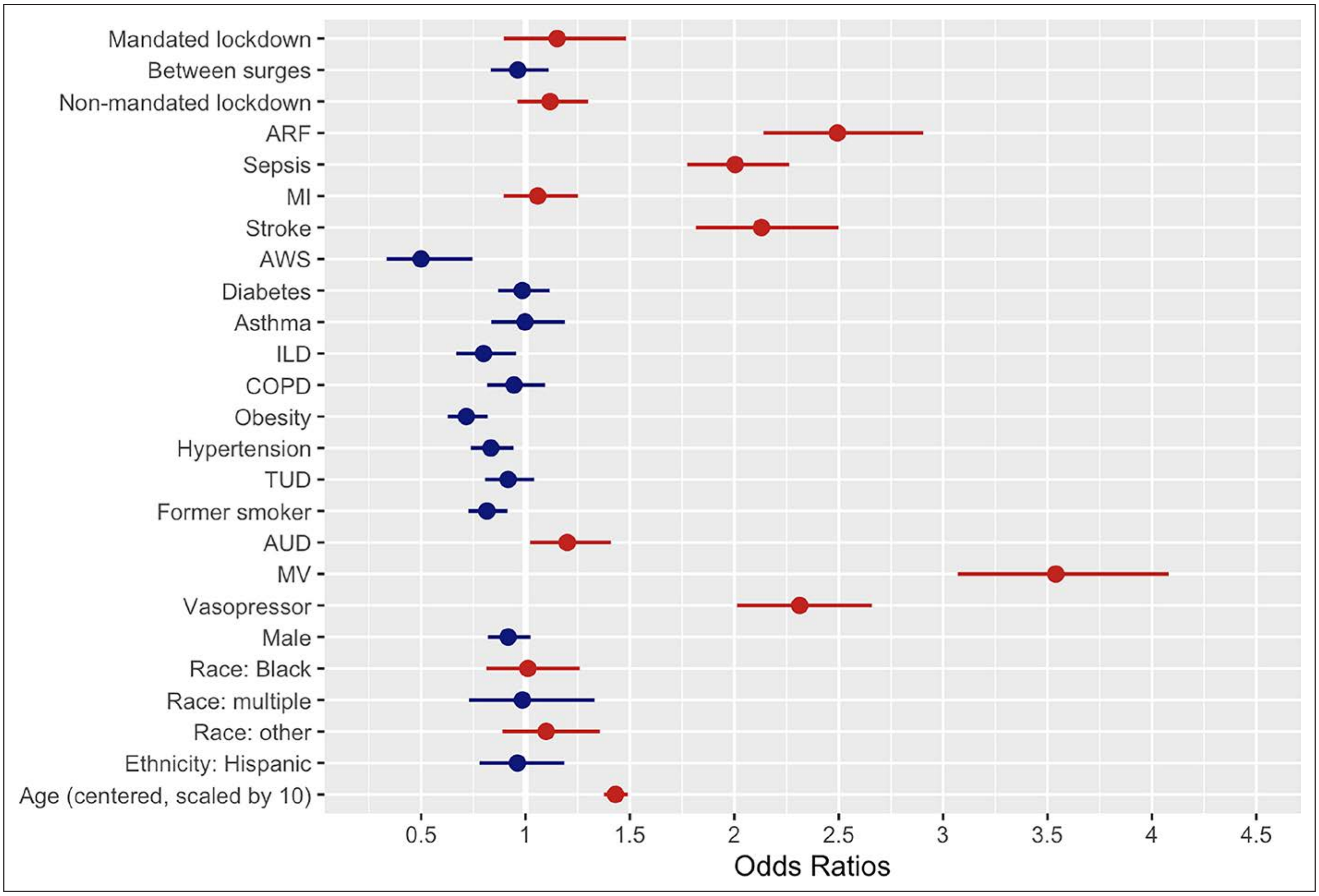

Figure 3. Forest plot of fully adjusted model with 28-d mortality risk among patients admitted for non-COVID–related ICU admissions across the mandated lockdown and subsequent nonlockdown surge period. ARF = acute respiratory failure, AUD = alcohol use disorder, AWS = alcohol withdrawal syndrome, COPD = chronic obstructive pulmonary disease, ILD = interstitial lung disease, MI = myocardial infarction, MV = mechanical ventilation.

also observed significant increases in the prevalence of AUD and AWS in all pandemic periods compared with the prepandemic period. It is possible that the increased mortality during the lockdown was partially driven by a greater number of patients presenting with AUD/AWS during the lockdown. Further, higher mortality among those with AUD may have resulted from delays in presentation, limited access to addiction services including usual rehabilitation or detoxification centers and/or increased alcohol misuse during the surge periods. Alternatively, patients with an AUD/AWS may have been cared for in less typical care environments (e.g., step-down, floor) for longer periods given the lack of access to intensive care resources and perceived lower acuity. Further studies should better define care provision to AUD/AWS patients during the pandemic surge periods.

A paucity of published data investigates the impact of COVID-19 on non–COVID-19 ICU outcomes and even less explore the impact of pandemic mandated lockdown and surge periods on non–COVID-19 patients. To date, we are not aware of any study investigating the impact of a statewide lockdown policy on non–COVID-19 patients admitted to the ICU. Despite this, several reports have noted similar findings congruent with our current data. First, a noticeable drop in emergency department admissions and overall general hospital attendance was noted in several reports worldwide during respective periods of government regulation (25–34). In fact, Colorado experienced a similar admission rate trajectory compared with all of the United States during the first wave and state-issued lockdown: an initial drop in overall admissions with a rebound to near prepandemic levels in June/July of 2020 (34). This phenomenon is likely multifactorial including: general fear and avoidance of COVID-19 hotspots such as hospitals; changes in social media and reporting of the disease; decline in traffic accidents due to reduction in workplace travel; cancellation of elective surgeries; and decreased school exposure of other non–COVID-19 contagious agents (25). Second, we and others have found an overall increase in mortality rate during the early pandemic or lockdown periods. One study found excess non–COVID-19 deaths in the United States in the early stages of the pandemic throughout multiple age and gender cohorts (35). Another report from the United Kingdom showed excess deaths during the early surge months compared with the average of 5 years prior (33). It remains unclear whether this is a result of undercounting actual COVID-19 cases. Finally, two trauma studies also noted an increase in AWS within the first wave of the pandemic in the United States (29, 36), highlighting the possible social and behavioral changes that are simultaneously occurring during this time.

Although our cohort represents a large population across a regional healthcare system, there are important limitations to our study. First, the United States has experienced a wide variance in local, regional, and state measures in mitigating COVID-19 spread, and therefore, our conclusions are unique to Colorado. Second, we are unable to comment on causality related to changes in mortality observed across periods given the observational nature of our study. Third, admission diagnoses were collected based on the *International Classification of Diseases*, which limits the accuracy of assessing the entire clinical picture (37). Fourth, as we used electronic medical records–based data, the granularity of our covariate definitions is limited. It is possible that residual confounding by severity of illness explains some of the associations observed in our data. Our available data on hospital staffing metrics are limited within our healthcare record, and it is likely that some provider- and hospital-level factors may explain some of the observed associations. We acknowledge that our current analysis does not explore the full extent of the effect of the lockdown and surge periods on healthcare delivery by only evaluating temporal trends in ICU admissions. There is likely selection bias in our estimates resulting from the use of an ICU-only cohort that is not fully controllable for with our current administrative data. A complete analysis of the effects of lockdown conditions would explore population-level changes in overall hospital admissions and infections and require community-level data on a larger scale. Our data can inform useful trends in ICU admission diagnoses. Future studies should explore mechanisms for temporal variation in ICU admission diagnoses in the setting of persistently present COVID-19. Potential mechanisms for further study include delays in care delivery, alterations in care quality during surge periods, and differences in risk groups receiving ICU care during surge periods including differences in illness severity and etiologies of organ failure including respiratory failure.

CONCLUSIONS

Among patients first admitted to the ICU in the initial COVID-19 pandemic surge (March 2020 to June 2020) across a multicenter, regional healthcare system in Colorado, we found no evidence of greater mortality during the lockdown period for non-COVID-19–related diagnoses compared with the prepandemic and postlockdown periods after adjustment for admission diagnoses. This suggests that the excess strain placed on the healthcare system may not have worsened outcomes for non–COVID-19 patients in our healthcare system for those with the same admission diagnosis.

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