Clinical Outcomes in Patients Presenting to the Emergency Department for Opioid Overdose and Concurrent COVID-19 Infection

Benjamin Gerstein,1 Kori L. Brewer, Ph.D.,2 Dmitry Tumin, Ph.D.,3,4 Jason Hack, MD,2
1 Brody School of Medicine, East Carolina University, 2 Departments of Emergency Medicine, 3 Department of Pediatrics, and 4 Department of Academic Affairs, Greenville, NC 27834, USA.

INTRODUCTION
- Each year, nearly 3 million US adults visit an emergency department (ED) for treatment related to opioid use, of whom >25% require admission to the hospital.
- The onset of the COVID-19 pandemic in 2020 coincided with an increase in ED visits due to opioid overdose, as well as an increase in deaths due to opioid overdose.
- Opioids may cause respiratory depression through activation of μ-opioid receptors, and also alter the infiltration and cytotoxicity of immune cells, leading to higher incidence of infection and increased severity of the disease state.
- Objective: Research on opioid overdose during the COVID-19 pandemic has focused on the increase in rates of ED visits related to opioids, opioid overdose and death, but has not considered how concurrent COVID-19 infection influenced clinical outcomes.

HYPOTHESIS
COVID-19 infection increased the need for respiratory support, prolonged hospital stays, and increased mortality among patients admitted to the hospital after presenting to the ED due to opioid overdose.

MATERIALS & METHODS
- The 2020 National Emergency Department Sample (NEDS), was used to identify patients admitted to the hospital after presenting to the ED with a primary diagnosis of opioid abuse, and whose COVID-19 infection status could be determined.
- Three outcomes were assessed:
  - Primary outcome of interest was the need for any respiratory support.
  - Secondary outcomes were hospital length of stay (LOS) and death before discharge from the hospital.
- Bivariate analysis, compared study variables between patients with and without COVID-19 infection. Multivariable analysis included logistic regression models for dichotomous variables, and a Poisson regression model for LOS.

RESULTS
- Among the 6,094 eligible ED visits, we estimated that 3% (N = 172) of patients had a COVID-19 diagnosis. The estimated need for respiratory support was 27%, the estimated in-hospital mortality was 4%, and the mean hospital length of stay was 3.9 days.
- After multivariable adjustment of study outcomes,
  - COVID-19 was not associated with the requirement for respiratory support.
  - COVID-19 was associated with a higher odd of in-hospital mortality and a longer hospital stay.
- Our data suggests that COVID-19 may exacerbate some physiological consequences of opioid overdose, including organ damage. COVID-19 testing may continue to be important in hospitalized patients after an opioid overdose to identify patients at risk for worse clinical outcomes.

PROJECT CONTINUATION
- Use the newest 2021 set of data from the NEDS database that comes out in December 2023 to compare to our findings.
- Investigate our finding that there is no difference in need for respiratory support in patients with and without COVID-19 infection. Was there a possibility of under coding? Was our exclusion criteria too selective and we choose only the sickest opioid overdose patients?
- Identify the reasons that LOS and mortality would be higher in patients with a COVID-19 infection. Is there an administrative reasons for extended LOS? Literature has pointed to a connection between acute kidney injury and worse COVID-19 outcomes does damage to kidneys by opioid abuse play a factor?