# Uncovering Bias in Real-World Data: Challenges in Inpatient Mortality

Wes Anderson, Will Roddy, Smith F. Heavner
*Critical Path Institute, Tucson, AZ*

CRITICAL PATH INSTITUTE

## Background and Objectives

- EHR data are valuable for generating real-world evidence (RWE) but vary widely across institutions.
- Variability in mortality documentation, especially around discharge, can distort outcome analyses.
- This study illustrates how misclassified mortality can affect clinical trial emulations using real-world data.

## Methods

- Data source: 14 partner sites (n=120,994) harmonized to OMOP CDM under the CURE Drug Repurposing Collaboratory.
- Population: Adult inpatients with complete demographics; COVID-19–related admissions.
- Design: Clinical trial emulation of dexamethasone vs. matched controls for 28-day mortality.
- Propensity score matching (PSM) to balance treatment/control cohorts.
- Exclusions: Patients treated with remdesivir or dexamethasone + remdesivir.
- Analysis: Cox proportional hazards models to estimate HRs (95% CI). Examined mortality at four definitions:
    - In-hospital only
    - 48 h post-discharge
    - 72 h post-discharge
    - 1-week post-discharge

## Results

**Mortality report**

- 8,816 inpatient deaths (7.3%) identified.
- 2,265 deaths (1.9%) occurred after discharge within 28 days.
- Among post-discharge deaths, 55.2% occurred within 7 days, and 24.7% within 48 hours.
- Discharge disposition data incomplete for 52.5% of patients.
    - Of known dispositions: 12.3% transferred to hospice, 27.3% transferred for further care, 6.4% discharged home.

**Trial Emulation**

- Findings:
    - 65,765 patients met inclusion criteria (54% of total).
    - 99% of dexamethasone-treated patients were matched to controls (n = 14,125).
    - No significant post-match differences by standardized mean difference or chi-squared tests.

**Figure 1.** Mortality over the course of 28 days post-acute COVID-19 admission; (A) inpatient deaths and discharged patient deaths, and (B) death in days post-discharge organized by discharge disposition.

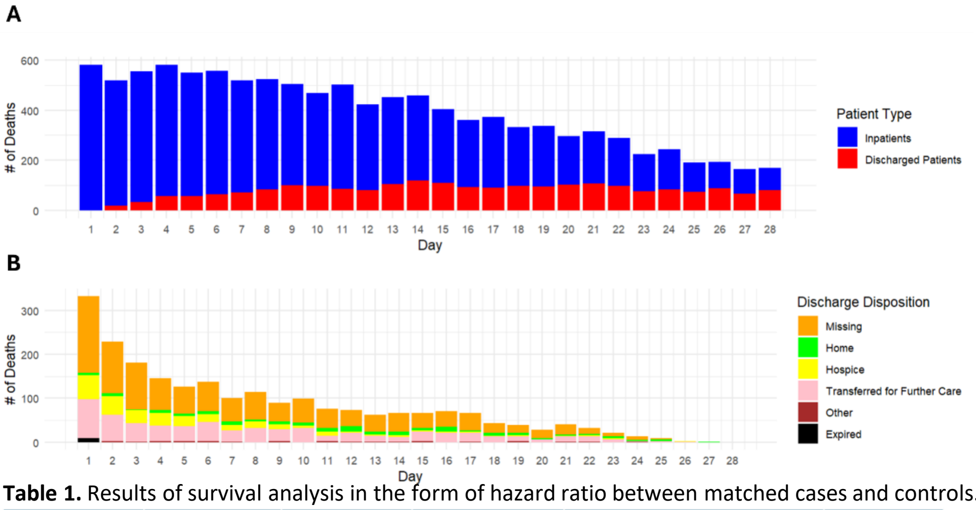


**Table 1.** Results of survival analysis in the form of hazard ratio between matched cases and controls.

| Outcome | Mortality Population | Analysis | Hazard Ratio (HR) | 95% Confidence Interval (CI) | | p-value |
|---|---|---|---|---|---|---|
| 28-day mortality | Strictly Inpatient Mortality | Overall | 1.1 | 1.04 | 1.21 | 0.004 |
| | | No Oxygen | 1.6 | 1.4 | 1.81 | < 0.001 |
| | | Oxygen Alone | 0.92 | 0.81 | 1.05 | 0.2 |
| | | Mechanical Ventilation | 0.93 | 0.8 | 1.08 | 0.36 |
| | Inpatient Mortality + 48 Hrs Post-Discharge | Overall | 1.1 | 1.06 | 1.23 | < 0.001 |
| | | No Oxygen | 1.6 | 1.4 | 1.8 | < 0.001 |
| | | Oxygen Alone | 0.95 | 0.84 | 1.1 | 0.46 |
| | | Mechanical Ventilation | 0.93 | 0.8 | 1.07 | 0.31 |
| | Inpatient Mortality + 72 Hrs Post-Discharge | Overall | 1.1 | 1.06 | 1.23 | < 0.001 |
| | | No Oxygen | 1.6 | 1.4 | 1.8 | < 0.001 |
| | | Oxygen Alone | 0.95 | 0.84 | 1.08 | 0.42 |
| | | Mechanical Ventilation | 0.92 | 0.8 | 1.07 | 0.29 |
| | Inpatient Mortality + 1 Week Post-Discharge | Overall | 1.15 | 1.07 | 1.24 | < 0.001 |
| | | No Oxygen | 1.6 | 1.4 | 1.78 | < 0.001 |
| | | Oxygen Alone | 0.97 | 0.86 | 1.09 | 0.58 |
| | | Mechanical Ventilation | 0.91 | 0.779 | 1.06 | 0.22 |

## Conclusions

- Mortality misclassification (inpatient vs. post-discharge) can bias treatment effect estimates.
- Framework presented enables sensitivity analysis for real-world data quality.
- Bias effects likely greater in smaller inpatient datasets.
- Standardized EHR data capture and validation are critical for reliable RWE generation.

## Future Plans

- Developing standardized frameworks and cross-institutional tools to validate and harmonize mortality data across EHR systems

For more information on:

- RWD research
- Critical Path Institute

CONTACT
**wanderson@c-path.org**

**Acknowledgments:** Funding for this poster was made possible, in part, by the Food and Drug Administration through grant (U18 FD 005320). Views expressed in written materials or publications and by speakers and moderators do not necessarily reflect the official policies of the Department of Health and Human Services; nor does any mention of trade names, commercial practices, or organization imply endorsement by the United States Government.