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**TITLE** 100 characters including spaces

Elevated Environmental Temperatures After Discharge from Cardiac Surgery Raise Risk of Readmission

**ABSTRACT (per** [ASC requirements](https://www.academicsurgicalcongress.org/wp-content/uploads/2024/06/ASC-2025-Abstract-Submission-Guidelines.pdf)**)** 3000 – 225 = 2775 characters

**Introduction:** Extreme heat exposure increases short-term cardiovascular morbidity and mortality in the general population, with cardiac surgery patients being especially vulnerable. High environmental temperatures increase likelihood of post-surgical infections (fungal or bacterial). Two small studies in India found more than double the complications in trauma and elderly surgical patients admitted during heat waves. However, the impact of non-optimum temperatures post-discharge from cardiac surgery remains unclear.

**Methods:** This retrospective single-center US study used sequential multivariable logistic regression in a novel statistical approach to predict 30-day readmission or mortality. Average daily temperatures over 30 days post-discharge were obtained from the European Centre for Medium-Range Weather Forecasts ERA5-Land dataset, indexed to patients’ zip codes, and censored after readmissions. Demographic and clinical variables were obtained from the Society of Thoracic Surgeons Adult Cardiac Surgery Database. First, a subset of these 98 variables was selected via the Bayesian Information Criterion. Second, a time-varying model was fit to predict whether an adverse event occurred on each post-discharge day, based on the selected clinical variables, the number of days since discharge, and the current day of the week. Third, the observed fraction of adverse events was compared to the predictions of the second time-varying model within bins of an additive exposure space with 3 dimensions: temperature, lag, and post-discharge day.

**Results:** The analysis included3902 patients spanning 2011-2019, of whom 396 (10.1%) were readmitted or died. Average daily temperature exposures ranged from -19.3 C to 32.0 C with a mean of 11.3 C. First, 7 clinical variables were selected: discharge to home, hematocrit, pericardiocentesis, surgical site infection, ICU hours, BMI, and pneumonia (trended protective but non-significant). Second, the time-varying rate of readmissions had a complex but justifiable shape: low at 1-2 days post-discharge (~0.15% of patient-days), spiking to ~0.7% on days 3-6, then decaying exponentially. Third, using 2-day bins, we found that high temperatures raise the rate of expected readmissions on post-discharge days 3-4 by log-odds 0.78 (p=0.005) and 1.03 (p=0.030): the former if 23 C to 26 C occurs on post-discharge day 1-2, and the latter if >26 C occurs on post-discharge day 3-4.

**Conclusions:** Extreme heat exposure within 4 days of discharge from cardiac surgery was associated with increased rates of readmission or mortality. Our novel approach could be used to determine whether heat exposures just after discharge or in the immediate past pose greater risk.

**Figure:**

A graph of temperature and temperature

Description automatically generated with medium confidence

**Greyscale version (I think it still shows the critical stuff, difficult to have a diverging colorscheme):**

A graph of temperature and temperature

Description automatically generated with medium confidence