Seasonality of Mortality for Solid Organ Waitlist Candidates

Jonathan Miller, PhD[1], Donnie Musgrove, PhD[1]
[1] Scientific Registry of Transplant Recipients, Minneapolis, MN

SCIENTIFIC REGISTRY OF TRANSPLANT RECIPIENTS

Introduction

• Analysis of the impact of policies or natural occurrences on transplant system outcomes requires comparison of a treatment (post-policy) period to a control (pre-policy) period. Choosing a proper control period requires an understanding of seasonality of outcomes of interest. This study describes seasonality of death on the solid organ transplant waiting lists and compares it to that of the US adult population.

Methods

• Mortality rates, by month from January 1999 to December 2018, for candidates aged 18 years and older and prevalent on each solid organ transplant waitlist at any point in a month were calculated using SRTR standard analysis files.
• Mortality rates, by month from January 1999 to December 2018,

for the United States population aged 18 years and older were calculated using death counts from CDC WONDER data and national population estimates from the US Census.
• Monthly rates were then standardized as a ratio to the 13-month simple moving average centered on the month to give an interpretation of more deaths (ratio > 1) than the yearly average or fewer deaths (ratio < 1).
• Linear regression with month as a categorical predictor modeled seasonality of standardized mortality for each organ and for the United States as a whole
• To test for differences in seasonality between each organ and the United States as a whole, models with interactions between month and an indicator for organ population or United States population were calculated.

Figure 1:
Mortality rate by month as a ratio of yearly mortality rate
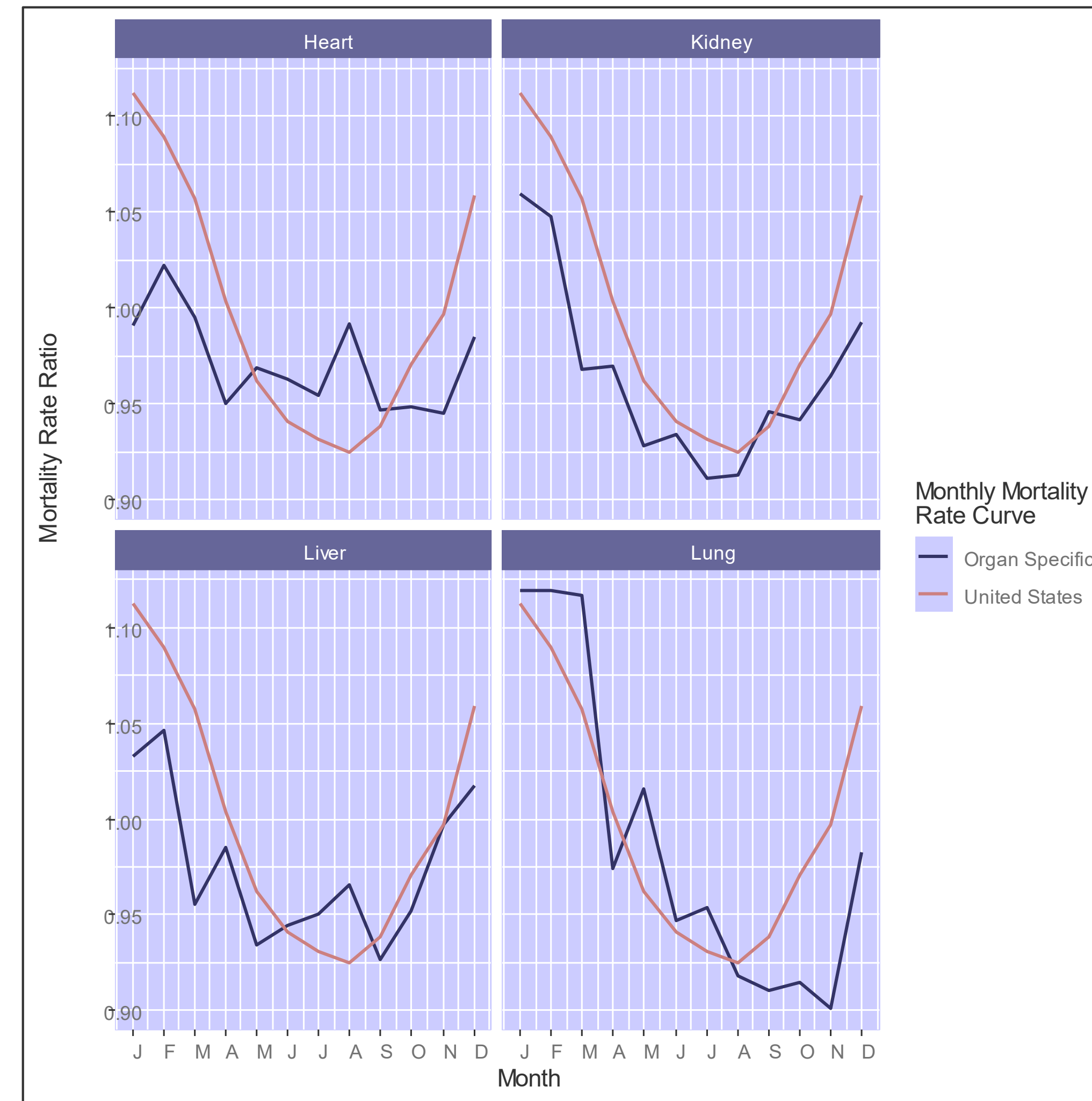
Results

• Mortality rates on the kidney, liver, and lung waitlists showed statistically significant variation by month.
• For kidney, liver, and lung, mortality rates were higher in the winter, particularly January and February, and lower in the summer.
• Heart waitlist mortality rates were fairly consistent through the year.
• Seasonal trends in mortality rates for kidney, liver, and heart differed significantly from seasonal trends in the US population. In the case of kidney, liver, and heart, seasonal trends were less pronounced than in the general population (Figure 1).

Conclusions

• Mortality rates on many solid organ transplant waitlists followed seasonal trends.
• Analysis of mortality outcomes before and after policy changes or natural experiments should use cohorts matched on time of year. For example, if data after a policy change are available only for January to April of a given year, an appropriate control cohort would most likely be January to April of the previous year.
• Given the seasonality in mortality in the general population, future analyses may consider possible effects of seasonality on deceased donor organ procurement.