Purpose:

Mail-order pharmacy has evolved to meet the growing prescription needs of Americans. To maintain the USP recommended storage parameters, most medications should remain at room temperature (20°C-25°C) during transit; however, medications are typically mailed in bubble-mailers without any temperature monitors.[2] Therefore, the purpose of this study was to evaluate if the shipping methods used by mail-order pharmacies expose the contents of unrefrigerated packages to potentially unsafe temperatures.

Methods:

The mean kinetic temperature (MKT) is a common method utilized by USP, manufacturers, and distributors to analyze if a drug product is stored outside of its respective label storage conditions.[3] An Elitech RC-5+ PDF USB Temperature Data Logger was placed in each standard bubble-mailer to record the MKT every 20 mins. The packages were mailed via USPS to six destinations: Tucson, AZ; Palo Alto, CA; Largo, FL; Chicago, IL; Baltimore, MD; and Katy, TX. Four mailings occurred during the winter season (December 2019-February 2020) and three mailings during the summer season (June 2020-August 2020). Descriptive statistics were conducted using Microsoft Excel; a Chi-squared test was conducted using Stata software.

Results:

Seven out of eight trips to each of the six destinations were included for analysis. The fourth summer mailing was excluded because it was deemed "lost in transit" due to COVID-19 delays experienced by the USPS. All packages fell outside of the acceptable USP excursion storage temperature range during transit which is defined as 15-30 degrees Celsius. The percentage of time outside the permitted excursion temperature storage range was 16.67-32.40% ($p < 0.001$) during the winter season and 3.89-13.07% ($p<0.001$) during the summer season (Table 2). **Percentage of temperature readings outside of the acceptable excursion temperature range** was **significantly different** between the **winter** and **summer** seasons with p values less than 0.001 for all locations.

There was no association between delivery time and/or travel distance and the percentage of time outside of the acceptable excursion temperature range.

Several limitations: including the number of mailings, only assessing unrefrigerated packaging and the impact of the COVID-19 pandemic on USPS.

Conclusion:

This study supports the notion that the current shipping methods used by mail-order pharmacies expose the contents of non-refrigerated packages to potentially unsafe temperatures. Future studies are needed to assess true causal associations and to further characterize at what temperature and/or length of exposure is associated with decreases in medication efficacy. Furthermore, advocating for the increased regulation of mail-order pharmacies to ensure appropriate storage conditions are maintained throughout transit is paramount, as mail-order pharmacy continues to evolve to meet the growing prescriptions needs of Americans.