

The background of the slide is a dark blue color with a complex network of white dots and lines, resembling a molecular structure or a data network. The dots are of varying sizes and are connected by thin white lines, creating a web-like pattern across the entire slide.

Cytel

Adverse Event Data- g^Raphically DV11

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The Clinical Data Science Conference**

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Introduction

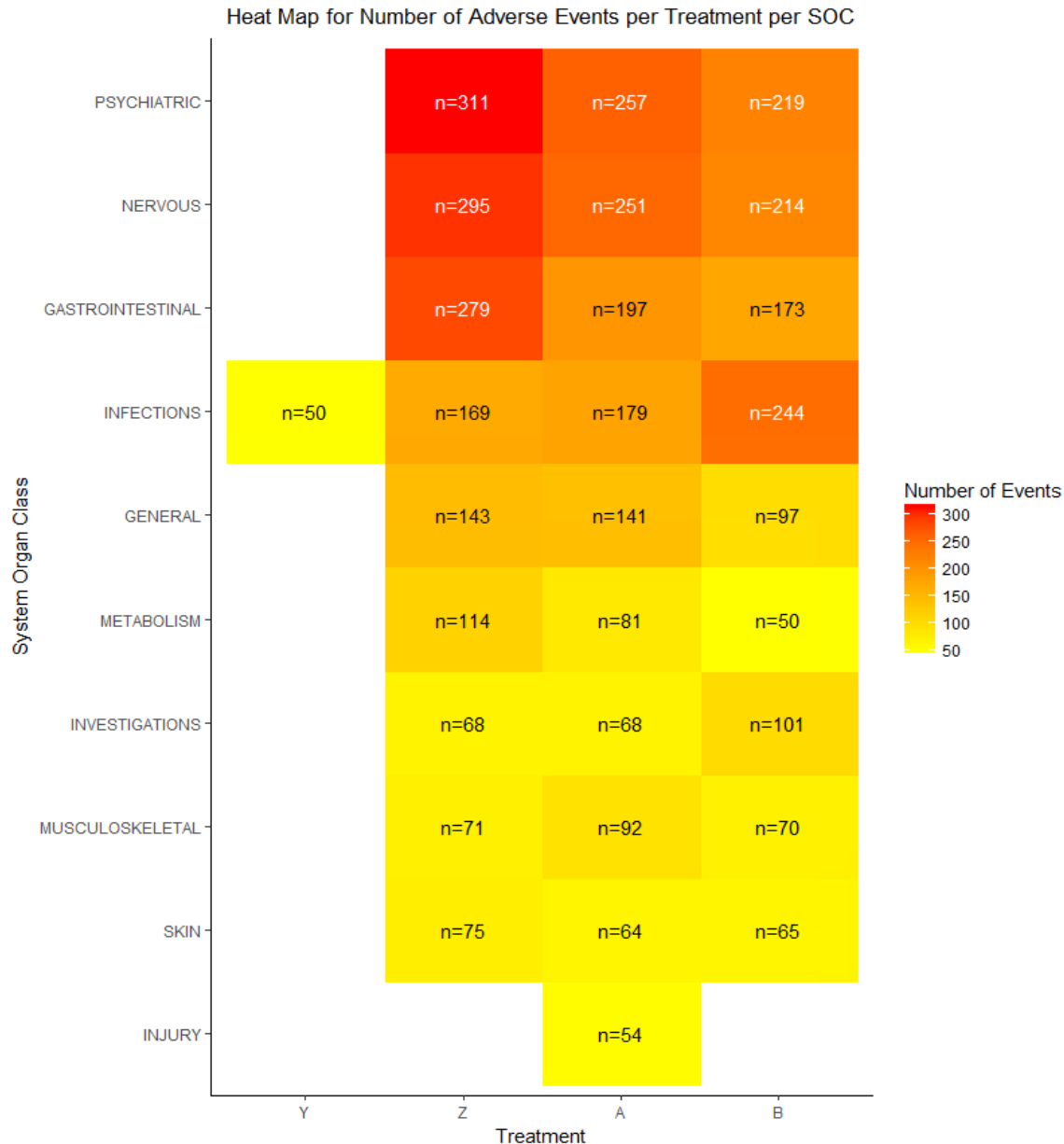
- Adverse event (AE) is any untoward medical occurrence including:
 - ✓ undesirable signs & symptoms
 - ✓ disease or accidents
 - ✓ abnormal lab findings
- AEs are graded as per severity and seriousness.
- Treatment Emergent AEs are events that:
 - ✓ occurred after dosing
 - ✓ already existed but worsened after dosing
- Heat maps are charts with values described using colours
- Volcano Plot is a type of scatter-plot; used to quickly identify changes in large data sets

Introduction

- Overview of the data being considered for creation of graphs-
 - ✓ Trial for treating a mental health disorder
 - ✓ 5 treatments with varying dose amounts
 - ✓ AEs classified using standard medical dictionary
- Packages used-
 - ✓ Heat map : ggplot2
 - ✓ Volcano plot : plotly

Other packages used are sas7bdat, plyr, dplyr, reshape, reshape2

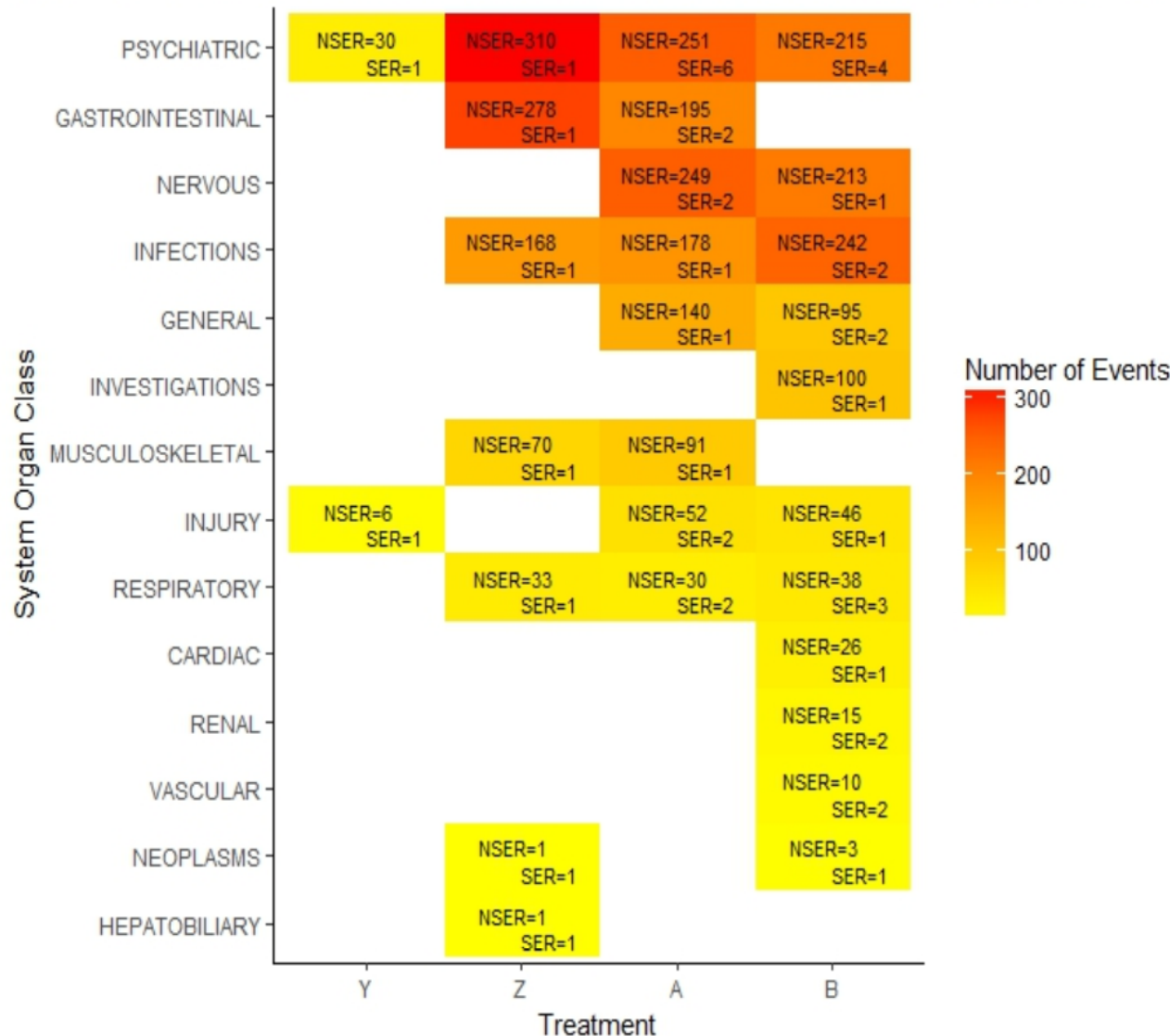
Heat Map for Number of AEs per System Organ Class (SOC) per Treatment



- Plot SOC's on Y axis
- Plot Treatments on X axis

Heat Map for Number of Serious and Non Serious AEs per SOC per Treatment

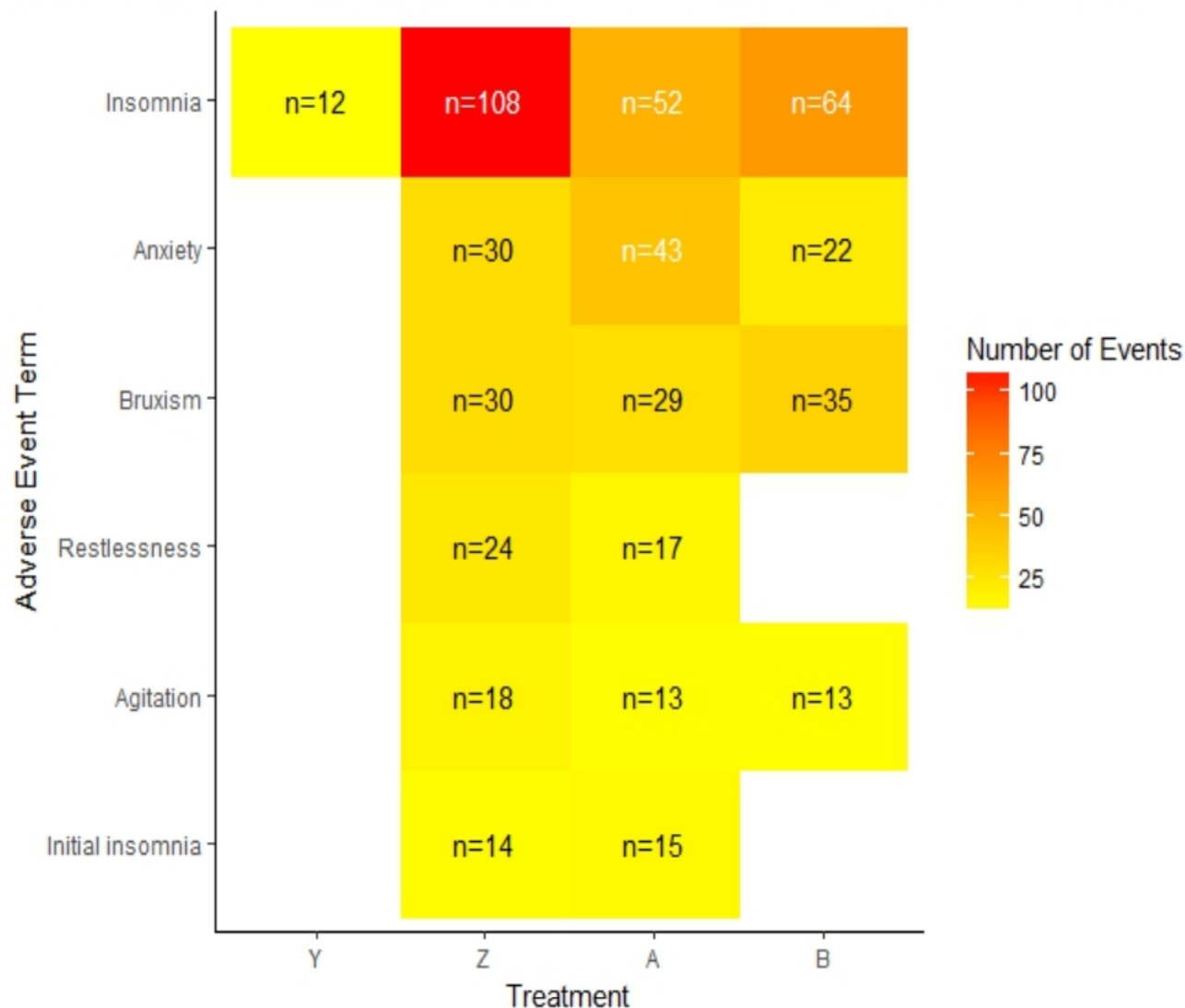
Heat Map for Number of Serious and Non Serious Adverse Events per SOC per Treatment



- Plot SOC's on Y-axis
- Plot Treatments on X-axis

Heat Map for Number of AEs per Treatment for a Single SOC

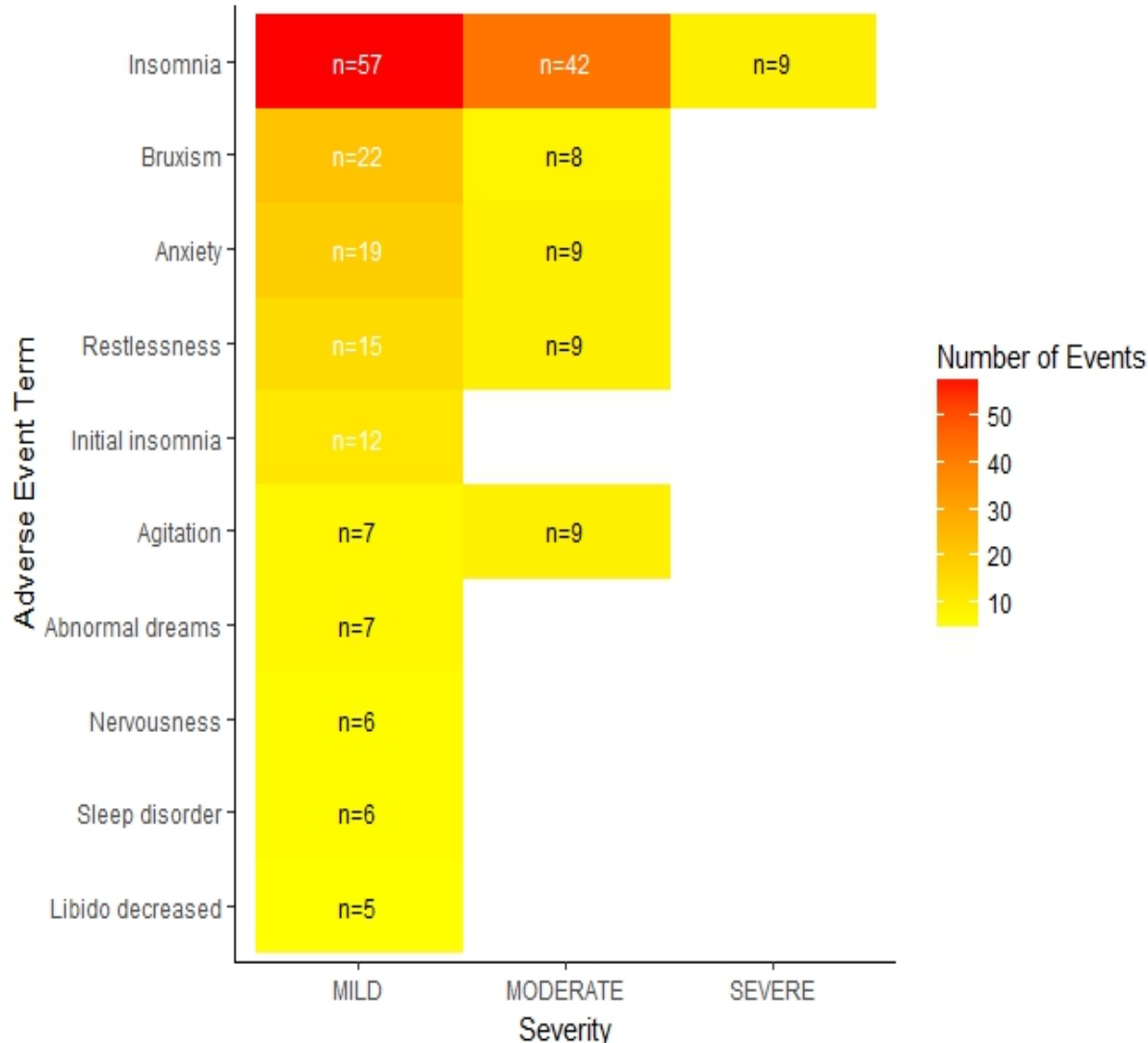
Heat Map for Number of AEs per Treatment per AE Term for Psychiatric Disorders



- Plot AEs on Y-axis
- Plot Treatment on X-axis

Heat Map for Number of AEs for a Single SOC for a Single Treatment per Severity

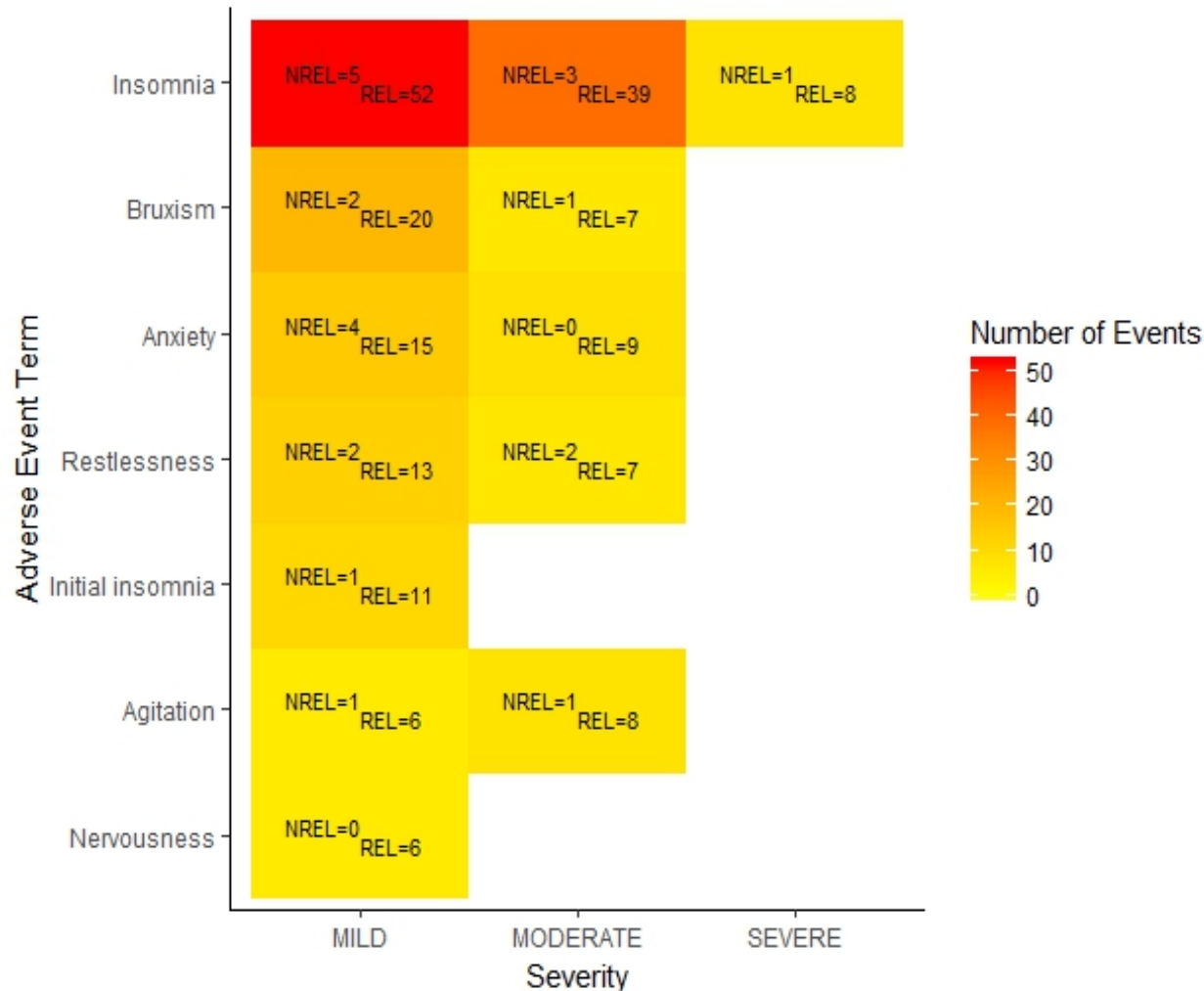
Heat Map for Number of AEs in Psychiatric Disorders for Treatment Z per Severity



- Plot AEs on Y-axis
- Plot Severity on X-axis

Heat Map for Number of Related and Not Related AEs per Severity for a Single SOC and Treatment

Heat Map for Number of Related and Not Related AEs per Severity for Psychiatric Disorders of Treatment Z



- Plot AEs on Y-axis
- Plot Severity on X-axis

Volcano Plot of Treatment Emergent Adverse Events

Relative Risk (RR):

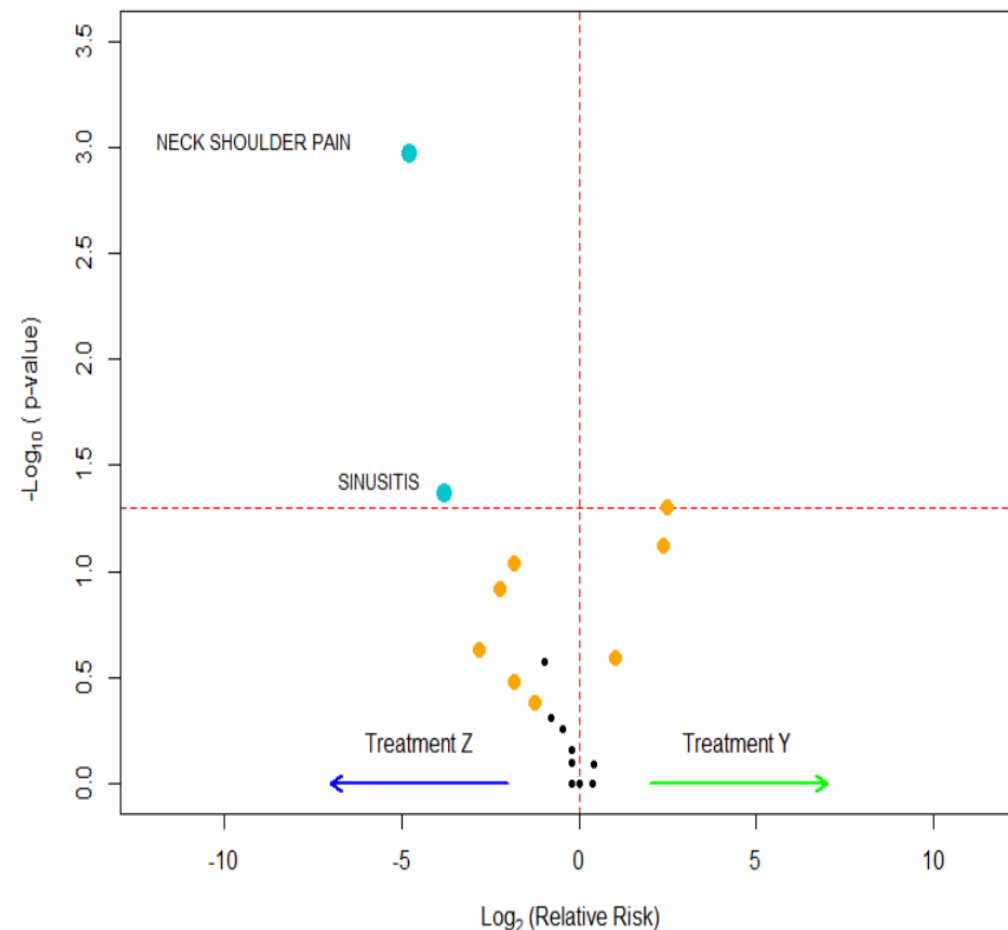
- A measure of the risk of a certain event happening in one group compared to the risk of the same event happening in another group.
- Calculate RR,

$$RR = [a/(A)] / [b/(B)]$$

	Treatment Y (n=A)	Treatment Z (n=B)
Subjects with AE	a	b
Subjects without AE	c	d

Volcano Plot of Treatment Emergent Adverse Events

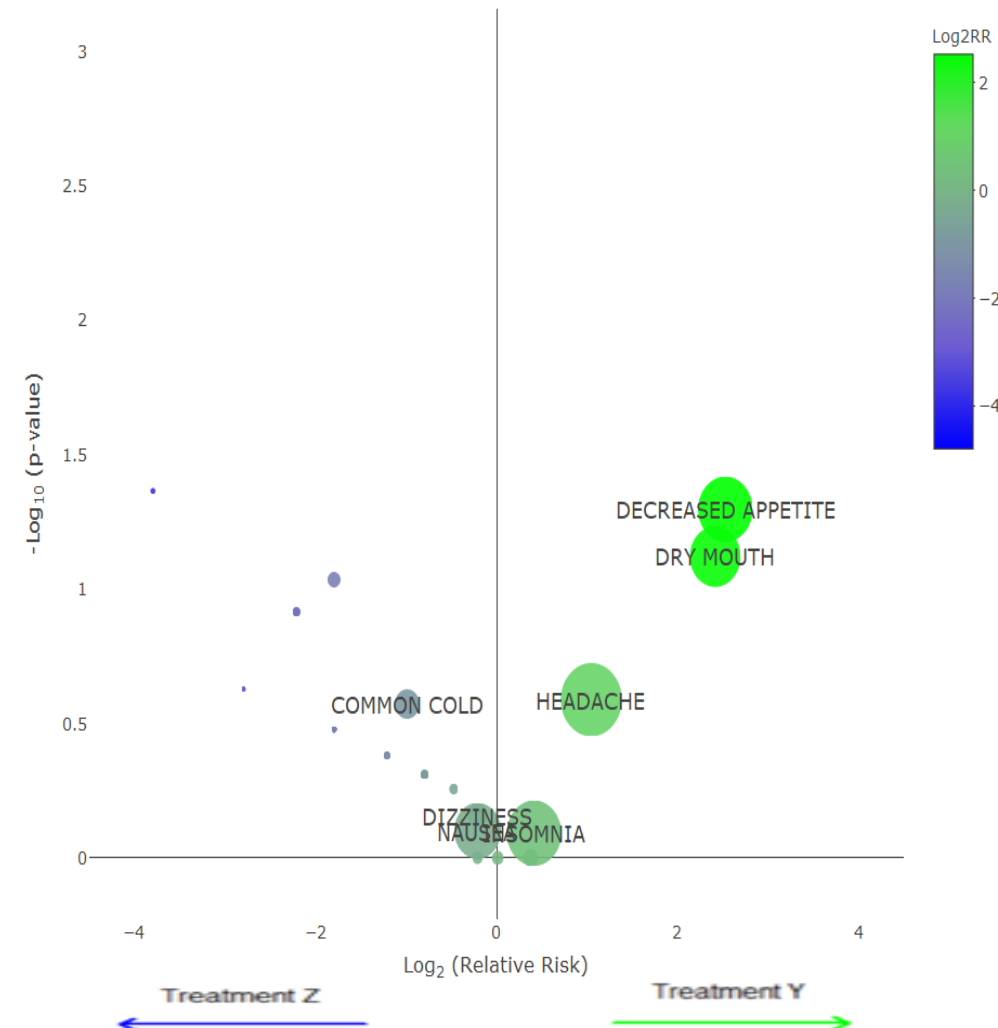
Volcano Plots of Treatment Emergent Adverse Events



- Plot negative $\log_{10}$ -transformed p-value calculated using Fisher exact test on Y-axis
- $\log_2$ -transformed relative risk on x-axis
- Dashed red line shows $p = 0.05$
- AE terms with p-values < 0.05 are labeled as they are significant

Bubble Plot of $-\text{Log}_{10}$ (p-value) by Relative Risk, Sized by Counts

Bubble Plot of Treatment Emergent Adverse Events Using Relative Risk



- Each bubble represents an AE
- Bubble size represents the total number of occurrences of the AE
- Headache is the most commonly occurring AE
- Log_2 (RR) = 0; represents no difference

Limitations

- Heat maps are a basic tool of visualizing any data. More exploration needs to be done to perform complex analysis using heat maps.
- In volcano plots, treatments are compared in a pair wise fashion resulting in only two treatments being compared at any given instance.

Summary

- Graphical displays could be given more consideration in the analysis of safety data
- They help us to identify any areas of interest or concern in the data
- Heat maps are useful to understand the spread of the adverse event data
- Volcano plots are space-saving tools that emphasize important differences between the adverse event profiles of two treatment arms
- Future scope- R Shiny applications can be developed to generate various types of plots discussed

References

- <https://www.nature.com/articles/srep24955>
- <https://ggplot2.tidyverse.org/reference/index.html>
- <https://plot.ly/r/reference/#scatter>
- <https://community.plot.ly/>

Any Questions ?

Thank you