

Safety Data Visualization Tool

PhUSE Connect 2020

Megan Kendellen PhD, Richard Ryan PhD, and Nicholas Masel

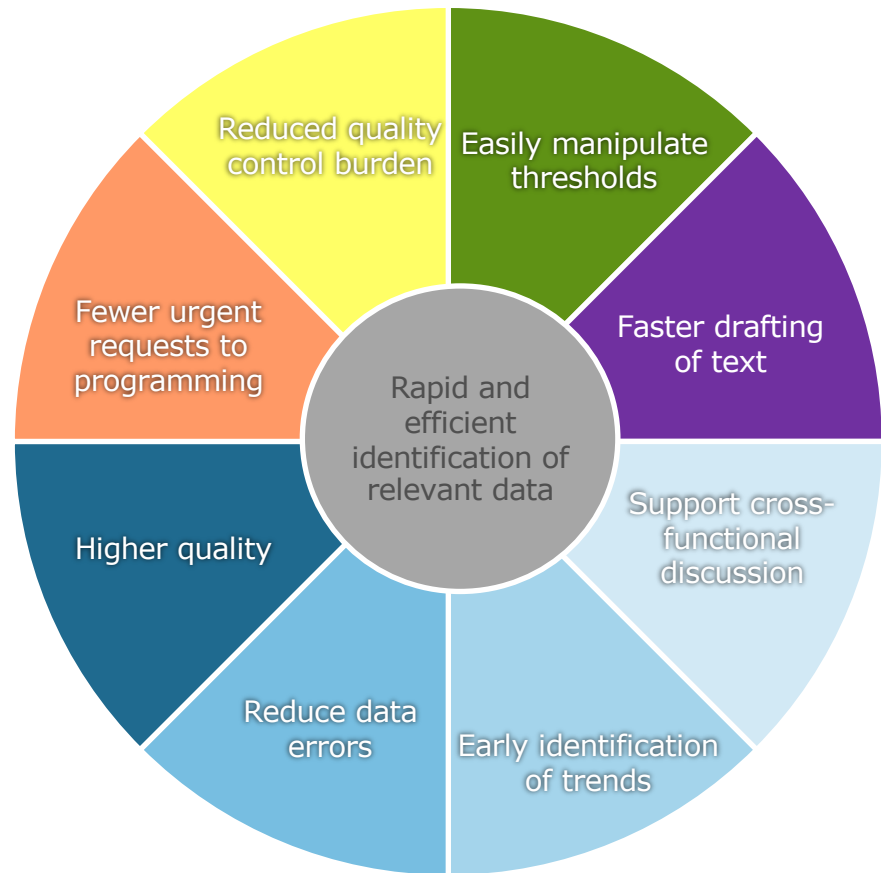


Manual Review of Safety Outputs

- Error-prone
- Increasingly untenable with ever-shortening timelines
- Hinders cross-functional discussion
- Late identification of trends delays generation of needed ad hoc outputs

Data Visualization Tool

- Automated analysis of safety data across outputs for CSRs, IBs, RMPs, DSURs, etc.
- Identify common and differentially-observed AEs
 - Medical history
 - Conmeds
- Visualize trends
- Anticipated benefits



Technical Details

- Programmed in R using several key packages
- R Shiny for user interaction with application
- DT for table display with 'out of box' sort, search and cell coloring
- bs4Dash for a clean, professional user interface
- dplyr for the `_at` variance functions

Conversion from Document to Data Frame

- RTF or DOCX files are read into the application and parsed into a data frame
- Columns are checked to confirm which contain counts and percentages
- Column names are stored for further processing

Dynamic Processing using dplyr _at()

- Pass functions an object containing column names for processing
- Select the relevant variables
- Pass them all to a function to make variable containing counts
- Rename the set of variables
- Repeat for percentages

```
# Create count variables
counts <- df_with_columns %>%
  select_at(columns_with_percentages$col) %>%
  mutate_at(columns_with_percentages$col, find_count) %>%
  rename_at(columns_with_percentages$col, rename_count)
```

mutate_at() with Helper Functions

- Alternate method using helper functions to return the groups of variables to process

```
# subject count cutoff variables
count_cutoffs <- counts %>%
  mutate_at(vars(starts_with("cnt_")), 1
    .funs = list(
      2 eeis_heatmap = ~ . - as.integer(input$sl_i_subject_cutoff)
    )
  )
```

- Process all variables that start with "cnt_"
- Pass these to a function that returns the difference from the cutoff
- New variables with "_eeis_heatmap" appended to name
 - "cnt_col1_eeis_heatmap", "cnt_col2_eeis_heatmap", etc.
- Now process this set of variables using ends_with("_eeis_heatmap")

Demo!



Back-up Slides

User Interface

Select desired threshold

Select desired analysis

Select SOC and/or preferred term

Load output and select MedDRA version

The screenshot shows the Janssen RegMW ELT presentation user interface. Red circles highlight the following elements:

- Incidence cutoff:** A text input field with the value '0'.
- Display Columns:** A dropdown menu showing 'col2, col3'.
- SOC/PT/Both:** A slider control with a 'Both' button.
- Export results:** A section with buttons for 'Print', 'Excel', 'PDF', and 'Reset'.
- Search:** A text input field.
- Load RTF:** A section with a 'Browse...' button and a text input field containing 'tsfae02a_practi'.
- Select MedDRA version:** A dropdown menu showing '21.1'.

The main content area displays a table titled 'Summary of Treatment-emergent Adverse Events by System Organ Class and Preferred Term'. The table has columns for 'col1', 'col2', and 'col3'. The first row shows '1' in the 'col1' column, 'Treatment Group A' in the 'col2' column, and 'Treatment Group B' in the 'col3' column.

Select subset of treatment groups
(or change comparator for differential)

Search for AEs
of interest

2 Treatment Groups

Which AEs (SOC and preferred terms)
are most commonly reported in the
study?

Imported table **Exceeding Incidence (%)** Exceeding Differential (%) Exceeding Incidence (n) Exceeding Differential (n)

Incidence cutoff

5

Display Columns:

col2, col3

SOC/PT/Both:

Both

Show 25 entries

Print

Excel

PDF

Reset

Search:

Summary of Treatment-emergent Adverse Events by System Organ Class and Preferred Term

col1	col2	col3
1	Treatment Group A	Treatment Group B
2	MedDRA System Organ Class / Preferred Term	
3	Infections and infestations	117 (45.3%) 119 (45.8%)
4	Upper respiratory tract infection	25 (9.7%) 35 (13.5%)
5	Nasopharyngitis	16 (6.2%) 18 (6.9%)
6	Blood and lymphatic system disorders	104 (40.3%) 110 (42.3%)
7	Anaemia	60 (23.3%) 68 (26.2%)
8	Neutropenia	35 (13.6%) 50 (19.2%)
9	Thrombocytopenia	48 (18.6%) 48 (18.5%)
10	Lymphopenia	17 (6.6%) 19 (7.3%)
11	Leukopenia	10 (3.9%) 18 (6.9%)



PHARMACEUTICAL COMPANIES
OF Johnson & Johnson

Which AEs (preferred terms) are more/less frequently reported in Treatment Group B?

Imported table Exceeding Incidence (%) **Exceeding Differential (%)** Exceeding Incidence (n) Exceeding Differential (n)

Difference in incidence cutoff

Compare to column:

Display Columns:

SOC/PT/Both:

PT only

Show entries

Print

Excel

PDF

Reset

Search:

Summary of Treatment-emergent Adverse Events by System Organ Class and Preferred Term

col1	col2	col3
1	Treatment Group A	Treatment Group B
2	MedDRA System Organ Class / Preferred Term	
3	Upper respiratory tract infection	25 (9.7%)35 (13.5%)
4	Sinusitis	4 (1.6%)10 (3.8%)
5	Anaemia	60 (23.3%)68 (26.2%)
6	Neutropenia	35 (13.6%)50 (19.2%)
7	Leukopenia	10 (3.9%)18 (6.9%)
8	Chills	32 (12.4%)15 (5.8%)
9	Back pain	32 (12.4%)27 (10.4%)

3+ Treatment Groups

Which AEs (SOC and preferred terms)
are more/less frequently reported
compared with Treatment Group C?

Imported table Exceeding Incidence (%) **Exceeding Differential (%)** Exceeding Incidence (n) Exceeding Differential (n)

Difference in incidence cutoff

Compare to column:

Display Columns:

SOC/PT/Both:

Show entries

Search:

Summary of Treatment-emergent Adverse Events by System Organ Class and Preferred Term

col1	col2	col3	col4	col5
1	Treatment Group A	Treatment Group B	Treatment Group C	Treatment Group D
2	MedDRA System Organ Class / Preferred Term			
3	Infections and infestations	117 (45.3%)	32 (12.4%)	119 (45.8%)
4	Upper respiratory tract infection	25 (9.7%)	6 (2.3%)	35 (13.5%)
5	Pneumonia	16 (6.2%)	9 (3.5%)	4 (1.6%)
6	Urinary tract infection	1 (0.4%)	9 (3.5%)	3 (1.2%)
7	Lower respiratory tract infection	5 (1.9%)	0	8 (3.1%)
8	Blood and lymphatic system disorders	104 (40.3%)	47 (18.2%)	110 (42.3%)
9	Anaemia	60 (23.3%)	17 (6.6%)	68 (26.2%)
10	Neutropenia	35 (13.6%)	16 (6.2%)	50 (19.2%)

Which AEs (SOC and preferred terms)
are more/less frequently reported
compared with Treatment Group D
(excluding Treatment Group A)?

Difference in incidence cutoff

Compare to column:

Display Columns:

SOC/PT/Both:

Both

Show entries

Print

Excel

PDF

Reset

Search:

Summary of Treatment-emergent Adverse Events by System Organ Class and Preferred Term

col1	col3	col4	col5	
1	Treatment Group B	Treatment Group C	Treatment Group D	
2	MedDRA System Organ Class / Preferred Term			
3	Infections and infestations	32 (12.4%)	119 (45.8%)	32 (12.3%)
4	Upper respiratory tract infection	6 (2.3%)	35 (13.5%)	8 (3.1%)
5	Pneumonia	9 (3.5%)	4 (1.6%)	3 (1.2%)
6	Urinary tract infection	9 (3.5%)	9 (3.5%)	3 (1.2%)
7	Lower respiratory tract infection	0	8 (3.1%)	2 (0.8%)
8	Blood and lymphatic system disorders	47 (18.2%)	110 (42.3%)	61 (23.5%)
9	Anaemia	17 (6.6%)	68 (26.2%)	21 (8.1%)
10	Neutropenia	16 (6.2%)	50 (19.2%)	32 (12.3%)