How Metadata can help drive the creation of Tables, Listings and Figures

SA05

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Agenda

Introduction

TLF Generation Process

Role of Metadata

Using an MDR to generate TFLs

Conclusion

Introduction

- Tables, Listings and Figures (TFLs) are required part of Clinical Study Report

ICH
harmonisation for better health

- PhUSE CSS Working Group has developed standard shells

Project: Analysis and Display White Papers Project Team
Title: Analysis and Displays Associated with Adverse Events **Working Group:** Standard Analyses and Code Sharing

Table 11.1. **Overview of Adverse Events During the Treatment Phase**
Safety Population

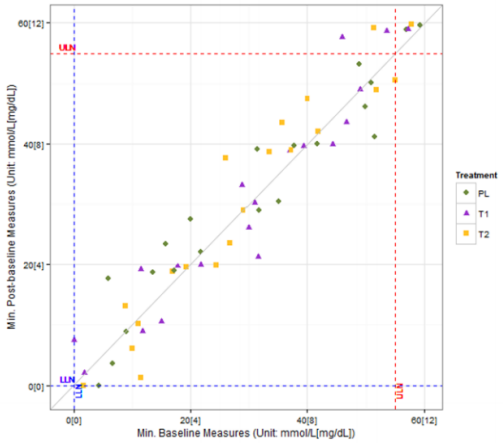
	T1 (N=XX) n (%)	T2 (N=XX) n (%)	PL (N=XX) n (%)	T1 & T2 (N=XX) n (%)	Risk Difference[a] T1-PL (95% CI)	Risk Difference[a] T2-PL (95% CI)	Risk Difference[a] T1&T2-PL (95% CI)
Treatment Emergent Adverse Events	xx (xx.x)	xx (xx.x)	xx (xx.x)	xx (xx.x)	xx.x (xx.x, xx.x)	xx.x (xx.x, xx.x)	xx.x (xx.x, xx.x)
Serious Adverse Events	xx (xx.x)	xx (xx.x)	xx (xx.x)	xx (xx.x)	xx.x (xx.x, xx.x)	xx.x (xx.x, xx.x)	xx.x (xx.x, xx.x)
Adverse Events leading to Discontinuation of Treatment	xx (xx.x)	xx (xx.x)	xx (xx.x)	xx (xx.x)	xx.x (xx.x, xx.x)	xx.x (xx.x, xx.x)	xx.x (xx.x, xx.x)
Fatal Adverse Events	xx (xx.x)	xx (xx.x)	xx (xx.x)	xx (xx.x)	xx.x (xx.x, xx.x)	xx.x (xx.x, xx.x)	xx.x (xx.x, xx.x)

Footnotes:
N=number of patients; n=number of patients with at least one row event. Percentages are calculated relative to the treatment group N.
Patients may be counted in more than one row.
Serious Adverse Events are counted regardless of whether or not severity increases relative to baseline.
[a]Risk difference confidence interval from [insert method].

Project: *Analysis and Display White Papers Project Team*
Title: *Analyses and Displays Associated with Outliers or Shifts*
Working Group: *Standard Scripts for Analysis and Programming*

Figure 11.1 **Scatterplot and Shift Summary for Quantitative Safety Measures Assessing Low Value: Individual Study**

Scatterplot and Shift Table Summary of Absolute Lab values - Lab Test 1
Minimum Baseline vs. Minimum Post-baseline

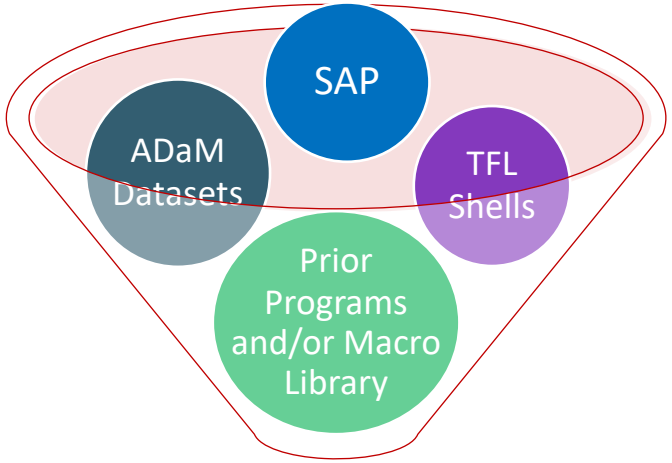


LLN=Lower limit of normal; ULN=Upper limit of normal; If the limits (LLN and ULN) vary across the population, the limits that apply to the majority of subjects are displayed in the scatter plot. Axes values are labeled in both SI unit and CN unit (in '[]'). The black diagonal line represents no change from min. baseline to min. post-baseline.

Current Process Evaluation

- Head's down programming, utilizing old code from past projects
- Maintaining a collection of programs dedicated to each table output
- Macro libraries that support different table styles
  - In each case, a second programmer performs double programming or QC of all outputs

Current TFL Generation Process



Statistical Programmer

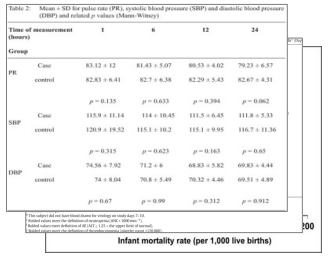


Table 2: Mean ± SD for pulse rate (PR), systolic blood pressure (SBP) and diastolic blood pressure (DBP) and related p values (Mann–Wilncy)

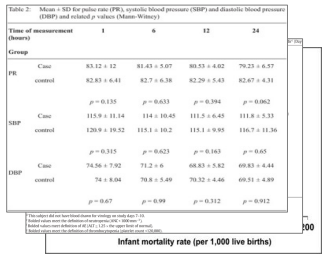
Time of measurement (hours)		1	6	12	24
Group					
PR	Case	83.12 ± 12	81.43 ± 5.07	80.53 ± 4.02	79.23 ± 6.57
	control	82.83 ± 6.41	82.7 ± 6.38	82.29 ± 5.43	82.67 ± 4.31
		p = 0.135	p = 0.633	p = 0.394	p = 0.062
SBP	Case	115.9 ± 11.14	114 ± 10.45	111.5 ± 6.45	111.8 ± 5.33
	control	120.9 ± 19.52	115.1 ± 10.2	115.1 ± 9.95	116.7 ± 11.36
		p = 0.315	p = 0.623	p = 0.163	p = 0.65
DBP	Case	74.56 ± 7.92	71.2 ± 6	68.83 ± 5.82	69.83 ± 4.44
	control	74 ± 8.04	70.8 ± 5.49	70.32 ± 4.46	69.51 ± 4.89
		p = 0.67	p = 0.99	p = 0.312	p = 0.912

† This subject did not have blood shares for vivitogs on study days 7–10.
Bolded values meet the definition of neutropenia (ANC < 1000 mm⁻³).
Bolded values meet definition of HI (ST > 1.25 × the upper limit of normal).
§ Bolded values meet the definition of thrombocytopenia (platelet count < 150).

Infant mortality rate (per 1,000 live births)

Tables, Listings and Figures

2nd Statistical Programmer



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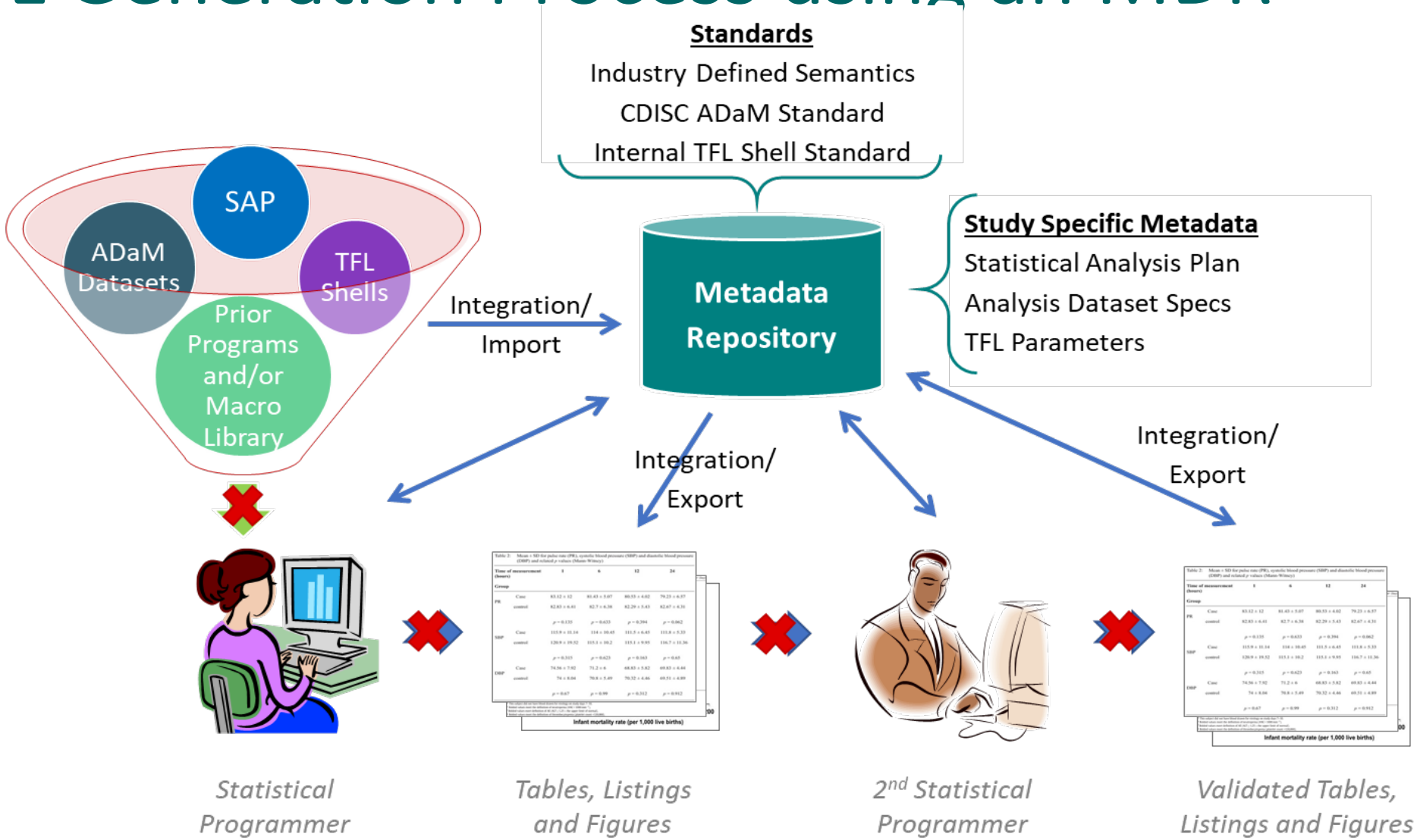
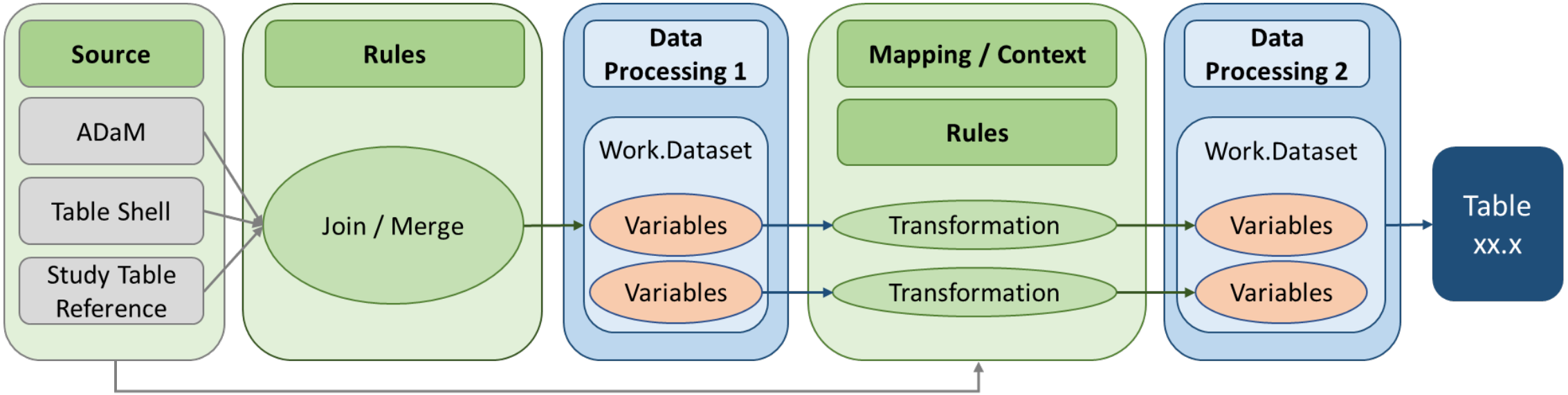
Validated Tables, Listings and Figures

TFL Generation Process using an MDR



Example Process Flow for Creating a Table



Domain, Variable, Table, Reference

Dataset level Transformation: Instruction & SQL

Variable (row, column, cell) level Transformation: Instruction & SAS (Pseudo) Code

Output: Approved table

Example : Table Shell using Macro Calls

Company Header(s)

Titles

Description

Row Variable 1

Row Variable 2

Footnote(s)

- Table Name
- Table ID
- Macro Name
- Description
- Titles
- Footnotes
- Input Data
- Filter (i.e. Pop Flag)
- Column Variable
- Row Variable 1
- Row Variable 2…
- Row Variable n

- Table Type
- Data Join(s)
- Output Format (i.e. PDF)
- Orientation
- Project
- Study
- Company Headers
- Column Format
- Column n %
- Page By
- Row Labels 1 - n
- Row Formats 1 - n
- Row Statistics 1 - n
- Categorical Continuous 1 - n

MDR
- ADaM
- TFL metadata
- Study Reference

SAS
- Data
- Macros
- Output

Example : Table Shell / Metadata Defined

Company Header(s)		
Titles		Column Variable
Description	• Table Name • Table ID • Table Type • Description • Titles • Footnotes • Input Data • Data Join(s) • Filter (i.e. Pop Flag) • Output Format (i.e. PDF) • Orientation • Project • Study • Company Headers	• Column Variable • Column Variable Values • Column Format • Column n % • Page By • Row Variable 1 • Values, Label, Format, Stats, Categorical or Continuous • Row Var Value 1 x Col 1 Algorithm • Row Var Value 1 x Col 2… Algorithm • Row Var Value 2 x Col 1 Algorithm • Row Var Value 2 x Col 2… Algorithm • Row Variable n …
Row Variable		
Row Variable		
Footnote(s)		

MDR
- ADaM
- TFL metadata
- Study Reference

SAS
- Data
- Macros
- Output

Combined
- TFL metadata
- Output

Using an MDR to generate TFLs

- Define study Source and Target metadata and Mapping / Context Rules
- Relate togeth

Published Asset: AGE.AGEGR1 ([ADaM] R 1)

Asset Type: Rule

Overview

Asset Context

Classifiers

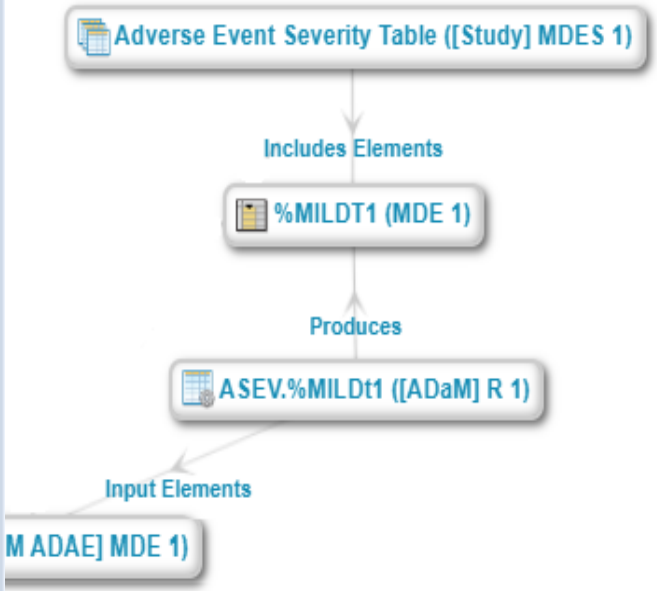
Name	Value
Lifecycle Status	Draft
Endorsement Level	Global
Clinical Lifecycle Stage	Data Tabulations
Rule Type	Computation

Artifacts

Name	Value
SAS Derivation	If Age <= 5 then AGEGR1 = "5 and under" ; Else if Age > 5 and Age < 12 then AGEGR1 = "6 to 11"; Else if Age >= 12 then AGEGR1 = "12 and over";
Computational Method	Assign age groups for "5 and under", "6 to 11" and "12 and over"
R Derivation	AGEGR1 <-ifelse(AGE <= 5, "5 and under", ifelse(AGE <= 12, "6 to 11",no = "12 and over"))

Relationships

Relationship	Asset Type	Asset Name
Input Elements	Metadata Element	AGE ([Study SDTM DM] MDE 1)
Produces	Metadata Element	AGEGR1 ([Sponsor ADSL] MDE 1)



Providing Metadata for Consumption

- API Calls
- MDR Exports
- SQL Queries

TARGET DOMAIN	TARGET FIELD	DESCRIPTION	ROLE	TYPE	FIELD TYPE	SOURCE DATA MODEL	SOURCE DOMAIN	SOURCE FIELD	Transformation
AE Severity Table	Unique_Subject_ID	Unique Subject Identifier			Analysis	ADaM	ADAE	USUBJID	Direct
AE Severity Table	Treatment_Group	Treatment Group			Analysis	ADaM	ADAE	ARM	Direct
AE Severity Table	Severity_T1	Total number of Adverse Events for treatment group 1			Analysis	ADaM	ADAE	ASEV, ARM	Count of adverse events within treatment group 1
AE Severity Table	Mild_T1	Total number of Mild Adverse Events for treatment group 1			Analysis	ADaM	ADAE	ASEV, ARM	Count of adverse events within treatment group 1 where severity = Mild
AE Severity Table	Mild%_T1	Percentage of Mild Adverse Events for treatment group 1			Analysis	ADaM	ADAE	Mild_T1, Severity_T1	Count of adverse events within treatment group 1 where severity = Mild divided by total number of adverse events within treatment group 1
AE Severity Table	Moderate_T1	Total number of Moderate Adverse Events for treatment group 1			Analysis	ADaM	ADAE	ASEV, ARM	Count of adverse events within treatment group 1 where severity = Moderate
AE Severity Table	Moderate%_T1	Percentage of Moderate Adverse Events for treatment group 1			Analysis	ADaM	ADAE	Moderate_T1, Severity_T1	Count of adverse events within treatment group 1 where severity = Moderate divided by total number of adverse events within treatment group 1
AE Severity Table	Severe_T1	Total number of Severe Adverse Events for treatment group 1			Analysis	ADaM	ADAE	ASEV, ARM	Count of adverse events within treatment group 1 where severity = Severe
AE Severity Table	Severe%_T1	Percentage of Severe Adverse Events for treatment group 1			Analysis	ADaM	ADAE	Severe_T1, Severity_T1	Count of adverse events within treatment group 1 where severity = Severe divided by total number of adverse events within treatment group 1
AE Severity Table	Missing_T1	Total number of Missing Values for treatment group 1			Analysis	ADaM	ADAE	ASEV, ARM	Count of adverse events within treatment group 1 where severity = Missing

Conclusion

- TFL metadata includes source dataset standards, TFL shell content, and transformational instructions/code
- An MDR should be able to manage TFL metadata on a global as well as study level
- If the MDR can manage all above-mentioned metadata, this can be fed to executional software to automate the generation of TFL output

Any questions?

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