

BY-lieve in better BY group tables

Paper CT08 - Coding Tips & Tricks

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INTRODUCTION

Table 1
Adverse Events

SOC	PT	Placebo + SoC (N=86)	Drug A + SoC (N=168)
CARDIAC DISORDERS	ATRIAL FIBRILLATION	1 (1.2)	4 (2.4)
	ATRIAL FLUTTER	0	2 (1.2)
	ATRIAL HYPERTROPHY	1 (1.2)	0
	ATRIOVENTRICULAR BLOCK FIRST DEGREE	1 (1.2)	1 (0.6)
	ATRIOVENTRICULAR BLOCK SECOND DEGREE	1 (1.2)	0
	BRADYCARDIA	1 (1.2)	0
	BUNDLE BRANCH BLOCK LEFT	1 (1.2)	0
	BUNDLE BRANCH BLOCK RIGHT	1 (1.2)	1 (0.6)
	CARDIAC DISORDER	0	1 (0.6)
	CARDIAC FAILURE CONGESTIVE	1 (1.2)	0
	MYOCARDIAL INFARCTION	4 (4.7)	6 (3.6)
	PALPITATIONS	0	2 (1.2)
	SINUS ARRHYTHMIA	1 (1.2)	0
	SINUS BRADYCARDIA	2 (2.3)	15 (8.9)
	SUPRAVENTRICULAR EXTRASYSTOLES	1 (1.2)	2 (1.2)
	SUPRAVENTRICULAR TACHYCARDIA	0	1 (0.6)
	TACHYCARDIA	1 (1.2)	0
	VENTRICULAR EXTRASYSTOLES	0	3 (1.8)
	VENTRICULAR HYPERTROPHY	1 (1.2)	0

TWO MOST USUAL METHODS

- Wrap a macro around the entire program and call it for each age group.
- Wrap only the PROC REPORT in a macro, calling it for each age group using macro variables for the denominator labels.

PROBLEMS WITH BOTH METHODS

Although both these look to be simple ways to solve our problem, they may not be the best solution.

- Multiple calls to PROC REPORT
- Need to take care of code for opening and closing RTF/PDF.
- Lack of ability to programmatically check denominator counts for each group.
- Issues with multiple resolving '&' can be hard to trace back.

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ACROSS VARIABLES

ACROSS VARIABLES?

- Examples tend to show ACROSS variables being used to transpose data and summarize it.
- As clinical programmers we want to create a reporting dataset that directly represents the required output to assist with QC.
- Because of this we tend to overlook the possibilities of using ACROSS variables.

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SIMPLE EXAMPLE

STANDARD ADVERSE EVENT FREQUENCY TABLE

Table 1
Adverse Events

SOC	PT	Placebo + SoC (N=86)	Drug A + SoC (N=168)
CARDIAC DISORDERS	ATRIAL FIBRILLATION	1 (1.2)	4 (2.4)
	ATRIAL FLUTTER	0	2 (1.2)
	ATRIAL HYPERTROPHY	1 (1.2)	0
	ATRIOVENTRICULAR BLOCK FIRST DEGREE	1 (1.2)	1 (0.6)
	ATRIOVENTRICULAR BLOCK SECOND DEGREE	1 (1.2)	0
	BRADYCARDIA	1 (1.2)	0
	BUNDLE BRANCH BLOCK LEFT	1 (1.2)	0
	BUNDLE BRANCH BLOCK RIGHT	1 (1.2)	1 (0.6)
	CARDIAC DISORDER	0	1 (0.6)
	CARDIAC FAILURE CONGESTIVE	1 (1.2)	0
	MYOCARDIAL INFARCTION	4 (4.7)	6 (3.6)
	PALPITATIONS	0	2 (1.2)
	SINUS ARRHYTHMIA	1 (1.2)	0
	SINUS BRADYCARDIA	2 (2.3)	15 (8.9)
	SUPRAVENTRICULAR EXTRASYSTOLES	1 (1.2)	2 (1.2)
	SUPRAVENTRICULAR TACHYCARDIA	0	1 (0.6)
	TACHYCARDIA	1 (1.2)	0
	VENTRICULAR EXTRASYSTOLES	0	3 (1.8)
	VENTRICULAR HYPERTROPHY	1 (1.2)	0

- Let's reproduce this table by age group!

STEP 1:

- Create denominator count dataset

TRT01AN	TRT01A	AGEGR1	AGEGR1N	NCOL
0	Placebo + SoC	<65	1	14
0	Placebo + SoC	65-80	2	42
0	Placebo + SoC	>80	3	30
1	Drug A + SoC	<65	1	19
1	Drug A + SoC	65-80	2	102
1	Drug A + SoC	>80	3	47

STEP 2:

- Make denominator labels

TRT01AN	TRT01A	AGEGR1	AGEGR1N	NCOL	VAR1
0	Placebo + SoC	<65	1	14	Placebo + SoC# (N=14)
0	Placebo + SoC	65-80	2	42	Placebo + SoC# (N=42)
0	Placebo + SoC	>80	3	30	Placebo + SoC# (N=30)
1	Drug A + SoC	<65	1	19	Drug A + SoC# (N=19)
1	Drug A + SoC	65-80	2	102	Drug A + SoC# (N=102)
1	Drug A + SoC	>80	3	47	Drug A + SoC# (N=47)

STEP 2:

... and transpose

AGEGR1N	AGEGR1	NCOL0	NCOL1
1	<65	Placebo + SoC# (N=14)	Drug A + SoC# (N=19)
2	65-80	Placebo + SoC# (N=42)	Drug A + SoC# (N=102)
3	>80	Placebo + SoC# (N=30)	Drug A + SoC# (N=47)

STEP 3:

- Create AE counts by treatment and age group

TRT01AN	TRT01A	AGEGR1N	AGEGR1	AESOC	AEDECOD	NPAT	NCOL	NPCT
0	Placebo + SoC	1	<65	GENERAL DISORDERS AND ADMINISTRATION SITE CONDITIONS	ASTHENIA	1	14	1 (7.1)
0	Placebo + SoC	2	65-80	GASTROINTESTINAL DISORDERS	ABDOMINAL PAIN	1	42	1 (2.4)
0	Placebo + SoC	2	65-80	PSYCHIATRIC DISORDERS	AGITATION	1	42	1 (2.4)
0	Placebo + SoC	3	>80	MUSCULOSKELETAL AND CONNECTIVE TISSUE DISORDERS	BACK PAIN	1	30	1 (3.3)
0	Placebo + SoC	3	>80	PSYCHIATRIC DISORDERS	AGITATION	1	30	1 (3.3)
1	Drug A + SoC	2	65-80	GASTROINTESTINAL DISORDERS	ABDOMINAL PAIN	3	102	3 (2.9)
1	Drug A + SoC	2	65-80	MUSCULOSKELETAL AND CONNECTIVE TISSUE DISORDERS	BACK PAIN	4	102	4 (3.9)
1	Drug A + SoC	2	65-80	PSYCHIATRIC DISORDERS	AGITATION	3	102	3 (2.9)
1	Drug A + SoC	3	>80	GASTROINTESTINAL DISORDERS	ABDOMINAL PAIN	1	47	1 (2.1)
1	Drug A + SoC	3	>80	GENERAL DISORDERS AND ADMINISTRATION SITE CONDITIONS	ASTHENIA	1	47	1 (2.1)

STEP 4 and 5: Reporting dataset

- Transpose AE counts by treatment and merge with denominator labels

AGEGR1N	AGEGR1	AESOC	AEDECOD	NCT0	NCT1	NCOL0	NCOL1
1	<65	GENERAL DIS...	ASTHENIA	1 (7.1)	0	Placebo + SoC# (N=14)	Drug A + SoC# (N=19)
2	65-80	GASTROINTES...	ABDOMINAL PAIN	1 (2.4)	3 (2.9)	Placebo + SoC# (N=42)	Drug A + SoC# (N=102)
2	65-80	MUSCULOSKEL...	BACK PAIN	0	4 (3.9)	Placebo + SoC# (N=42)	Drug A + SoC# (N=102)
2	65-80	PSYCHIATRIC...	AGITATION	1 (2.4)	3 (2.9)	Placebo + SoC# (N=42)	Drug A + SoC# (N=102)
3	>80	GASTROINTES...	ABDOMINAL PAIN	0	1 (2.1)	Placebo + SoC# (N=30)	Drug A + SoC# (N=47)
3	>80	GENERAL DIS...	ASTHENIA	0	1 (2.1)	Placebo + SoC# (N=30)	Drug A + SoC# (N=47)
3	>80	MUSCULOSKEL...	BACK PAIN	1 (3.3)	0	Placebo + SoC# (N=30)	Drug A + SoC# (N=47)
3	>80	PSYCHIATRIC...	AGITATION	1 (3.3)	0	Placebo + SoC# (N=30)	Drug A + SoC# (N=47)

STEP 6: Let's report!

```
PROC REPORT data=rep3 nowd missing split="#";  
  BY agegr1n agegr1;  
  COLUMNS  aesoc aedecod nct0,ncol0 nct1,ncol1;  
  
  DEFINE aesoc      / "SOC" order order=data _stylestatement_;  
  DEFINE aedecod    / "PT" _stylestatement_;  
  DEFINE nct:       / "" _stylestatement_;  
  DEFINE ncol:      / "" across;  
  
RUN;
```

THE OUTPUT:

Age group: <65

SOC	PT	Placebo + SoC (N=14)	Drug A + SoC (N=19)
CARDIAC DISORDERS	ATRIAL HYPERTROPHY	1 (7.1)	0
	ATRIOVENTRICULAR BLOCK SECOND DEGREE	1 (7.1)	0
	SINUS BRADYCARDIA	0	1 (5.3)
GASTROINTESTINAL DISORDERS	DIARRHOEA	3 (21.4)	1 (5.3)

Age group: 65-80

SOC	PT	Placebo + SoC (N=42)	Drug A + SoC (N=102)
CARDIAC DISORDERS	ATRIAL FIBRILLATION	0	3 (2.9)
	ATRIOVENTRICULAR BLOCK FIRST DEGREE	1 (2.4)	1 (1.0)
	BRADYCARDIA	1 (2.4)	0
	CARDIAC DISORDER	0	1 (1.0)
	MYOCARDIAL INFARCTION	1 (2.4)	4 (3.9)

Age group: >80

SOC	PT	Placebo + SoC (N=30)	Drug A + SoC (N=47)
CARDIAC DISORDERS	ATRIAL FIBRILLATION	1 (3.3)	1 (2.1)
	ATRIAL FLUTTER	0	2 (4.3)
	BUNDLE BRANCH BLOCK LEFT	1 (3.3)	0
	BUNDLE BRANCH BLOCK RIGHT	1 (3.3)	1 (2.1)
	CARDIAC FAILURE CONGESTIVE	1 (3.3)	0

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**WHAT IF I HAVE
SPANNING
HEADERS?**

STEP 7:

- Create treatment count dataset with counts grouped by age group-treatment and age group-treatment-sex

TRT01AN	TRT01A	AGEGR1	AGEGR1N	SEX	SEXN	NCOL	NSPAN	VAR1	VAR2
0	Placebo + SoC	<65	1	Female	1	9	14	Sex: Female# (N=9)	Placebo + SoC# (N=14)
0	Placebo + SoC	<65	1	Male	2	5	14	Sex: Male# (N=5)	Placebo + SoC# (N=14)
0	Placebo + SoC	65-80	2	Female	1	22	42	Sex: Female# (N=22)	Placebo + SoC# (N=42)
0	Placebo + SoC	65-80	2	Male	2	20	42	Sex: Male# (N=20)	Placebo + SoC# (N=42)
0	Placebo + SoC	>80	3	Female	1	22	30	Sex: Female# (N=22)	Placebo + SoC# (N=30)
0	Placebo + SoC	>80	3	Male	2	8	30	Sex: Male# (N=8)	Placebo + SoC# (N=30)
1	Drug A + SoC	<65	1	Female	1	10	19	Sex: Female# (N=10)	Drug A + SoC# (N=19)
1	Drug A + SoC	<65	1	Male	2	9	19	Sex: Male# (N=9)	Drug A + SoC# (N=19)
1	Drug A + SoC	65-80	2	Female	1	56	102	Sex: Female# (N=56)	Drug A + SoC# (N=102)
1	Drug A + SoC	65-80	2	Male	2	46	102	Sex: Male# (N=46)	Drug A + SoC# (N=102)
1	Drug A + SoC	>80	3	Female	1	24	47	Sex: Female# (N=24)	Drug A + SoC# (N=47)
1	Drug A + SoC	>80	3	Male	2	23	47	Sex: Male# (N=23)	Drug A + SoC# (N=47)

STEP 8: All together now

AGEGR1N	AGEGR1	AESOC	AEDECOD	NCT01	NCT02	NCT11	NCT12	NCOL01
1	<65	GENER..	ASTHENIA	1 (11.1)	0	0	0	Sex: Female# (N=9)
2	65-80	GASTR..	ABDOMINAL PAIN	1 (4.5)	0	2 (3.6)	1 (2.2)	Sex: Female# (N=22)
2	65-80	MUSCU..	BACK PAIN	0	0	2 (3.6)	2 (4.3)	Sex: Female# (N=22)
2	65-80	PSYCH..	AGITATION	1 (4.5)	0	3 (5.4)	0	Sex: Female# (N=22)
3	>80	GASTR..	ABDOMINAL PAIN	0	0	1 (4.2)	0	Sex: Female# (N=22)
3	>80	GENER..	ASTHENIA	0	0	1 (4.2)	0	Sex: Female# (N=22)
3	>80	MUSCU..	BACK PAIN	1 (4.5)	0	0	0	Sex: Female# (N=22)
3	>80	PSYCH..	AGITATION	1 (4.5)	0	0	0	Sex: Female# (N=22)

NCOL01	NCOL02	NCOL11	NCOL12	SPAN0	SPAN1
Sex: Female# (N=9)	Sex: Male# (N=5)	Sex: Female# (N=10)	Sex: Male# (N=9)	Placebo + SoC# (N=14)	Drug A + SoC# (N=19)
Sex: Female# (N=22)	Sex: Male# (N=20)	Sex: Female# (N=56)	Sex: Male# (N=46)	Placebo + SoC# (N=42)	Drug A + SoC# (N=102)
Sex: Female# (N=22)	Sex: Male# (N=20)	Sex: Female# (N=56)	Sex: Male# (N=46)	Placebo + SoC# (N=42)	Drug A + SoC# (N=102)
Sex: Female# (N=22)	Sex: Male# (N=20)	Sex: Female# (N=56)	Sex: Male# (N=46)	Placebo + SoC# (N=42)	Drug A + SoC# (N=102)
Sex: Female# (N=22)	Sex: Male# (N=8)	Sex: Female# (N=24)	Sex: Male# (N=23)	Placebo + SoC# (N=30)	Drug A + SoC# (N=47)
Sex: Female# (N=22)	Sex: Male# (N=8)	Sex: Female# (N=24)	Sex: Male# (N=23)	Placebo + SoC# (N=30)	Drug A + SoC# (N=47)
Sex: Female# (N=22)	Sex: Male# (N=8)	Sex: Female# (N=24)	Sex: Male# (N=23)	Placebo + SoC# (N=30)	Drug A + SoC# (N=47)
Sex: Female# (N=22)	Sex: Male# (N=8)	Sex: Female# (N=24)	Sex: Male# (N=23)	Placebo + SoC# (N=30)	Drug A + SoC# (N=47)

STEP 9: Let's report (again)

```
PROC REPORT data=rep3 nowd missing split="#";
  BY agegr1n agegr1;
  COLUMNS  aesoc aedecod (span0,(nct01,ncol01 nct02,ncol02)) gap
              (span1,(nct11,ncol11 nct12,ncol12));

  DEFINE gap  / display " " computed style(column)=[cellwidth=1% padding=0];

  DEFINE aesoc      / "SOC" order order=data _stylestatement_;
  DEFINE aedecod    / "PT"  _stylestatement_;
  DEFINE nct:       / ""    _stylestatement_;

  DEFINE span:      / "" across style(header)=[borderbottomwidth=0.5];
  DEFINE ncol:      / "" across;

RUN;
```

STEP 9: Let's report (again)

```
COLUMNS aesoc aedecod (span0, (nct01,ncol01 nct02,ncol02))  
          gap          (span1, (nct11,ncol11 nct12,ncol12));
```

THE OUTPUT:

Age group: <65

SOC	PT	Placebo + SoC (N=14)		Drug A + SoC (N=19)	
		Sex: Female (N=9)	Sex: Male (N=5)	Sex: Female (N=10)	Sex: Male (N=9)
CARDIAC DISORDERS	ATRIAL HYPERTROPHY	0	1 (20.0)	0	0
	ATRIOVENTRICULAR BLOCK SECOND DEGREE	0	1 (20.0)	0	0
	SINUS BRADYCARDIA	0	0	0	1 (11.1)
GASTROINTESTINAL DISORDERS	DIARRHOEA	2 (22.2)	1 (20.0)	1 (10.0)	0

Age group: 65-80

SOC	PT	Placebo + SoC (N=42)		Drug A + SoC (N=102)	
		Sex: Female (N=22)	Sex: Male (N=20)	Sex: Female (N=56)	Sex: Male (N=46)
CARDIAC DISORDERS	ATRIAL FIBRILLATION	0	0	2 (3.6)	1 (2.2)
	ATRIOVENTRICULAR BLOCK FIRST DEGREE	1 (4.5)	0	0	1 (2.2)
	BRADYCARDIA	1 (4.5)	0	0	0
	CARDIAC DISORDER	0	0	0	1 (2.2)

Age group: >80

SOC	PT	Placebo + SoC (N=30)		Drug A + SoC (N=47)	
		Sex: Female (N=22)	Sex: Male (N=8)	Sex: Female (N=24)	Sex: Male (N=23)
CARDIAC DISORDERS	ATRIAL FIBRILLATION	1 (4.5)	0	0	1 (4.3)
	ATRIAL FLUTTER	0	0	0	2 (8.7)
	BUNDLE BRANCH BLOCK LEFT	1 (4.5)	0	0	0
	BUNDLE BRANCH BLOCK RIGHT	1 (4.5)	0	0	1 (4.3)

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CONCLUSIONS

Conclusions

- ACROSS variables can allow us to simplify creation of BY group tables
- QCer's can programmatically check correct counts are displayed
- Can be extended to spanning headers
- Could be used in day-to-day programming to facilitate programmatic QC and allow rapid modification to create BY tables.



Thank You

Any questions?

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