Regional Anesthesia & Pain Medicine

RAPM: A Standardized Approach to Data Presentation

To facilitate readability, increase editorial efficiency, and allow comparisons between manuscripts, we have created the following document outlining in detail our recommended approach to standardization of data presentation for all manuscripts submitted to *Regional Anesthesia & Pain Medicine*.

The presentation of data in tables and figures should assist readers in the interpretation of research results. Keep data presentation as simple and clear as possible.[1] Avoid restating all findings in the text of the results section — instead, focus on the primary findings of interest. A comprehensive review can be found at *Reporting Statistical Information in Medical Journal Articles.*[2] Manuscripts should follow data reporting guidelines as outlined in the EQUATOR Network CONSORT Guidelines. Our guidelines are largely modeled after the recommendations from the *AMA Manual of Style, 10th Edition*.

General Principles

- Use past tense when referring to results in the text (e.g., *"We found a 30% reduction in the incidence of hospital readmission following…"*).
- The presentation of results should answer the research question and/or hypothesis.
- Avoid presenting redundant information in tables and figures (i.e., do not present the same results as both a table and figure).
- In general, results should first be reported unadjusted, with appropriate estimates of uncertainty.
- Present absolute rates and proportions prior to presenting comparative measures of association such as relative risk and odds ratios; for example:

  When comparing patients having general anesthesia vs. nerve block, postoperative neurological sequelae occurred in 2 per 1000 vs. 1 per 1000, respectively; RR 2.0 (95% CI 1.8, 2.2).
- Do not use subjective qualifying terms for non-significant results such as "trend toward."
- For all observational study designs (i.e., non-randomized studies), avoid using language that suggests causality. For instance, avoid describing results in the context of terms such as "effect" or "efficacy." Instead, discuss relationships as "associations."
- For all study designs, clearly state the primary and secondary outcomes (including adverse events measured).

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Statistical Analyses Described in the Methods Section

- All analyses should follow the EQUATOR Reporting Guidelines and be consistent with the trial registration or study data plan.
- In general, the last paragraph of the Methods section should include an overview of the statistical methods employed. Specific mention should be made of the statistical tests that were used for the different types of data. It is not necessary to describe the measures of central tendency (e.g., mean and proportions) and dispersion used to summarize the study participants. For all primary and secondary analyses, authors should state the specific univariate statistical tests (e.g., independent sample t- test, chi-squared test) used to compare the groups. For example:

> *We used a t-test to compare means between the two groups for normally distributed, continuous data (e.g., blood pressure, opioid consumption, and comorbidity score), and a Mann-Whitney test to compare medians for skewed endpoints (e.g., length of stay, healthcare expenditures, and pain scores).*

Sample Size Calculation

For all randomized trials, a sample size calculation is required. Achieving a sufficient sample size is critical to distinguish between a negative study (a study that finds no difference) versus a study that has unacceptable risk for a *Type II error* (i.e., incorrectly concluding that there is no difference between two groups when, in fact, one exists in the population). In general, for experimental study designs, sample size calculations should include the following:

- The chosen power of the study to detect a difference (1-beta), where beta is the probability of a Type II error (traditionally set at 0.20)
- The chosen critical alpha level (traditionally set at 0.05)
- Anticipated effect size of the intervention
- The measures of central tendency and dispersion in the two groups

Statistical Modeling

In randomized trials where factors are balanced at baseline, rarely are statistical models required. The exception to this is among randomized trials that collect repeated measures over time.

Observational study designs rely on statistical modeling to evaluate relationships while controlling for confounding factors or to create a model in order to predict an outcome. When data are either clustered within units (e.g., patients within hospitals) or repeated measures collected over time regression models (e.g., pain scores obtained daily for seven days after surgery), either mixed models or general estimating equations must be used. Clearly state the type of statistical model used, its structure, and the covariates included. For mixed models, identify the structure of the random effects (i.e., whether random intercepts of slopes were used) and the fixed effects included. When using generalized estimating equations, identify the correlation structure employed.

Multiple Comparisons

Use appropriate statistical methods to correct for multiple comparisons. Post-hoc comparisons should be clearly identified as comparisons that were conducted during data analysis.

Missing Data

In randomized trials, missing data as a result of loss to follow-up should be identified in the CONSORT diagram. In general, data from randomized controlled trials should be analyzed as intention to treat. For observational studies, identify missing data in descriptive tables and whether the participants were included in the analyses.

Format of Data Presentation

Authors should follow guidelines for data presentation as outlined in the EQUATOR network. When possible and regardless of study design, data should first be presented in unadjusted form consisting of rates or proportions with corresponding measures of uncertainty (e.g., standard error, 95% confidence intervals, etc.). Generally, distributions of continuous, normally distributed data should be summarized using the arithmetic mean and standard deviation (SD). Continuous data that are skewed (i.e., not normally distributed) should be summarized using the median and interquartile range (IQR). Alternatively, under certain circumstances, non- normally distributed data can be transformed to normal (e.g. log transformation) to facilitate parts of the analysis. Nominal and ordinal data (with few categories) should be summarized using both frequencies and relative percent in each category.

P-values

P-values should never be presented in isolation but should be accompanied by the measures in which they are comparing. For instance: "*Regional anesthesia compared to systemic opioids was associated with a reduction in mean length of stay by 1.2 days (95% CI 1.0 to 1.9; P = 0.03).*" P values should be presented with only two decimal points of precision. Values between 0.01 and 0.001 should be presented as "<0.01". In regard to decimal point precision, the exception is p-values of less than 0.001, which should be presented as "<0.001". For randomized trials, summary descriptive tables and text do *not* need to include p-values.

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Table and Figures

Tables and Figures should accentuate and efficiently summarize the findings of the study. Use either 10- or 12-point font for tables. Each Table and Figure should be referenced in the text and included at the end of the manuscript. Each table and figure should contain enough information to be impactful without reading the manuscript.

Table Guidelines (see Table Example)

- Tables should be created with word processing software.
- Each data point must be in its own cell.
- Tables should always have at least two columns.
- For categorical data, include frequencies along with relative percent that add up across rows "n (%)."
- The denominator information should also be available in the columns (see below).
- Indents in table should be two spaces.
- Include p-values in a separate column with a footnote indicating which statistical tests were used.
- Superscripts in footnotes should be labeled as "a,b,c,d…" Do not use special symbols.
- Add a foot note if column data does not add up to 100% of data.

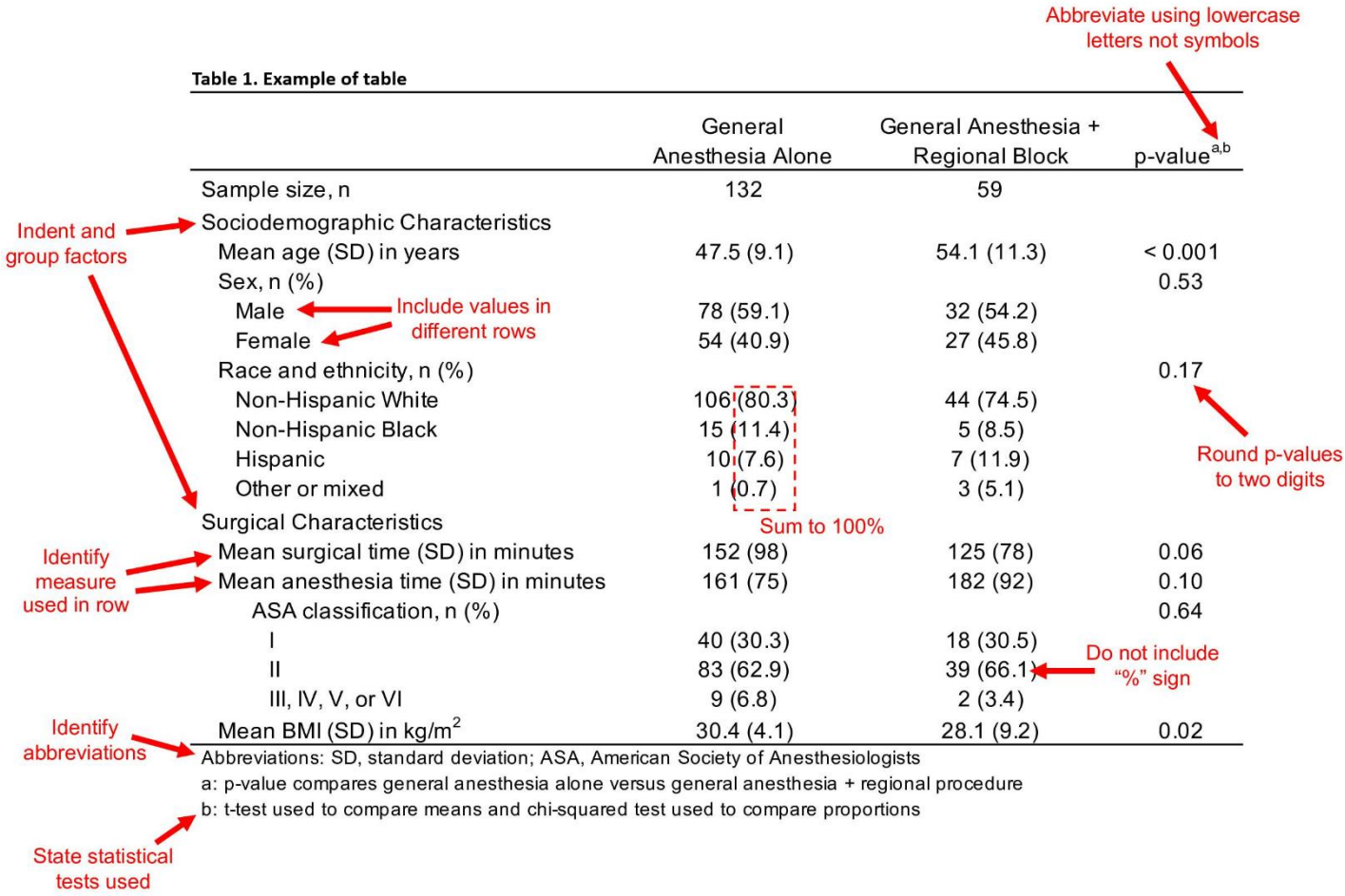

Table 1. Example of table

	General Anesthesia Alone	General Anesthesia + Regional Block	p-value[a,b]
Sample size, n	132	59	
Sociodemographic Characteristics			
Mean age (SD) in years	47.5 (9.1)	54.1 (11.3)	< 0.001
Sex, n (%)			0.53
Male	78 (59.1)	32 (54.2)	
Female	54 (40.9)	27 (45.8)	
Race and ethnicity, n (%)			0.17
Non-Hispanic White	106 (80.3)	44 (74.5)	
Non-Hispanic Black	15 (11.4)	5 (8.5)	
Hispanic	10 (7.6)	7 (11.9)	
Other or mixed	1 (0.7)	3 (5.1)	
Surgical Characteristics			
Mean surgical time (SD) in minutes	152 (98)	125 (78)	0.06
Mean anesthesia time (SD) in minutes	161 (75)	182 (92)	0.10
ASA classification, n (%)			0.64
I	40 (30.3)	18 (30.5)	
II	83 (62.9)	39 (66.1)	
III, IV, V, or VI	9 (6.8)	2 (3.4)	
Mean BMI (SD) in kg/m^2	30.4 (4.1)	28.1 (9.2)	0.02

Abbreviations: SD, standard deviation; ASA, American Society of Anesthesiologists

a: p-value compares general anesthesia alone versus general anesthesia + regional procedure

b: t-test used to compare means and chi-squared test used to compare proportions

***Figure Guidelines** (see Figures 1 through 3)*

Please see figure quality and file type requirement at https://authors.bmj.com/writing-and-formatting/formatting-your-paper/.

- Each Figure must contain title (and legend if needed). The title should fully describe what is shown in the figure. For instance, "30-day all-cause mortality following total shoulder replacement."
- The figure legend should explain any symbols and abbreviations used.
- Do not include animations.
- Do not include pie charts.
- The y axis should not contain vertical text.
- Footnote superscripts should be indicated by "a,b,c,d…"

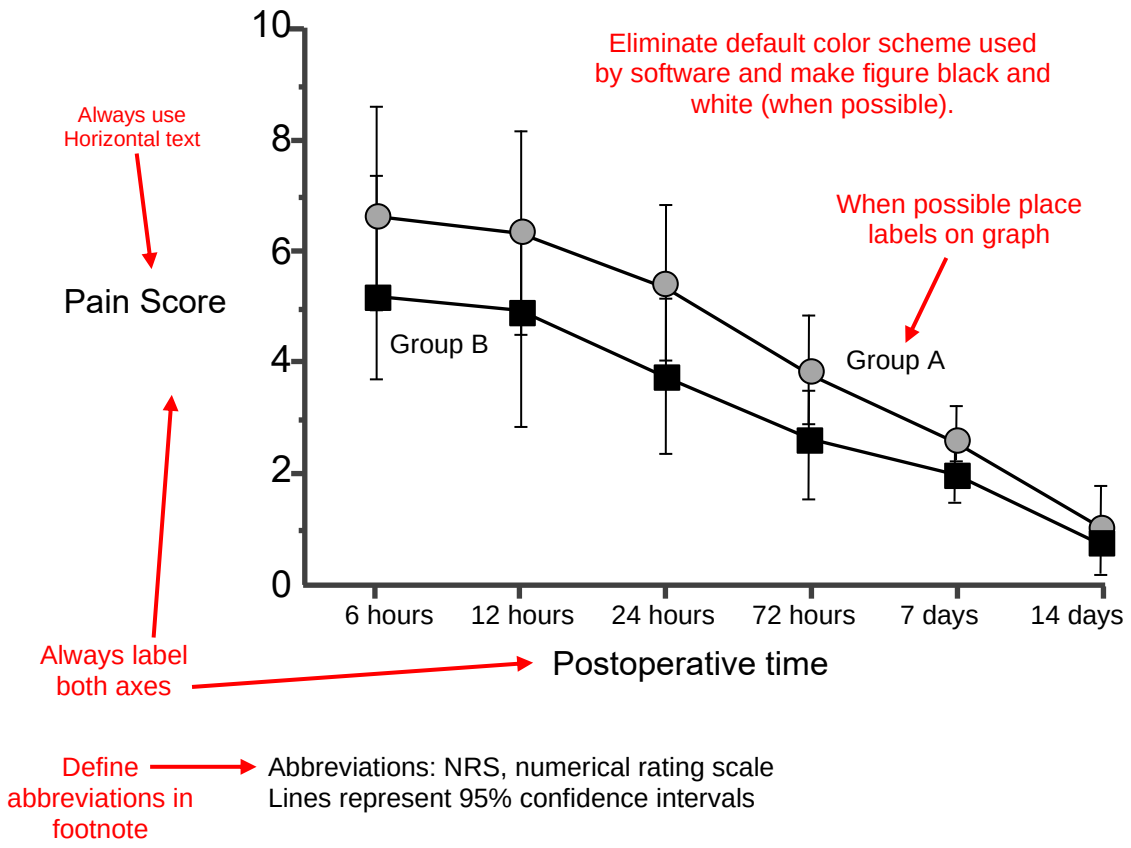

Figure 1. Example of a line graph

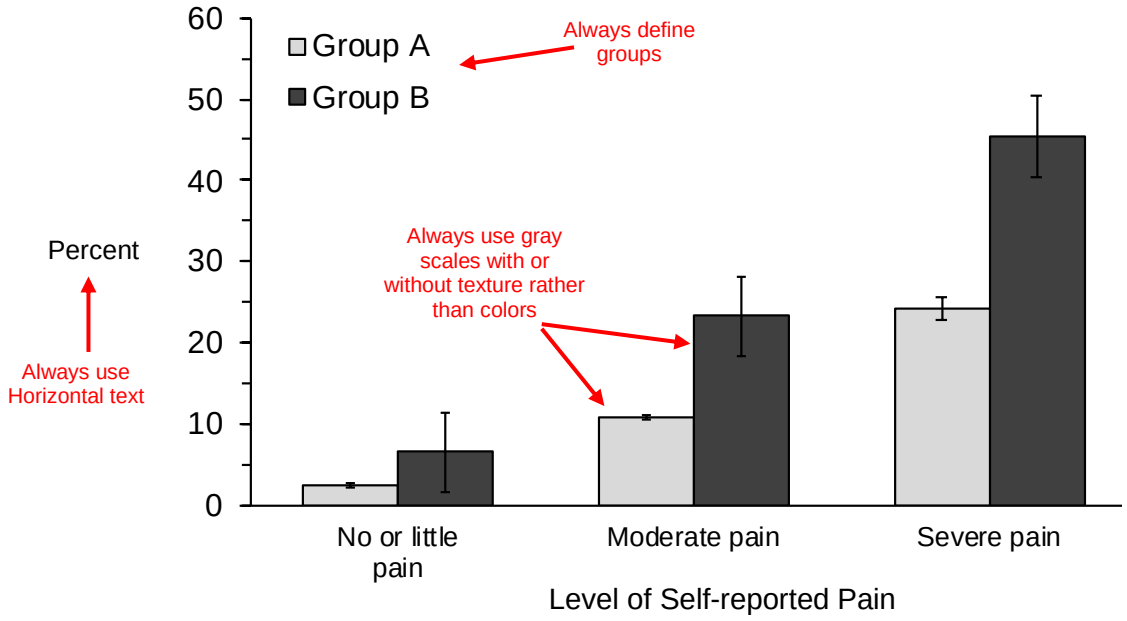

Figure 2. Example of a bar chart

RAPM strongly encourages visual display of complex data. One of our favorite approaches is to create a Forest Plot (FIGURE 3) to display Odds Ratios, Relative Risks, or means. Such a figure is immensely helpful when trying to display predictive models. When possible, and where appropriate, try to include both crude (unadjusted) and adjusted data.

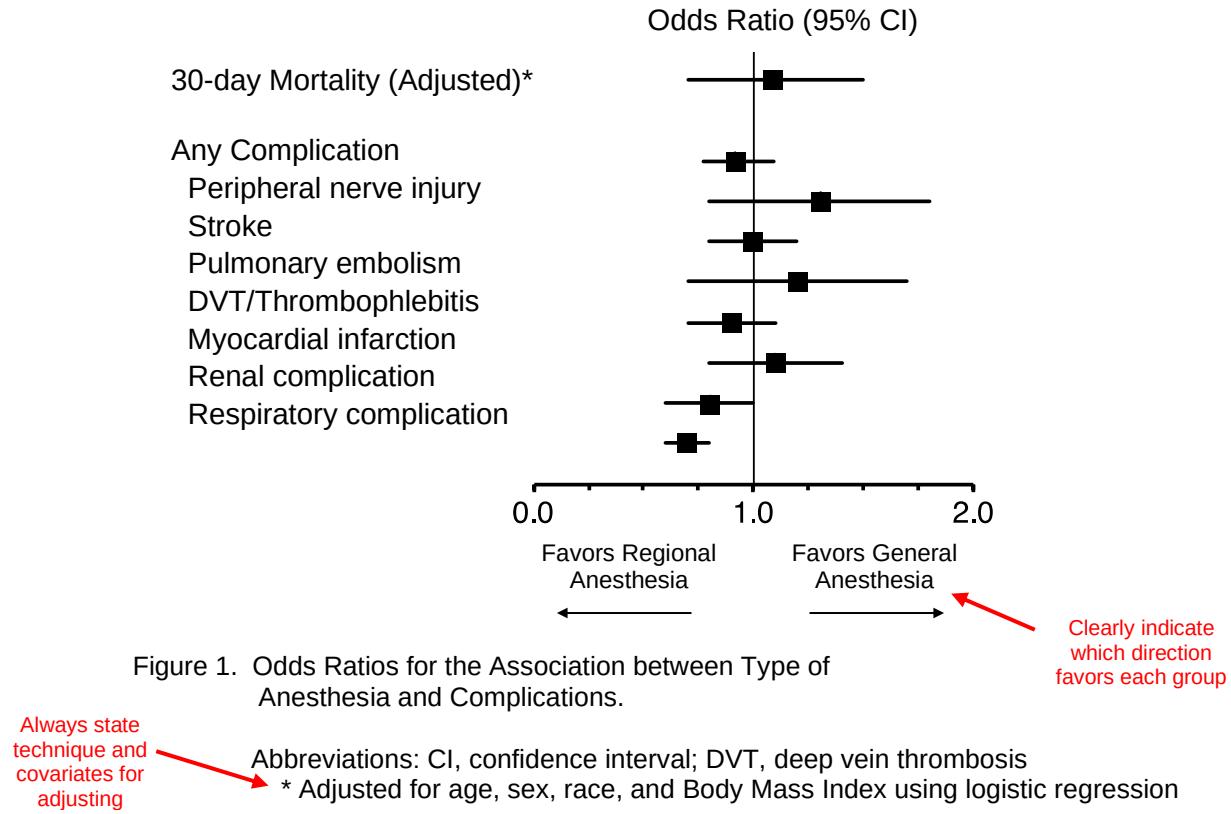

Figure 3. Example of a forest plot

Medical Images and Video

When including media content, images and video should provide information that is not able to be communicated in text, tables, or figures. Supplemental media can be useful in the context of procedural and anatomical detail. Written patient permission must be obtained when involving human subjects and made available to the editorial office upon request.

References

1. Tufte, E. R. (2001). The visual display of quantitative information (2nd ed.). Cheshire, Conn.: Graphics Press.
2. Cummings P, Rivara FP. Reporting Statistical Information in Medical Journal Articles. *Arch Pediatr Adolesc Med.* 2003;157(4):321–324. doi:10.1001/archpedi.157.4.321