Writing and Presentation of Data in a Scientific Paper/ Manuscript

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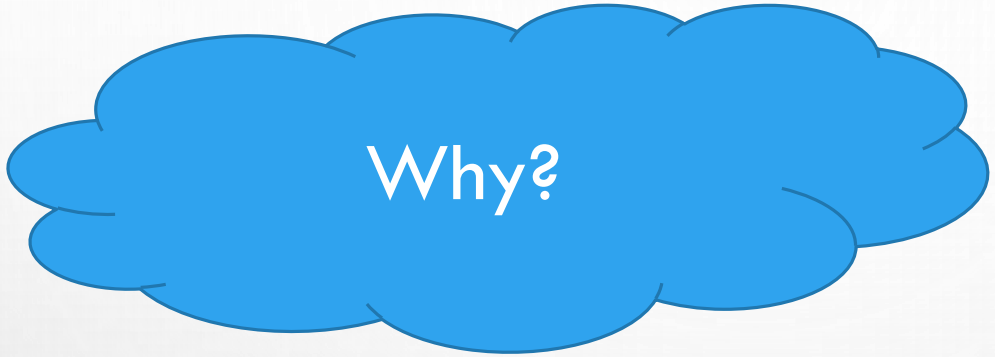
INTRODUCTION



- Researchers publish scientific manuscripts to present data collected during experiments and to speculate on their significance.
- Document the process of testing a hypothesis and advancing research.
- Results section is the only one that contains data which makes it the critical section to convey the significance of a manuscript.

GENERAL RULES

- **keep it simple.**

  this golden rule seems obvious but which is not the case.

- **First general, then specific.**
- **data should answer the research questions identified earlier.**
- **Leave the process of data collection to the methods section. Do not include any discussion**
- **Always use past tense in describing results.**
- **Text, tables or graphics?**
  - These complement each other in providing clear reporting of research findings. Do not repeat the same information in more than one format. Select the best method to convey the message.

Organizing and Writing the Results

Over the past 50 years, nearly all top science journals have adopted exclusively the TIMRD/IMRaD model of a manuscript.

Among these sections, the results section contains the data collected during experiments

Cont…

- One of the most prominent reason for the rejection of a manuscript is the lack of novelty or the presentation of obsolete data.

- While reporting data, it is important to be clear, brief, and accurate.

- Results section presents the data collected during research and is often further divided into sub-sections according to the methods used or logical relationship among data points.

Cont..

- A clear, brief, and accurate results section includes only data, which are presented using a combination of text, figures and tables.
- Data should be presented logically, either in the order in which the methods were presented or according to the order that most effectively developed hypothesis. hypotheses are developed over several experiments,
- Note that data is rarely reported in the same order in which the corresponding experiments were conducted.
- Instead, many authors identify the most important data points and put them in a sequence that demonstrates the development and effective testing of the central hypothesis.

Presentation of data

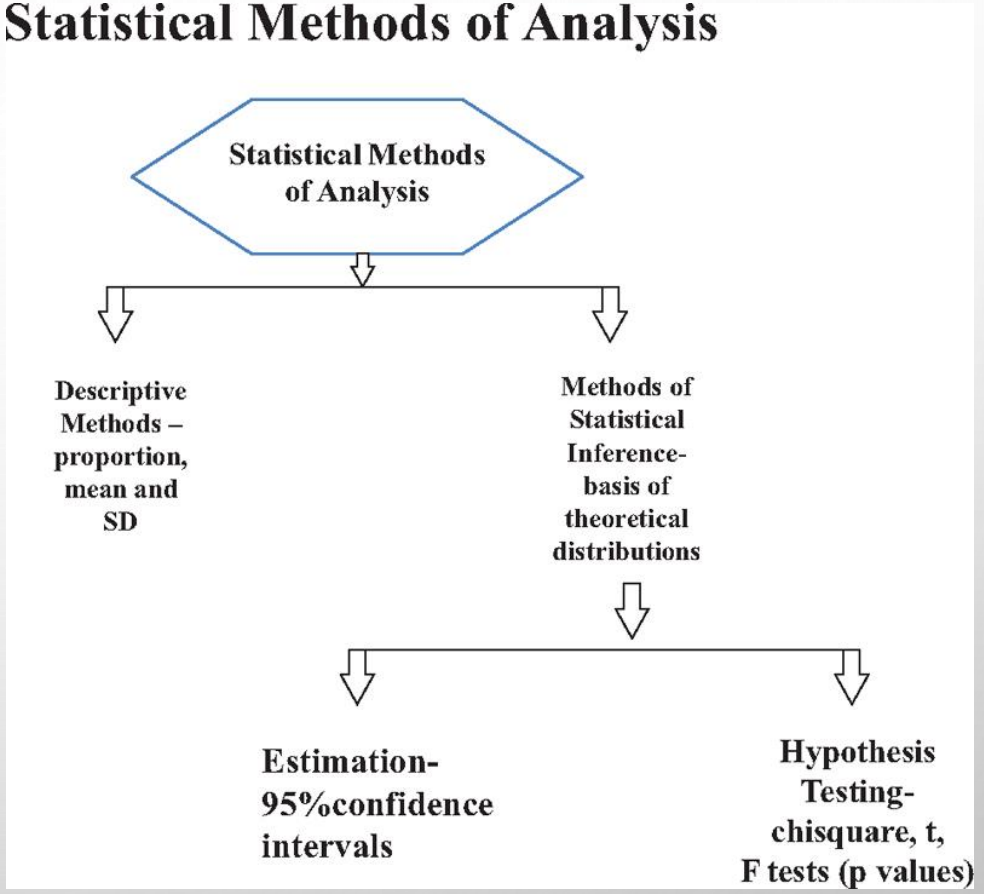
Common Pitfalls

- Presenting data that has nothing to do with a research question.
- Presenting only some of data. if you think you will want to draw conclusions from it or refer to the data in some supportive way, it must be presented.
- Using inappropriate and generic data presentation techniques. selecting a data presentation technique simply from a drop down menu in a computer-based spreadsheet shows a lack of imagination and there is a danger that a poor selection will result in demonstrating a lack of understanding of the complexity of the data in question.
- using a data presentation technique which is inappropriate for the data itself. think carefully about the type of data (continuous or discrete) and whether the technique you have chosen is appropriate for that type of data.
- using the same data presentation technique more than once. show some imagination and try to come up with an original data presentation technique, unique to your particular data.
- combining more than one data presentation together. remember, the ultimate aim is to make the data, patterns and relationships easy to see, not to create confusion for the reader.
- presenting the same piece of data more than once. this can waste time and effort – choose the most appropriate technique only. if that technique does not show everything you want it to, it is not the right technique to use.
- using techniques in an inaccurate fashion. spend time checking that you have labelled keys and axes appropriately – marks can be easily lost without these checks.

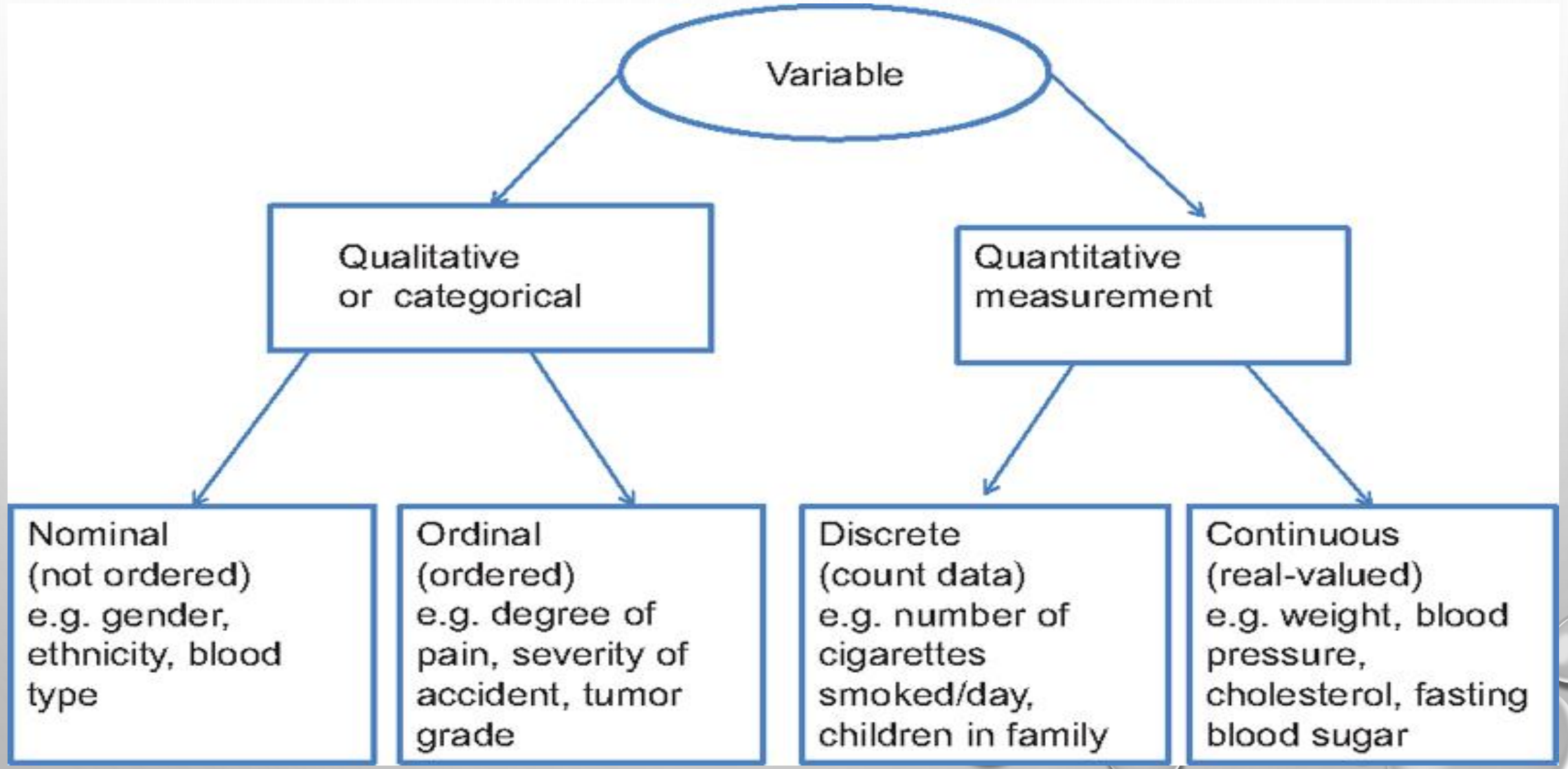
Data

Data analysis has two broad approaches

- ✓obtaining descriptive features as estimates
- ✓performing tests of hypothesis to obtain inference on the data collected



Types of Data



TEXT	TABLE	FIGURE
• The data you intend to present is not relevant to the main findings of your study • the data is not too complex or large, and can be easily incorporated in your manuscript • your data, if presented as a table, would warrant only 1 or 2 columns	•many and precise numerical values in a small space •compare/contrast values or characteristics of items that are related or that share several characteristics or variables •show the presence or absence of specific characteristics	• trends, patterns, & relationships across and between data sets, when the trend is more important than the precise data values • summarize the results of your research • visually explain a sequence of events, phenomena, characteristics, or geographical features

- Numbers and figures, are better presented in tables and graphics, while the interpretation are better stated in text.
- By doing so, No need to repeat the values in the text, and we can interpret the data for the readers.

- Too few variables, the data can be easily described in a simple sentence including its interpretation. ***For example, the majority of diabetic patients enrolled in the study were male (80%) compare to female (20%).***

- Using qualitative words to attract the readers' attention is not helpful. Such words like "remarkably" decreased, "extremely" different and "obviously" higher are redundant. The exact values in the data will show just how remarkable, how extreme and how obvious the findings are.

TEXT

Consider these two lines:

1. Mean baseline Hba_{1c} of 73 diabetic patients before intervention was 8.9% and mean Hba_{1c} after intervention was 7.8%.
2. Mean Hba_{1c} of 73 of diabetic patients *decreased* from 8.9% to 7.8% after an intervention.

In line 1, the author presents only the data (i.e. what exactly was found in a study) but the reader is forced to analyze and draw their own conclusion ("mean hba_{1c} decreased") thus making the result more difficult to read.

In line 2, the preferred way of writing, the data was presented together with its interpretation.

TABLES

- Highlight precise numerical values; proportions or trends are better illustrated with charts or graphics.
- Summarise large amounts of related data clearly and allow comparison to be made among groups of variables.

Title. Keep it brief and relate clearly the content of the table. Words in the title should represent and summarise variables used in the columns & rows.

Columns and rows. Columns are vertically listed data, and rows are horizontally listed data. Similar data ought to be presented in columns.

Comparison of the presenting symptoms among patients with and without thrombocytopaenia

Symptom	Platelet count (%)		OR* (95% CI)
	Normal	Thrombocytopaenia	
Presented at or after day 3 of fever	26 (65)	31 (93.9)	5.88(1.20-28.8)†
Myalgia	32 (80)	23 (82.1)	1.09 (0.51-2.31)
Headache	25 (64.1)	22 (78.6)	1.56 (0.75-3.26)
Nausea/vomiting	18 (46.2)	23 (76.7)	2.24 (1.12-4.50)‡
Arthralgia	26 (40)	13 (54.2)	1.43 (0.76-2.69)
Retro-orbital pain	9 (23.1)	6 (26.1)	1.11 (0.54-2.29)
Rash	5 (12.5)	8 (24.2)	1.47 (0.88-2.49)

*Odds ratio (95% confidence interval)
†p=0.04
‡p=0.01

table1 specimen data form

1	Name of Woman	
2	Woman ID	☐☐
3	Age	☐☐
4	Education: 1. Illiterate 2. Primary 3. High School 4. Intermediate 5. Graduate and above 6. Others	☐☐
5	Marital Status: 1. Never Married 2. Married 3. Widowed 4. Separated/Divorced	☐☐
6	Religion: 1. Hindu 2. Muslim 3. Christian 4. Sikh 5. Others	☐
7	Menstrual History: 1. Regular 2. Irregular 3.Menopause	☐
8	Clinical Sign: 1. Normal Cervix 2. Unhealthy Cervix 3. Cervical Erosion 4. Others	☐
9	VIA Result: 1. Positive 2. Negative 3. Not Done	☐
10	VILI Result: 1. Positive 2. Negative 3. Not Done	☐
11	Cytology Result: 1. Positive 2. Negative 3. Not Done	☐

table 2: hypothetical sample data of 6 women

W_ID	Age	Edu	Mart_Status	Religion	Mens_His	Cli_Sign	VIA_Res	VILI_Res	Cyto_Res
13-001	35	Illiterate	Married	Hindu	Regular	Normal cervix	Negative	Positive	Negative
13-002	50	Illiterate	Married	Hindu	Menopause	Unhealthy cervix	Negative	Negative	Negative
13-003	40	Primary	Married	Hindu	Irregular	Cervical erosion	Negative	Negative	Negative
13-004	31	Illiterate	Married	Hindu	Regular	Others	Negative	Negative	Negative
13-005	46	Primary	Married	Hindu	Menopause	Unhealthy cervix	Positive	Positive	Negative
13-006	35	Illiterate	Married	Hindu	Regular	Normal cervix	Negative	Negative	Positive

W_ID = women ID, Edu = education, Mart_Status = marital status, Reli = religion, Men_His = menstrual history, Cli_Sign = clinical sign, VIA_Res = VIA result, VILI_Res = VILI result, Cyto_Res = cytology result.

table 3:Post coding of hypothetical sample data of 6 women

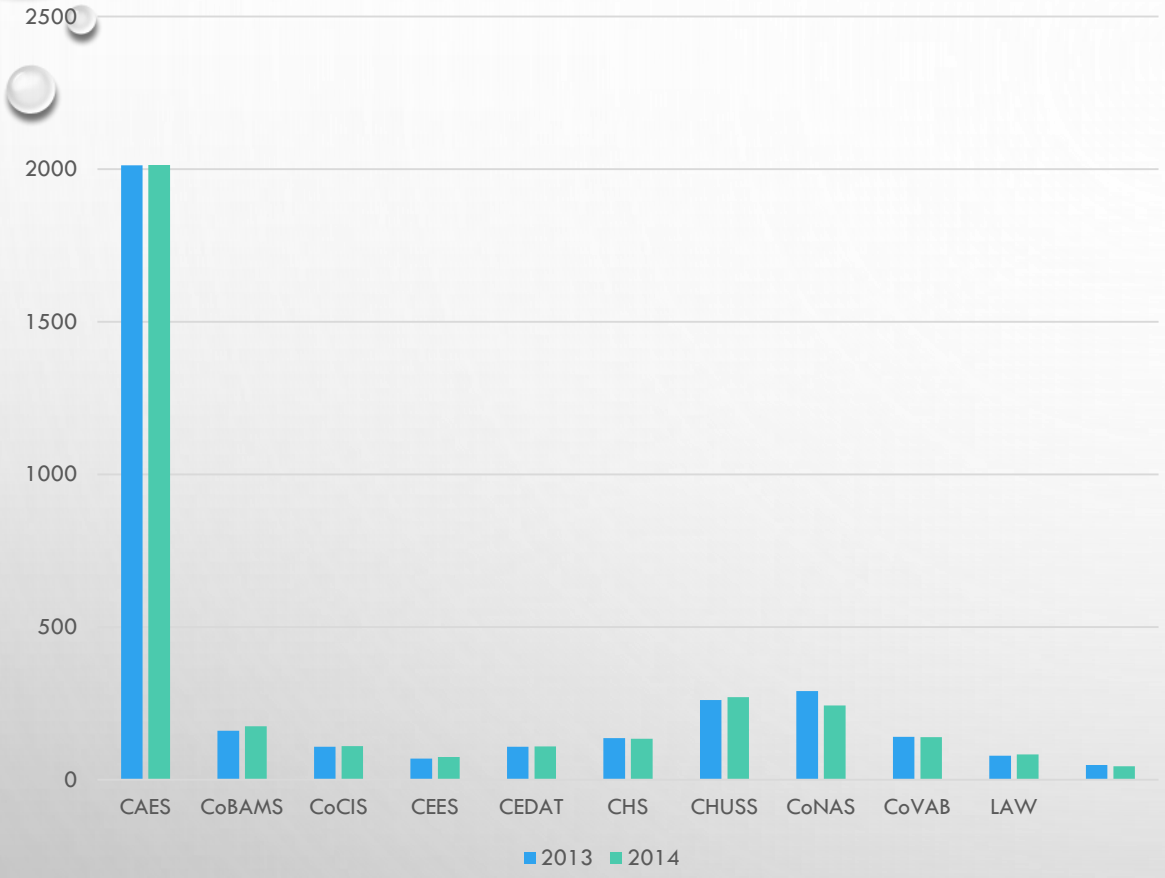
W_ID	Age	Edu	Mart_Status	Reli	Mens_His	Cli_Sign	VIA_Res	VILI_Res	Cyto_Res
13-001	35	1	2	1	1	1	2	1	2
13-002	50	1	2	1	3	2	2	2	2
13-003	40	2	2	1	2	3	2	2	2
13-004	31	1	2	1	1	4	2	2	2
13-005	46	2	2	1	3	2	1	1	2
13-006	35	1	2	1	1	1	2	2	1
13-007	42	1	2	1	2	3	2	2	2
13-008	40	1	2	1	2	2	2	2	2
13-009	50	1	2	1	3	2	1	1	1
13-010	30	1	2	1	2	1	2	2	2
13-011	40	3	3	2	2	1	2	2	2
13-012	30	1	2	1	1	1	2	2	2
13-013	45	1	2	1	2	2	2	2	2
13-014	50	3	2	1	3	3	2	2	1
13-015	50	1	3	1	3	2	2	2	2
13-016	55	2	2	1	3	2	2	2	2
13-017	30	4	2	1	1	1	2	2	2
13-018	49	4	2	1	2	1	1	1	2
13-019	40	1	2	2	1	2	2	2	2
13-020	45	1	2	1	2	3	2	2	2

W_ID = women ID, Edu = education, Mart_Status = marital status, Reli = religion, Men_His = menstrual history, Cli_Sign = clinical sign, VIA_Res = VIA result, VILI_Res = VILI result, Cyto_Res = cytology result.

GRAPHICS

- Graphics are particularly good for demonstrating a trend in the data that would not be apparent in tables.
- It provides visual emphasis and avoids lengthy text description.
- However, presenting numerical data in the form of graphs will lose details of its precise values which tables are able to provide.
- The authors have to decide the best format of getting the intended message across.
- Bar charts, either horizontal or column bars, are used to display categorical data. Bar charts with continuous data should be drawn as histograms or line graphs. Usually, data presented in bar charts are better illustrated in tables unless there are important pattern or trends that need to be emphasized.

Note: Avoid 3D GRAPHS AND CHARTS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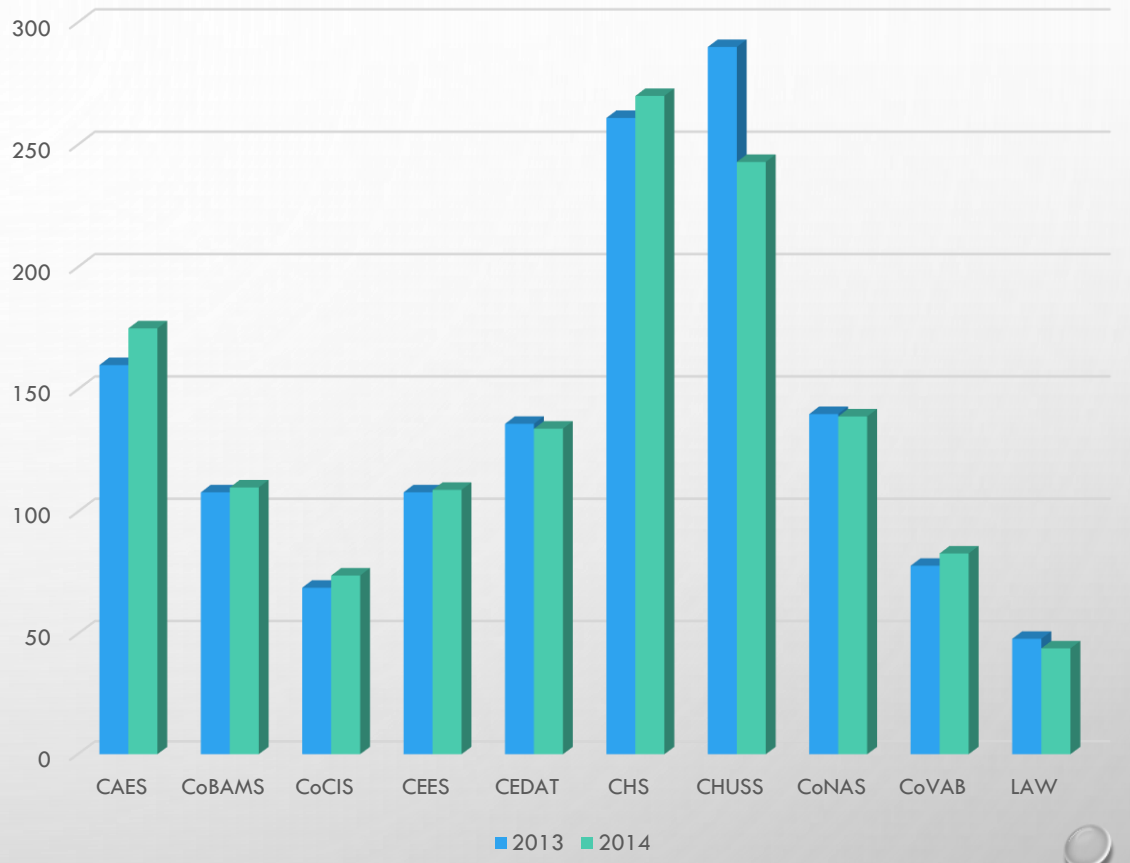
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STATISTICS

- Papers are often rejected because wrong statistical tests are used or interpreted incorrectly.
- Consult the statistician early. Bearing in mind that most readers are not statisticians, the reporting of any statistical tests should aim to be understandable by the average audience but sufficiently rigorous to withstand the critique of experts.
- Simple statistic such as mean and standard deviation, median, normality testing is better reported in text. For example, age of group a subjects was normally distributed with mean of 45.4 years old kg (SD=5.6). More complicated statistical tests involving many variables are better illustrated in tables or graphs with their interpretation by text.
- Quote and interpret p value correctly.
- Confidence intervals. It is now preferable to report the 95% confidence intervals (95%CI) together with p value, especially if a hypothesis testing has been performed.

CONCLUSION

- Main core of the result section consists of text, tables and graphics.
- As a general rule, text provides narration and interpretation of the data presented. Simple data with few categories is better presented in text form.
- Tables are useful in summarising large amounts of data systemically
- Graphics should be used to highlight evidence and trends in the data presented.
- Content of the data presented must match the research questions and objectives of the study in order to give meaning to the data presented.
- keep the data and its statistical analyses as simple as possible to give the readers maximal clarity.

Figures

- illustrations should be provided as separate files, not embedded in the main manuscript file.
- each figure of a manuscript should be submitted as a single file.
- tables should not be submitted as figures but should be included in the main manuscript file.
- multi-panel figures (those with parts a, b, c, d etc.) should be submitted as a single composite file that contains all parts of the figure.

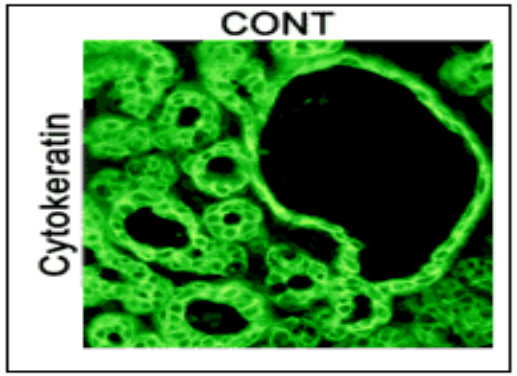


Figure 1a

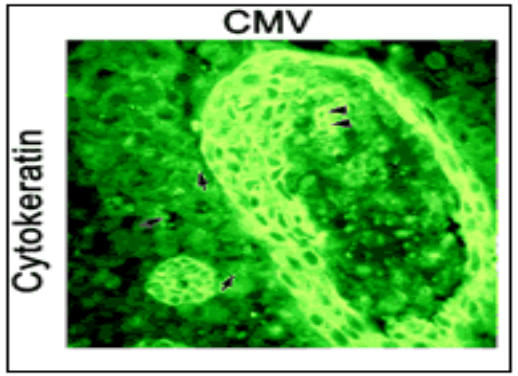


Figure 1b

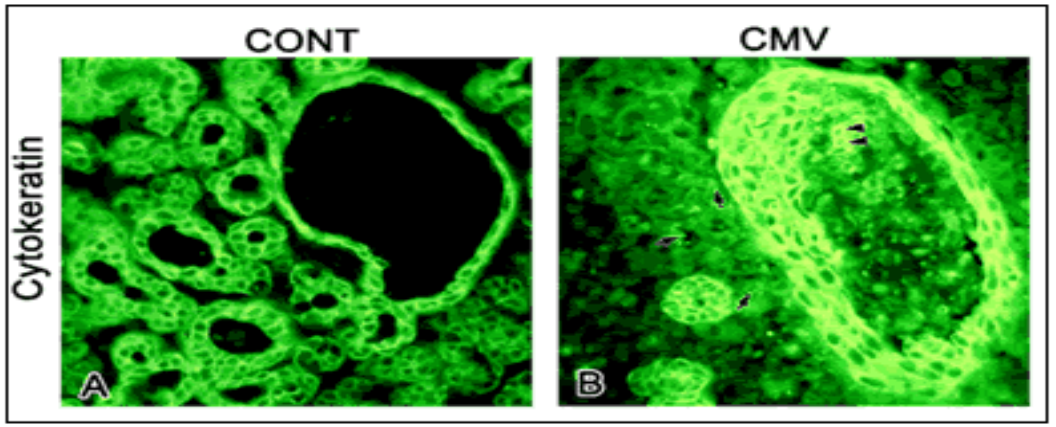
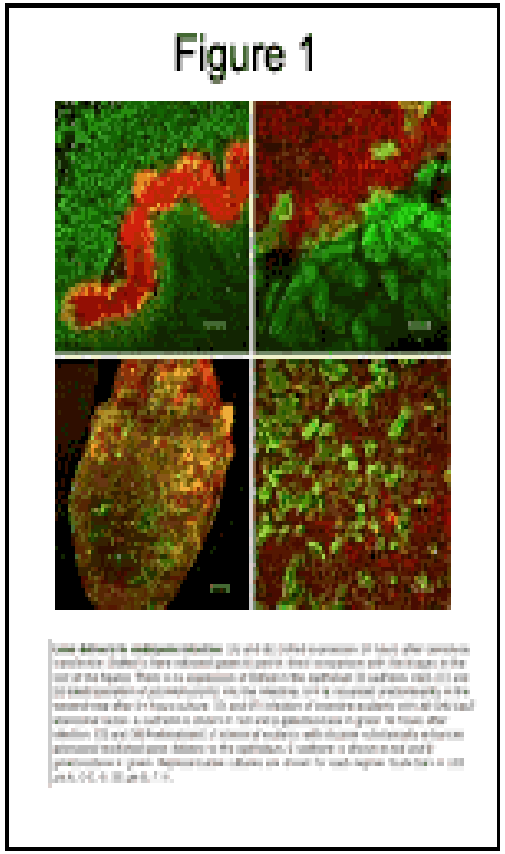
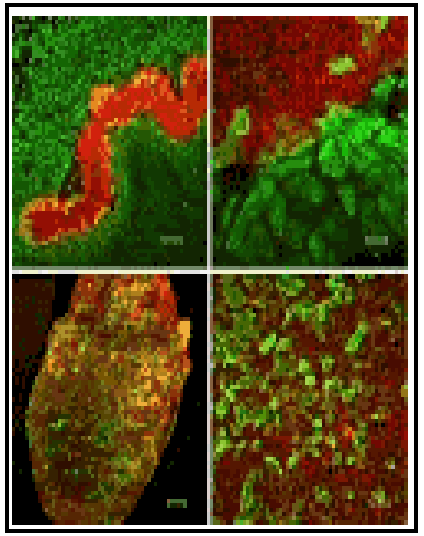


Figure 1





THANK
YOU

Q&A