Results –Quantitative data

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General intent

- The purpose of a results section is to present and illustrate your findings. Make this section a completely objective report of the results, and save all interpretation for the discussion.
- Should address research question(s) posed at the start
- Follows what is described in the methods
- Reports results whether or not they support your hypothesis

CONTENT of results

- Summarize your findings in text and illustrate them, if appropriate, with figures and tables.
- In text, describe each of your results, pointing the reader to observations that are most relevant.
- Provide a context, such as by describing the question that was addressed by making a particular observation.
- Describe results of control experiments and include observations that are not presented in a formal figure or table, if appropriate.
- Analyze your data, then prepare the analyzed (converted) data in the form of a figure (graph), table, or in text form.

Getting started on results

- Organize the layout of the results section in the same way you structured the hypotheses or research questions in the introduction section of your research project. This will make it easier for the readers to follow your results.

Getting started on results

- Start by describing the statistical test or tests used to compare the different conditions or test your hypotheses. Be clear on what hypothesis or question is being compared with each statistical test as well as how you are defining the groups being compared within the test

Getting started on results

- Use descriptive statistics to describe the overall characteristics of the groups being compared or sample tested with the inferential statistic.
- State the statistical results in the acceptable format for your discipline; you should familiarize yourself with whichever format is appropriate and follow the guidelines rigorously

Getting started on results

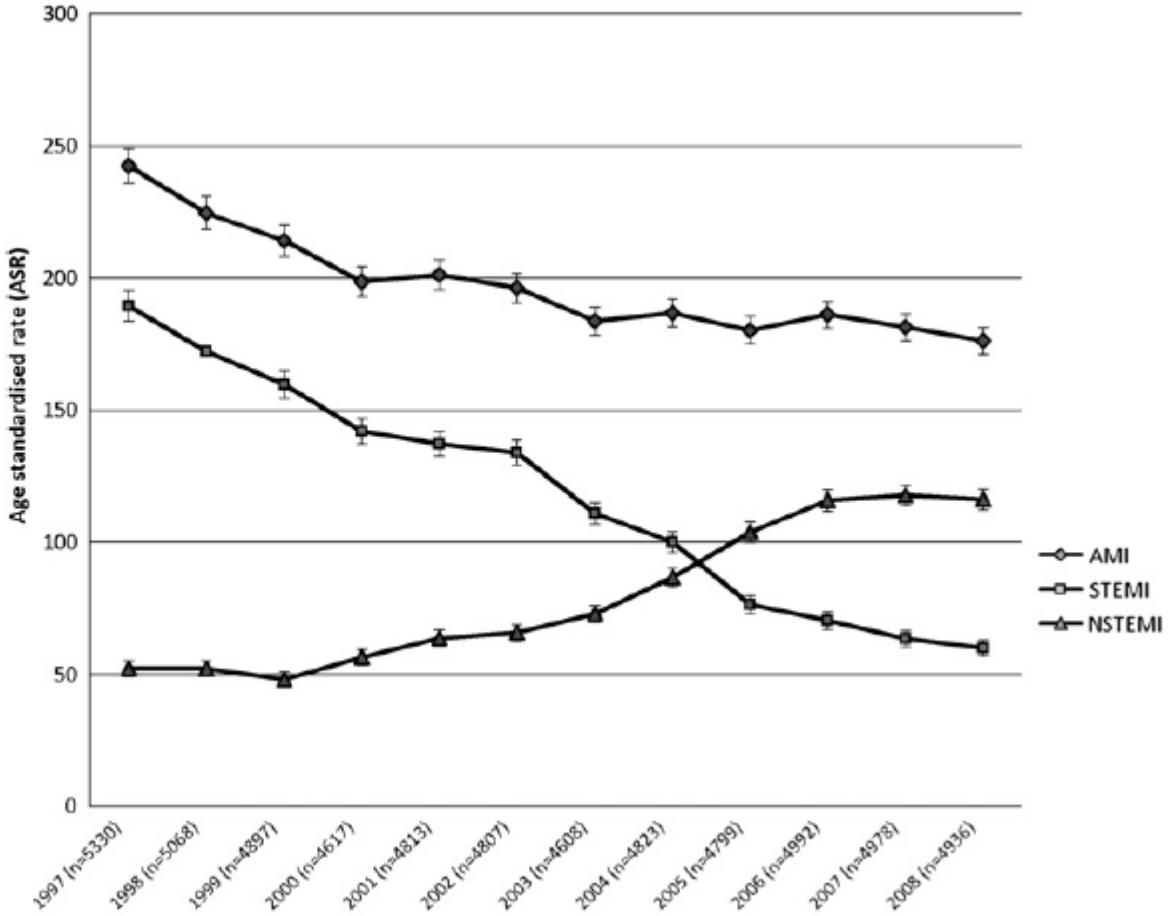
- End each statistical test with a sentence or two indicating what that particular statistical result says about the hypothesis or question. Was your hypothesis supported by the statistical result?

Getting started on results

- Use tables and figures sparingly. Tables and figures should help the reader visualize the important results
- Tables and figures are helpful to summarize a large amount of data that is essential for the reader to see.

Examples

Figure 1 Age-standardised rates (95% CI) for AMI, STEMI and NSTEMI, 1997–2008.



Examples

Table 2 Trend in numbers of hospitalisations, mean age, gender and in-hospital mortality for acute myocardial infarction (AMI), ST elevation myocardial infarction (STEMI) and non- ST elevation myocardial infarction (NSTEMI), 1997–2008

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	p Value, trend
Numbers of hospitalisations													
AMI	5330	5068	4897	4617	4813	4807	4608	4823	4799	4992	4978	4936	
STEMI	4131	3850	3610	3263	3239	3136	2718	2528	1961	1822	1691	1633	
NSTEMI	1199	1218	1287	1354	1574	1671	1890	2295	2815	3151	3282	3299	
Mean age (±SD)													
AMI* (m)	64.7	64.9	65.3	65.1	65.5	65.2	65.5	66.4	66.2	65.4	65.6	65.8	0.01
AMI* (F)	72.8	72.9	73.2	72.7	73.2	73.9	73.9	74.5	74.8	74.4	74.2	73.5	0.006
STEMI (M)	64.1	64.1	64.4	64.0	64.3	63.6	63.7	64.3	63.3	62.6	62.4	62.7	0.001
STEMI (F)	72.0	72.3	72.5	72.1	72.3	72.8	72.1	72.5	72.1	72.2	71.7	71.0	0.09
NSTEMI (M)	67.1	67.8	68.0	67.9	68.4	68.5	68.4	69.1	68.6	67.3	67.5	67.4	Ns
NSTEMI (F)	75.2	74.7	75.0	74.0	74.6	75.7	75.9	76.3	76.3	75.4	75.2	74.6	Ns
% Male													
AMI*	64.3	63.7	65.3	66.1	64.9	65.1	64.3	62.7	64.5	64.5	66.6	66.1	0.110
STEMI	66.0	65.4	66.9	67.4	67.7	67.9	68.3	67.4	70.9	70.4	71.9	68.3	<0.001
NSTEMI	58.5	58.5	60.9	63.0	59.2	59.7	58.6	57.6	60.1	61.1	64.0	64.9	<0.001
In-hospital mortality (crude rate)													
AMI*	15.4	15.7	15.4	15.1	14.3	13.4	11.8	12.0	11.9	10.8	10.6	10.5	<0.001
STEMI	15.1	15.5	15.1	14.1	11.9	12.4	10.4	11.3	11.2	9.8	9.8	10.5	<0.001
NSTEMI	16.5	16.2	16.3	17.7	16.2	15.5	13.7	12.7	12.3	11.4	11.0	10.5	<0.001
In-hospital mortality (age standardised)													
AMI*	6.2	5.4	4.9	7.1	4.6	4.8	4.9	4.3	4.0	3.5	2.9	3.7	<0.001
STEMI	6.5	5.6	5.1	7.3	4.2	4.8	4.2	4.7	4.1	3.7	3.5	4.8	0.01
NSTEMI	4.7	4.6	4.5	5.7	5.8	4.6	6.0	3.5	4.2	3.5	2.6	3.0	0.02

*ICD code I22 is included in the AMI figures but not in STEMI/NSTEMI.

Getting started on results

- Rewrite and revise until you have every test necessary to test your hypotheses and the reader can easily determine what the results indicate in terms of your hypotheses or questions.

Specific points

Data vs results

- **Data** are facts presented as numbers or figures e.g. means, proportions etc.
- **Results are general statements that** interpret data, i.e., the meaning of the data

Example: Data but no result

- In the 20 control subjects, the mean resting blood pressure was 85 ±5 (SD) mmHg. In the 30 athletes, the mean resting blood pressure was 94 ± 3 mmHg.

Result and general idea of the magnitude

- The mean resting blood pressure was 10% higher in the 30 athletes than in the 20 control subjects [94 ±3 (SD) vs. 85 ± 5 mmHg, *P < 0.02].*

Differences, directionality, and magnitude

- Provide as much information as possible to the reader about the nature of differences or relationships.
- For example, if you testing for differences among groups, and you find a significant difference,
  - you *should not* simply report that "groups A and B were significantly different".
  - *but* "Group A individuals were 23% larger than those in Group B“
- Report the *direction* of differences (greater, larger, smaller, etc) and the *magnitude* of differences (% difference, how many times, etc.) whenever possible.

Presenting statistical data

- **Statistical test summaries are usually reported parenthetically in conjunction with the results they support.**
  - This should include the statistical test used and the level of significance (test statistic and DF are optional).
- For example, if you found that the mean height of male stroke patients was significantly larger than that of female patients, you might report this result (in blue) and your statistical conclusion (in red) as follows:
- "Males (180.5 ± 5.1; n=34) averaged 12.5 cm higher than females (168 ± 7.6 ; n=34) (two-sample t-test, t = 5.78, 33 d.f., $p < 0.001$)."

Use and over-use of the word "significant"

- In scientific studies, the use of this word implies that a statistical test was employed; limit the use of the word "significant" to this purpose only.
- If your results include a p-value that indicates significance (usually when $p < 0.05$), it is *unncecssary* (and *redundant*) to use the word "significant
- Interpretation of confidence intervals should focus on the implications (clinical importance)

Problems to avoid

- **Do not** reiterate each value from a Figure or Table - only the key result or trends that each conveys.
- **Do not** present the same data in both a Table and Figure - this is considered redundant and a waste of space and energy. Decide which format best shows the result and go with it.
- **Do not** report raw data values when they can be summarized as means, percents, etc.

Style

- As always, use past tense when you refer to your results, and put everything in a logical order.
- In text, refer to each figure as "figure 1," "figure 2," etc. ; number your tables as well (see the reference text for details)
- Place figures and tables, properly numbered, in order at the end of the report (clearly distinguish them from any other material such as raw data, standard curves, etc.)
- If you prefer, you may place your figures and tables appropriately within the text of your results section.

Figures and tables

- Either place figures and tables within the text of the result, or include them in the back of the report (following Literature Cited)
- If at the end of the report, make sure they are clearly distinguished from any attached appendix materials
- Regardless of placement, each figure must be numbered consecutively and complete with caption
- Each table must be titled, numbered consecutively and complete with heading (title with description goes above the table)
- Each figure and table must be sufficiently complete that it could stand on its own, separate from text

Observational studies - STROBE

- In observational studies considerations of confounding and bias are as important as statistical significance.
- Unadjusted and adjusted (for confounders) estimates provide some idea of the effect of confounding.

STROBE:RESULTS

- Participants – report numbers at each stage of the study – eligible, included, followed up and analysed. A flow chart can sometimes help.

- Give reasons for non-participation at each stage

STROBE:RESULTS

- Descriptive data:
  - Give characteristics of study participants (demographics etc) and information on exposures and confounders
  - Give numbers with missing data for variables of interest

STROBE:RESULTS

- Outcome data
  - Cohort studies – report number of outcome events or summary measures over time
  - Case-control study – report number in each exposure category or summary of exposure
  - Cross-sectional study – report number of outcome events or summary measures

STROBE:RESULTS

- Main results
  - Give unadjusted estimates, and adjusted (for confounders) and their precision (95% CI). Make clear which confounder were adjusted for and why
  - Report category boundaries when continuous data are categorised
  - Consider translating estimates of relative risk into absolute risk for meaningful time period

STROBE:RESULTS

- Other analyses
  - Report other analyses performed
  - Subgroups and interactions/effect modification
  - Sensitivity analyses