

Scientific Writing

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Reasons to publish your research results

- It is unethical to conduct a study and not report the findings
- You have some results that are worth reporting
- You want to progress scientific thought or improve health outcome
- You want to give credibility to your research team and reputation
- You want your work to reach a broad audience
- You will improve your chance of promotion
- You are more likely to obtain research grants

Reasons to publish your research results

From a scientific point of view:

Results that are **not** published
mean the research did **not** take
place

Rewards for being a good writer?

- Writing **time** is more productive and less frustrating
- Peers will take you more seriously
- Your research is more likely to lead to publications
- Your **grant applications** are more likely to be funded
- Your expertise will help you to become a **good reviewer or editor**

Authorship

Avoid guest- and ghost-writers

Authorship credit is based only on **substantial** contribution to:

- conception or design, **or** the acquisition, analysis, **or** interpretation of data
- **and** drafting the article **or** revising it critically for important intellectual content
- **and** final approval of the version to be published

Those who do not meet all these criteria should be acknowledged

Solely acquiring funding or collecting data does not justify authorship

All who meet the first criterion should have the opportunity to participate in criteria # 2 and 3

No one who fulfils the criteria should be excluded

Authorship

Corresponding author

Corresponding author is responsible for:

- communication during submission, peer review, and publication process
- administrative requirements (authorship details, IRB and COI forms, and clinical trial registration documentation)
- responding to critiques of the work and cooperating with any requests from the journal for data or additional information after publication

Types of article

Original research articles

- Introduction, Methods, Results, Discussion, and Conclusion
- Recommended length: 2000-3500 words

Short (Brief) communications

- Introduction, Methods, Results, Discussion, and Conclusion
- Recommended length: 1500-2000 words

Review article

- Solicited reviews selected by members of the editorial board
- Unsolicited reviews
- No standard sections
- Recommended length: 3500-8000 words

Types of article (*cont'd*)

Case reports/series: Introduction, Case(s) presentation, and Discussion

Letters to the editor (Correspondence)

[Medical hypotheses](#)

[History of medicine](#)

Other types

Correspondence

Or [Letter to the Editor](#)

On a recently published article

- Not indexed in Medline (via an online commenting system)
- Indexed in Medline (if subsequently published on a numbered electronic or print page)

On a general topic of interest

Report of an original research or a case (usually <1000 words)

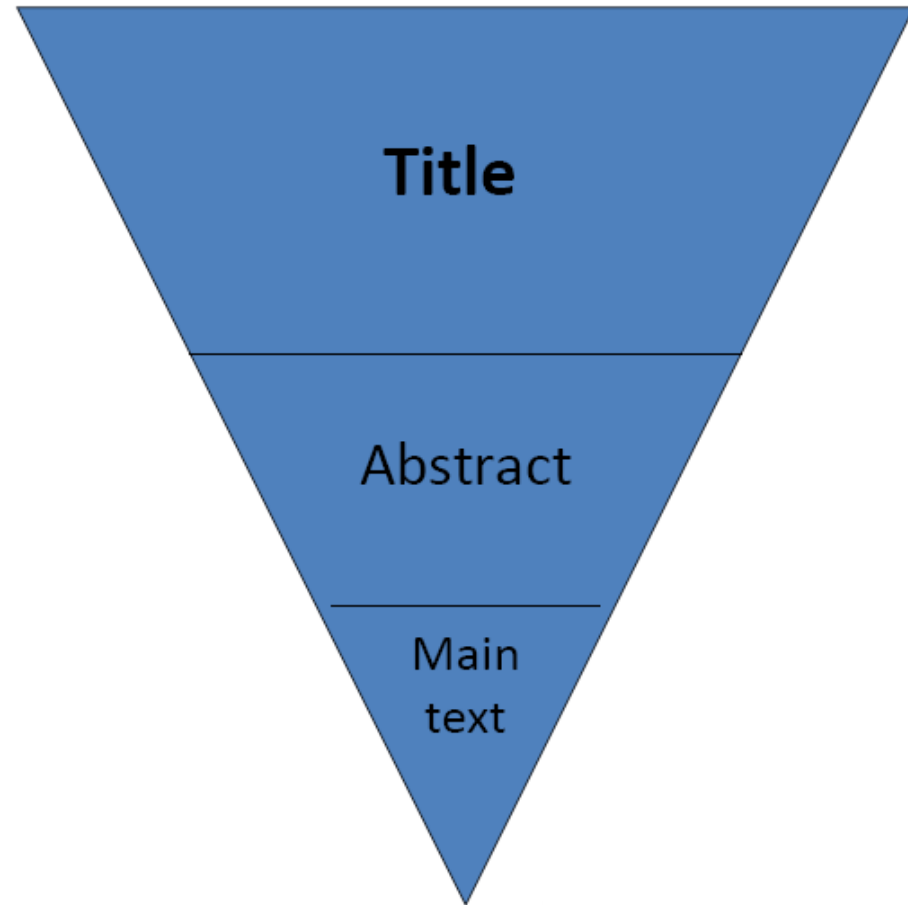
Where to start?

- **Methods**
- **Results**
- **Discussion**
- **Introduction**
- **Abstract/Title**

Title

The part most often read

Often the **only** part read



Title

Different ways of writing titles

Giving independent/dependent variables and population

- Effect of asthma on linear growth in children
- Asthma and linear growth in children
- Final height attainment of asthmatic children

Posing a question

- Does asthma reduce linear growth?
- Are asthmatic children shorter than non-asthmatic children?

Giving the answer to the question

- Asthma is negatively associated with growth in height
- Linear growth deficit in asthmatic children

Title

A common title: "Effect of Hypoxia on Exercise Capacity in the Rat"

Model + Outcome

Better Title: "Hypoxia Reduces Exercise Capacity in the Rat by Limiting O₂ Diffusion Within Muscle"

Species

Mechanism

Title – Group Exercise

What information is missing in this title and what would be a better alternative?

"Alcohol intake increases sexual risk behavior"

Title – Group Exercise

- What? Alcohol intake and sexual risk behavior
- Who?? eg. adolescents
- How?? eg. survey, cross-sectional study
- Where?? eg. Germany

"A survey on the effect of alcohol intake on sexual risk behavior among German adolescents"

Title

Journal editors may ultimately **rewrite**
the title after your paper is accepted
for publication

Abstract

Second most read part of your work

Many readers rely on reading the abstract rather than the whole article

Usually 250-300 words

Structured (Background, Aim, Methods, Results, Conclusion)

Unstructured

Key words

Writing your paper---Introduction

Or Background

If much longer and contains too much general knowledge, the reader/reviewer may lose interest

Ideally consists of three paragraphs

End with the research question

Appropriate verb tense (**aim of study presented in the past tense**)

Writing your paper---Introduction

Move from general to specific



Funnel-shaped, from general to specific

Writing your paper---Introduction

Three paragraphs

Paragraph 1:
What we know

Very short summary of the current knowledge of your research area

Paragraph 2:
What we don't know

Summarizes what other people have done in this field, what limitations have been encountered with work to date, and what questions still need to be answered

Paragraph 3:
Why we did this study

Clearly state what you did and why

Writing your paper---Introduction

Special notes

- Do not put “text book” knowledge into your introduction because readers will not want to be told basic information that they already know
- Do not end the introduction section with a quick summary of your own results
- **Last paragraph** of the introduction
 - most essential part of the introduction
 - giving details of your aim or hypothesis
 - should be the very first sentence you write with your coauthors
 - a good place to tell your readers, in a few words, the type of study design

Writing your paper---Introduction

Potential problems

- The reason for the study is not clear
- Lack of focus (research article is not a review article)
- Overuse of references (research article is not a review article)
- Too many references suggest that the author is not truly knowledgeable in the field and cannot discern the most important studies on the topic

Writing your paper---Methods Format

Materials and Methods=a recipe

Written in **past tense**

Remember that you are not writing a travel guide.

Format

- Patients; Study Design; Study Drugs/Interventions; Study End Points; and Statistical Analysis
- Data corresponding to each of these headings, except for Statistical Analysis, will **need to be presented in the Results section** (in the same order)
- Refer to the [CONSORT](#) (Consolidated Standards of Reporting Trials) checklist

Writing your paper---Methods Content

Enough detail must be given to duplicate the study

Common knowledge information can be omitted such as exclusion of

- pregnant or lactating women
- subjects who are receiving other investigational drugs

If a particular method or procedure has been **described previously**, **only a reference** to the method should be used

Modifications of previously published or well-known methods should be explained in detail

Writing your paper---Methods

Patients

Institutional review board (IRB) ethics committee approval and informed consent statement:

- “The protocol was approved by the institutional review board of all participating institutions, and all patients gave written informed consent before any study-related procedures were done.”

Protocol-specific demographics of age, sex, and disease state should be provided

The time frame of the study should be provided

Inclusion and exclusion criteria

Writing your paper---Methods

Study Design: Randomization method

Sample size: include details of your **sample size calculations**

Questionnaires

- give precise details of the questionnaires you used
- how they were developed, validated, and tested for repeatability
- mode of administration

Study Drugs/Interventions

- name of the study drugs
- dosage (ie, amount and frequency)
- manufacturer

Writing your paper---Methods

Study End Points

“The **primary** efficacy end point was the proportion of patients who did not have progressive disease measured after 12 months of therapy.”

“**Secondary** end points were survival time and the need for palliative therapy. The primary safety end points were reports of adverse events and changes in laboratory parameters.”

Writing your paper---Methods

Statistical analysis

Data were shown as mean \pm standard deviation (for normal distribution); t-test

Data were shown as median (interquartile range) (for non-normal distribution); Mann–Whitney U or Wilcoxon rank sum test

Data were presented as mean \pm standard deviation (SD) or as median (interquartile range). Statistical analysis was performed with the Statistical Package for Social Sciences for Windows (Version 16, SPSS Inc., Chicago, IL) using the chi-square test, Fisher's exact test, Mann–Whitney U test, Wilcoxon signed-rank test, independent-samples t test, and paired-samples t test, as appropriate. A p value of <0.05 was considered statistically significant.

Writing your paper---Results

Provide the results for all end points and measures stated in the methods

The results section should report the results of your study only

After the methods, this should be the **easiest section to write**

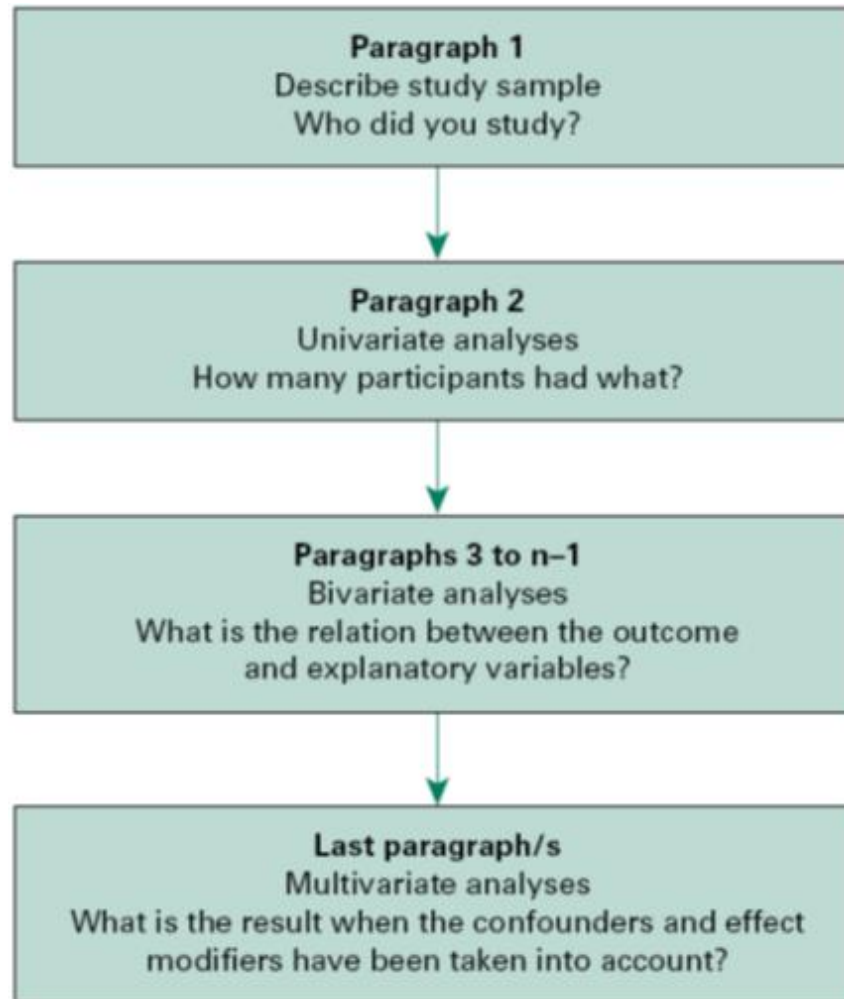
In tables, do not write $P < 0.05$ instead of $P = 0.043$

In tables, do not write “NS (not significant)” for indicating a lack of statistical significance

Writing your paper---Results Paragraphs

- Paragraph 1
 - Give accurate details of your study sample
 - In most papers, Table 1 is used to describe the details of the participants
- Next paragraphs
 - Explain what your paper is really about

Writing your paper---Results Paragraphs



Writing your paper --- Results

Statistics

Central tendency

Mean (average)

Measure of the centre of the data
($\Sigma x/n$)

Median (centre)

The point at which half the measurements lie below and half lie above. Calculated by ranking measurements in order.
Median = observation at the middle of the ranked data

Spread

Standard deviation (SD)

95% of the measurements lie within two standard deviations above and below the mean
 $SD = \sqrt{\text{variance}}$
 $\text{Variance} = \Sigma (x_i - \bar{x})^2/n - 1$

Range

Lowest and highest value
Calculate by ranking measurements in order

Interquartile range

Range of 25th to 75th percentiles
Calculate by ranking measurements in order

Precision

Standard error (SE)

Estimate of the accuracy of the calculated mean value
 $SE = SD/\sqrt{n}$

95% confidence interval (CI)

Interval in which we are 95% certain that the "true" mean lies
 $95\% \text{ CI} = \text{mean} \pm (SE \times 1.96)$

Writing your paper---Results

Potential problems

- Only provide the facts (explanation fits the discussion section)
- Failure to report all end points that were listed in the Methods section
- Pitfalls of translating Persian thesis into an English article!
- Avoid duplicating the same data in text, tables, and/or figures

Writing your paper---Discussion

How the results answer and support the research question

To compare and contrast the results with other studies in the field

Most difficult section of the article to write

No need to review the topic and the results in details again

Use **separate paragraphs** for different points you are making

Writing your paper---Discussion Paragraph 1

- **Begin** the discussion with
 - The results from this study showed that ...
 - Our results indicate that ...
 - The purpose of this study was to ... and we found that ...
- You can **restate the aim** in more general terms
- Brief summary of **what you really found** and why it was important
- **Do not restate** the results exactly as in the results section
- Remind the **uniqueness or newness** of your data

Writing your paper---Discussion

Paragraph 2

- Discuss how your results **agree** or **disagree** with other studies
- Confine yourself to discussing the work in your field that is highly relevant and reputable
- Different conclusion from other researchers
 - try to **explain** why you think this has happened

Writing your paper---Discussion Limitations

- Last paragraph before conclusion
- The **strengths** and **limitations** of your study design/methods
- **Honesty** is the best policy
- How your research is better than what has gone before

Writing your paper---Discussion

Last paragraph

- Exciting **summary** of the implications of your findings
- Never generalize your results beyond the bounds of the type of participants included in your study
- Never draw unjustified conclusions
- Never finish a discussion with,
 - “Further studies are needed ...”
 - “We are now investigating whether”

Writing your paper---Discussion

Topic sentences...

- begin a paragraph and explain what it will be about
- create the expectation of what the paragraph will be about
- are useful for introduction, discussion, and, results sections

Writing your paper---Discussion

Topic sentences

This study has important implications for both the prevention and treatment of asthma.

The data from the current studies add strength to the evidence that there is a causal relation between housedust mites and asthma.

The evidence that housedust mite allergens have an important association with asthma morbidity continues to accumulate.

There is encouraging evidence that reduction of housedust mite allergen exposure can reduce asthma morbidity.

Writing your paper---Discussion

Potential problems

- Too long, rambling, and unfocused
- Of little or no relevance to the present study
- Literature review is selective and biased in support of the paper
- Too much re-presentation of the data
- Failure to interpret the data and place them in the context of prior work
- Failure to reconcile divergent findings of other investigators
- Limitations are not adequately discussed
- Overly extrapolating findings
- Concluding more than the data allow

Writing your paper---Discussion Group Exercise

What do you think of this conclusion?

**Our results suggest that vitamin consumption
could be associated with a decreased risk of
respiratory illness.**

Writing your paper---Discussion

Group Exercise

To replace suggest with show or could be with is would be firmer but, unless you have conducted a definitive study, it is probably best not to change both parts of the sentence to stronger, more positive wordings.

Our results **suggest that vitamin consumption
could be associated with a decreased risk of
respiratory illness.**

Writing your paper

Verb tense throughout the paper

Section	Verb tense	Examples
Introduction	Present or past tense for describing the evidence that exists Past tense for describing your aims or hypotheses	It is known that ... There is no evidence that ... Therefore, we investigated whether ...
Methods	Past tense throughout	Participants were recruited from ...
Results	Past tense for results Present tense to refer to tables, etc.	We found that ... Figure 1 shows that ...
Discussion	Present tense for answers to questions Present tense to discuss the literature Past tense to discuss the results	Our findings suggest that ... Evidence from cohort studies shows that ... We found that ...

Tables and Figures

- Use the **present tense** to refer to figures and tables
- **No more than six** tables or figures
- Use Table 1 for sample characteristics (no *P* values)
- Put most important findings in a figure
- **Not embedded** in the manuscript

Thanks