Principles of Scientific Writing

Alireza Heidary Rouchi, MD
Iranian Tissue Bank & Research Center
Tehran University of Medical Sciences

June 12, 2015
Objectives of Publishing a Scientific Paper

• Assess the observations/ evidences you made

• Repeat the experiment if they wish

• Determine whether the conclusions drawn are justified by the data
Reasons to publish research results

• It is unethical to conduct a study and not report the findings (Participants, Funding Body)
• You have some results that are worth reporting
• You want to progress scientific thought or improve health outcomes
• You want to give credibility to your research team
• You want your work to reach a broad audience
• Your track record will improve
• You will add credibility to your reputation
• You will improve your chance of promotion
• You are more likely to obtain research grants
Scientific Writing

• Follows certain conventions
• These conventions relate to:
  Format
  Design
  Voice
  Tense
  Concision
  Organization
  Citation
Steps in Scientific Writing

• Design well
• Decide politics
• Choose journal
• Read instructions to authors/papers
• Set framework
• Prepare drafts
• Distribute
• Polish
• Submit
Absolute Requirements of a Study

Answer to this question: What does this study add to the global knowledge?

Study should be Well Designed & Well Reported
Well-Written Paper

• Easy to read
• Tells an interesting story
• Providing information under the correct headings
• Visually appealing
Standardized Reporting Guidelines

Writing is the only thing that, when I do it, I don’t feel I should be doing something else.

Gloria Steinem
Critical Appraisal Tools

• Two main Sources of "Key Reporting Guidelines":

1. Equator Network
2. CASP
International Ethical Guidelines for Biomedical Research & Publication Ethics

• ICMJE
  (International Committee of Medical Journal Editors)
  (Vancouver Group)
  www.icmje.org

• WAME (World Association of Medical Editors)
  www.wame.org

• COPE (Committee on Publication Ethics)
  www.publicationethics.org

• CIOMS (Council for International Organizations of Medical Sciences)
  www.cioms.ch
Welcome to the CASP UK Website

The Critical Appraisal Skills Programme helps people to find and interpret the best available evidence from health research.

It is part of an international network that shares a commitment to self-directed learning and promoting better understanding of science.

On this website you can find out about the CASP approach, download the CASP checklists, and find out what sort of workshops we offer to help improve your appraisal skills.

You can even commission one that is custom designed for your needs.

Checklists
Download the CASP critical appraisal checklists for:

Workshops
Soon we hope to offer you the facility to find a Critical Appraisal or Finding the Evidence workshop near you. In

Network News
Some people are experiencing difficulties downloading the CASP checklists from the website, due to
CASP CHECKLISTS

This set of eight critical appraisal tools are designed to be used when reading research, these include tools for Systematic Reviews, Randomised Controlled Trials, Cohort Studies, Case Control Studies, Economic Evaluations, Diagnostic Studies, Qualitative studies and Clinical Prediction Rule.

These are free to download and can be used by anyone under the Creative Commons License.

CASP Checklists (click to download)

<table>
<thead>
<tr>
<th>CASP Systematic Review Checklist</th>
<th>CASP Qualitative Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td>CASP Randomised Controlled Trial Checklist</td>
<td>CASP Case Control Checklist</td>
</tr>
<tr>
<td>CASP Diagnostic Checklist</td>
<td>CASP Cohort Study Checklist</td>
</tr>
<tr>
<td>CASP Economic Evaluation Checklist</td>
<td>CASP Clinical Prediction Rule Checklist</td>
</tr>
</tbody>
</table>

Some Study Designs.....
www.equator-network.org
A full paper may contain

- Title
- Authors and Affiliation
- Abstract
- Introduction
- Methods
- Results
- Discussion
- Acknowledgments (optional)
- References
Covering letter

• Write a cover letter, short and direct, addressed to the editor
  • Polite
  • Why Journal chosen
  • Importance of paper
  • Brief
Covering letter

• Describe the paper
• Conflict of interest
• Corresponding author
• Suggest reviewers
Title Page

Based on “Instruction to Authors”

- Title
- Running Title
- Authors
- Affiliation
- Organization
- Correspondence
- In advance “Registration Number” in case of RCTs
- Funding (if any), and the role of Funder/s
- Conflict of Interest (Competing Interest)
An abbreviated version of the title is called a running title, which may be used for identification of the report on subsequent pages.
Authors

• Full name, highest academic degree, title/s, position and address

• Many journals limit number of authors to 10

• Write The name of authors in separate lines
Corresponding Author

- Name
- Affiliation
- Organization/Department
- Mailing Address
- Phone and Fax
- E-mail

- Date on which the paper was submitted
Suggested Maximum Number of Authors

<table>
<thead>
<tr>
<th>Type of publication</th>
<th>Suggested maximum number of authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal articles</td>
<td>8–9</td>
</tr>
<tr>
<td>Letters</td>
<td>4–5</td>
</tr>
<tr>
<td>Reviews</td>
<td>3–4</td>
</tr>
</tbody>
</table>
Order of Draft Writing

• Methods (even before conducting the study)
• Results
• Introduction
• Discussion
• Abstract
• References
• Title
Main Components of an Article

• **Introduction:** Why did you start?
• **Methods:** What did you do?
• **Results:** What did you find?
• **Discussion:** What does it all mean?
<table>
<thead>
<tr>
<th>Section</th>
<th>Question to be answered</th>
<th>Purpose</th>
<th>Expected length with A4 paper, font size 10–12 and 1.5 line spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>Why did you start?</td>
<td>Summarise the context of your study and state the aims clearly</td>
<td>1 page</td>
</tr>
<tr>
<td>Methods</td>
<td>What did you do?</td>
<td>Give enough detail for the study to be repeated</td>
<td>2–3 pages</td>
</tr>
<tr>
<td>Results</td>
<td>What did you find?</td>
<td>Describe the study sample and use the data analyses to answer the aims</td>
<td>2–3 pages</td>
</tr>
<tr>
<td>Tables and figures</td>
<td>What do the results show?</td>
<td>Clarify the results</td>
<td>3–6 tables or figures</td>
</tr>
<tr>
<td>Discussion</td>
<td>What does it mean?</td>
<td>Interpret your findings in context of other literature and describe their potential impact on health care</td>
<td>2–3 pages</td>
</tr>
<tr>
<td>References</td>
<td>Who else has done important work in your field?</td>
<td>Cite the most relevant and most recent literature</td>
<td>20–35 references</td>
</tr>
<tr>
<td><strong>Total document</strong></td>
<td></td>
<td></td>
<td><strong>12–20 pages</strong></td>
</tr>
</tbody>
</table>
‘spend as much time on your title and abstract as you spend on the rest of the paper’.
your title must be

- accurate,
- specific,
- concise,
- informative,
- Title must not contain abbreviations
- Title must never be boring

*Study design should be stated clearly or can be inferred in Title.*
It is a sad fact of life that few researchers or clinicians read a journal article from beginning to end.
• whether or not potential readers find the paper?
• Will they take the time to download and read the full article?
• Each of these factors is a fundamental determinant of the paper’s impact.
Title and abstract

The shortest components of most academic work are the most important because if you do not write an effective title and abstract, there is little reason to invest in writing the rest of your paper.

Trailer to the movie
Title

• Titles take up only a few words
• It attracts readers.
• The basic function of a title is to describe the content of your paper in a succinct way.
• In these days of database searching, keywords in the title make your paper immediately accessible to workers in your field.
• Titles can also be used as a key tool to give your paper a distinct personality
Characteristics of effective titles

• Effective titles:
  • identify the main issue of your paper.
  • begin with the subject of your paper
  • are accurate, unambiguous, specific, and complete.
  • do not contain abbreviations.
  • attract readers.
Title

• Journals sometimes have specific requirements for titles.

• For example, *Archives of Diseases in Childhood* asks that the title does not contain the words *child, children or childhood* because these are implicit in the journal title.

• *They* also ask that the study design such as randomized controlled trial, observational study, etc., is included where appropriate.
Title

• Short titles are usually the best.
• some journals set a limit on the length.
• For example,
• some journals ask that the title does not exceed 10–15 words,
• whilst
• other journals ask that the title does not exceed two printed lines
• or a specified number of characters that includes the white spaces
Title

• Keep **clarity**, **brevity**, and, most of all, **human interest**.

• The following two journal articles relating to the human genome were published about the same time:
  
  ✓ *The sequence of the human genome.*
  ✓ *Initial sequencing and analysis of the human genome.*

• the first title is **shorter** and thus **more appealing**
• Consider the two titles below:

✓ The effect of parental smoking on the development of asthma and other atopic diseases in children: evidence from a birth cohort study in NSW, Australia.

✓ Parental smoking and the development of childhood asthma.

• The first title is comprehensive and descriptive but contains just too many prepositions and qualifiers.

• Both titles convey the same message but

• the second title begins with the main subject of the study parental smoking and encompasses the scope of the paper in a few words.
Abstract

• this section of your paper should only convey the most interesting and most important parts of your work.

• Ideally, your abstract will be added to a public database such as MEDLINE® or PubMed® and will therefore achieve a much wider distribution than the journal article itself.

• People don’t read the whole article unless they have a vested interest in the topic

• many people rely on reading the abstract to decide whether to obtain the entire article
Different parts of an abstract

• **aims** of the study
• **basic study design** and **methods**.
• the **main results** including specific data and their **statistical significance**.
• the **conclusion** and interpretation
Adhere to the word limit

• Some journals such as *Science* and *Nature* that are very well regarded in scientific circles request very **short abstracts**, which may be as low as **100 words**.

• However, the **usual limit is 250 words**.

• **Even if** a larger word count is allowed, limit yourself to 250 words. MEDLINE® accepts only 250 words.

• If you can’t word trim yourself, ask a colleague to do it for you.
Abstract

• Choose the journal you intend to submit to before you start writing, visit its web site, click on the author guidelines.

• whether the journal uses **structured** or **unstructured** abstracts.
Information that should be included in your abstract

Do:

• Provide a clear indication of what the reader can expect from your paper.
• Indicate why the reader should care to read further.
• List the key methodological details required to understand both how your study addresses the research question and what to expect of the results.
• Describe the results that directly answer the research question (usually including actual values for quantitative studies).
• Summarize the paper with the take home message of greatest importance.
Information that should be included in your abstract (cont’)

Do NOT:

• Meander into peripheral issues.
• Attempt to comprehensively describe every feature of your methodology.
• Present the first section of your results. Generally the results section in the body of your paper will offer a description of your participants. While that is important it is not usually the focus of the study.
• your abstract should offer a succinct summary of what the reader can expect to get out of reading your full article.

• What is the problem (or research question) your paper is going to address and why is it important?

• How did you go about collecting the data that empower you to speak to that problem?

• What did you find?

• What is the key message the reader should take away from your article?
Introduction

Paragraph 1: What we know

Paragraph 2: What we don’t know

Paragraph 3: Why we did this study
Introduction

• Brief and arresting
• Tell the reader why you have undertaken this study (aim)
• Must state clearly the question that you tried to answer in this study (state the importance of the subject)
• Clarify what your work adds (convince the audience that this study is different/ better that what has gone before)
• Brief review literature: only cite those references that are essential to justify your proposed study
• Except systematic review, introduction should include “Search Strategy”
• One-sentence description of “Study Design” should also be included
• Never include results or your conclusion
Write briefly, eliminate redundancy

Wordy:
In the first trial conducted in this experiment, there appears to be a demonstration of the effects when the substances are combined into one.

Concise:
The first trial demonstrated the negative effects of combining the substances.
Make Sentences Simple and Active

1. An analysis of the prefrontal cortex shows the patient’s inadequate emotional and behavioral regulation.

2. The researchers analyzed the patient’s prefrontal cortex and found that he inadequately regulated his emotions and behavior.
Observe Coherency

1. Intramembranous bones, in the cranium, are ossified from membranes transformed from mesenchymal tissues. The cranial vault, facial bones, the mandible, and the clavicle are intramembranous bones.

2. Some areas of the cranium are ossified from membranes transformed from mesenchymal tissues and are called intramembranous bones. These bones include the cranial vault, facial bones, the mandible, and the clavicle.
Use tenses correctly in the Introduction

✓ What is known
   in present simple tense
   Malaria is still the number one killer of all the infectious diseases. Most deaths.....

✓ Past studies and their results
   in past tense
   Schmidt et al. (1993) showed ....

Never forget including the aim/s of your study in the Introduction, preferably at the end.
Use tenses correctly in the Introduction

✓ Past results that are still valid
  in present perfect tense
  Malaria epidemics are known to be related to weather conditions. Previous research has shown ...

✓ The research aim or purpose
  in past tense
  The purpose of this study was to answer the following question.

✓ The research question
  in present tense
  What retrospective meteorological factors correlate....
Things to avoid in the introduction

✓ Reviewing the literature extensively
✓ Do not put the “text book knowledge

“Asthma is a condition in which the airways narrow in response to commonly occurring environmental stimuli.”

“Asthma is the most common chronic disease of childhood …”
Things to avoid in the introduction

• Do not end the introduction section with a quick summary of your own results.

  “We have undertaken a study to define the characteristics of children who become overweight. The results show that lack of exercise is a key factor and provide evidence that there has been a significant increase in overweight boys and girls in the last 12 years.”
Methods

• The purpose of the methods section is to describe how you:
  
  – reached your objectives
  – obtained your results

Simple & Transparent & Repeatable
Methods

- The most common part of a paper causes fast/absolute rejection.
- Provide enough details that the others could repeat the study.
- Describe/defend the experimental design.
- Give complete details of any new method used.
- Give the precision of the measurement undertaken.
- Sensibly use statistical analysis.
Methods

• Write this section, in full, before you start the study
• Describe in a logical sequence:
  How your study designed?
  How your study conducted?
  How you analyzed the data?
• Answer to WHO, WHAT, WHY, WHEN, WHERE, and HOW
Materials and Methods (1)

- Patients and Methods
- Methods and Participants
- Including:
  Participants
Inclusion and Exclusion Criteria (eligibility criteria)
Number of firstly enrolled participants
Materials and Methods (2)

• Also includes:
Ethical / Review Board Approval
Consent (+/-), Informed Consent (+/-),
Written or Oral Consent
The way of Participants Protection
Data Privacy/ Confidentiality
Questionnaire (How to develop?, How to validate?,
How tested for repeatability?)
The way of administration: self-, telephone-, interviewer administered)
Methods (Participants)

• use accurate and sensitive descriptions of race and ethnicity
• describe the logic behind any groupings that you use
• Common descriptors are:
  – Gender
  – self-assigned ethnicity
  – observer-assigned ethnicity
  – country of birth
  – country of birth of parents
  – Years in country of residence
  – religion
Methods (Study design)

• The study design should have been clearly identified before the study even began
• Should be *easily* described in the methods section
Methods (Study design)

• It is important to state the design of your study because:
  – each study type has its own strengths and limitations in terms of controlling for bias or confounding
  – Each study design also dictates the type of statistical tests that are appropriate
Methods (Sample size)

• The size of your study sample is of paramount importance for:
  – testing your hypothesis
  – fulfilling the study aims

• The number of participants should be large enough to Provide:
  – precise estimates of effect
  – reliable answer to the research question
Methods (Sample size)

• It is not *always* important to include details of your sample size calculations

• When the sample size is small
  – the results are rarely believable
  – the summary estimates lack precision
  – standard statistical methods may be inappropriate
  – generalisability of the results will be questionable
Methods (Questionnaires)

• you should give precise details of the questionnaires you used
• how they were:
  – Developed
  – Validated
  – Tested for repeatability
• The mode of administration:
  – self-administered
  – telephone-administered
  – interviewer-administered
Methods (Sample size)

• Sample size & Power level
  – what outcome variables your study was designed to detect a difference in
  – what size of difference you initially expected
  – what power level you were working with
  – why you chose a particular sample size

• When the differences are significant
  – Mentioning the Power is not applicable

• When the differences are not significant
  – You will be asked about the POWER
Methods (Interventions)

• You must also describe any procedures that you used to maximise or measure compliance with the interventions

• If a drug is being tested:
  – the generic name
  – the manufacturer
  – the doses used
  – any other information
Methods (Ethical Approval)

• It is important to give the details of the institutional ethics review boards who approved your study
• Ethics committees are convened to:
  – protect the rights and welfare of research participants
  – to ensure that informed consent is obtained
• Many journals now decline to publish results from studies that do not include details of prior ethical approval
Methods (Ethical Approval)

• Investigators should always document both:
  – the approval from the ethics committee
  – informed consent was obtained from each participant

• every paper must contain a statement about the protection of the participants

• If there is no need to be reviewed by an ethics committee, the reason should be provided (but should not have been made by the authors themselves)
Results *(short, meaty, clear)*

- The first/second? and easiest part of a manuscript to be written
- The section which the reader has been waiting for
- Major findings, relevant and representative data
- Clear and precise representation of the data
- Do not repeat in details the information provided in the tables or figures
- Minimize abbreviations
- Consistency of data in different parts of the paper: abstract, text, tables, figures
Results

• This section is **the most important part** of your paper

• because its function is to give **specific answers to the aims** that you stated in the introduction.

• **After the methods**, this should be **the easiest** section to write.
Template for the Results

Paragraph 1
Describe study sample
Who did you study?

Paragraph 2
Univariate analyses
How many participants had what?

Paragraphs 3 to n−1
Bivariate analyses
What is the relation between the outcome and explanatory variables?

Last paragraph/s
Multivariate analyses
What is the result when the confounders and effect modifiers have been taken into account?
<table>
<thead>
<tr>
<th>Notes</th>
<th>Topic sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td>The first paragraphs describe who the participants were.</td>
<td>A total of 1527 participants aged 18 to 73 years from two rural regions participated in this study. Table 1 shows the anthropometric characteristics of the participants ... and Figure 1 illustrates the selection criteria for our normal group. Table 2 shows that the “normal” group of participants were not significantly different from the remainder of the sample in terms of age, height, and weight ( (P &gt; 0.05) ).</td>
</tr>
<tr>
<td>The next paragraph describes the bivariate analyses.</td>
<td>The data for the normal group were used to obtain regression equations for FVC, FEV(_1) ... with weight, age, gender, and height as the main predictors.</td>
</tr>
<tr>
<td>The next paragraphs describe how the bivariate analyses were used.</td>
<td>Using our prediction equations, we calculated mean percentage of predicted FEV(_1) values for the whole sample (Figure 2). We then examined the factors that affect lung function.</td>
</tr>
<tr>
<td>The final paragraph describes the multivariate analyses.</td>
<td>Multiple regression showed that airway inflammation and asthma were significantly related to reductions in FEV(_1) and that the interaction between airway inflammation and recent symptoms was also significant ( (P &lt; 0.05) ).</td>
</tr>
</tbody>
</table>
### Clinical characteristics of patients randomised to usual care or nurse intervention. Values are numbers (percentages) unless stated otherwise$^2$

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Usual care (n = 81)</th>
<th>Nurse intervention (n = 84)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD) age (years)</td>
<td>75.6 (7.9)</td>
<td>74.4 (8.6)</td>
</tr>
<tr>
<td>Male</td>
<td>44 (51)</td>
<td>54 (64)</td>
</tr>
<tr>
<td>Living alone</td>
<td>38 (47)</td>
<td>37 (44)</td>
</tr>
<tr>
<td>Social services required</td>
<td>28 (35)</td>
<td>28 (33)</td>
</tr>
<tr>
<td>Other medical problems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>angina</td>
<td>40 (49)</td>
<td>38 (45)</td>
</tr>
<tr>
<td>past myocardial infarction</td>
<td>41 (51)</td>
<td>46 (55)</td>
</tr>
<tr>
<td>diabetes mellitus</td>
<td>15 (19)</td>
<td>15 (18)</td>
</tr>
<tr>
<td>chronic lung disease</td>
<td>18 (22)</td>
<td>23 (27)</td>
</tr>
<tr>
<td>hypertension</td>
<td>42 (52)</td>
<td>36 (43)</td>
</tr>
<tr>
<td>atrial fibrillation</td>
<td>24 (30)</td>
<td>29 (35)</td>
</tr>
<tr>
<td>valve disease</td>
<td>12 (15)</td>
<td>15 (18)</td>
</tr>
<tr>
<td>past admission for chronic heart failure</td>
<td>36 (44)</td>
<td>27 (32)</td>
</tr>
<tr>
<td>New York Heart Association class at admission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>16 (20)</td>
<td>19 (23)</td>
</tr>
<tr>
<td>III</td>
<td>33 (42)</td>
<td>28 (34)</td>
</tr>
<tr>
<td>IV</td>
<td>30 (38)</td>
<td>36 (43)</td>
</tr>
<tr>
<td>Degree of left ventricular systolic dysfunction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mild</td>
<td>10 (13)</td>
<td>18 (22)</td>
</tr>
<tr>
<td>moderate</td>
<td>42 (53)</td>
<td>31 (38)</td>
</tr>
<tr>
<td>severe</td>
<td>28 (35)</td>
<td>32 (40)</td>
</tr>
<tr>
<td>Renal function at admission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>median (interquartile range)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>plasma urea (mmol/l)</td>
<td>9.7 (6.5–13.9)</td>
<td>8.1 (6.0–10.3)</td>
</tr>
<tr>
<td>median (interquartile range)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>plasma cotinine (µmol/l)</td>
<td>116 (90–168)</td>
<td>108 (84–132)</td>
</tr>
<tr>
<td>Mean (SD) blood pressure (mmHg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>systolic</td>
<td>126.1 (21.4)</td>
<td>116 (19.5)</td>
</tr>
<tr>
<td>diastolic</td>
<td>70.1 (12.0)</td>
<td>68.4 (10.2)</td>
</tr>
</tbody>
</table>
Baseline characteristics

• To describe the baseline characteristics of the participants in any type of study, always use a table and never use a figure.

❖ comparability of the study groups
  o unevenly distributed confounders may cause an important bias.

• Generalisability of your results.
Baseline characteristics (cont’)

• Never call the baseline characteristics the “demographics” of your study sample.

Oxford Dictionary:

• *Demography* is the branch of anthropology in which the statistics of births, deaths, and diseases are studied.
statistics

• To avoid bias in your results, it is essential to use the correct statistical tests

• The best time to consult a statistician is at an early point in planning your study and not once the data analyses have begun
Results: statistics

- to describe the data distribution, you must use the correct measures of central tendency and spread:
  - Normally distributed data: Mean & SD
  - Skewed data: Median & Interquartile range

- In figures and tables, you must always explain whether you are using:
  - the SD as a measure of spread
  - the SE or 95% CI as a measure of precision
Results: statistics

In general:

• SDs are the correct measurement to describe baseline characteristics

• SEs and CIs are the correct measurements to describe precision
## Results: statistics

<table>
<thead>
<tr>
<th>Precision</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard error (SE)</td>
<td>Estimate of the accuracy of the calculated mean value</td>
</tr>
<tr>
<td></td>
<td>$SE = \frac{SD}{\sqrt{n}}$</td>
</tr>
<tr>
<td>95% confidence interval (CI)</td>
<td>Interval in which we are 95% certain that the “true” mean lies</td>
</tr>
<tr>
<td></td>
<td>$95% \ CI = \text{mean} \pm (SE \times 1.96)$</td>
</tr>
</tbody>
</table>


Results: statistics

• Describing the $P$ value as “NS” or “$P > 0.05$” can be misleading if the actual value is marginal, say 0.07, but the difference between groups is clinically important.

• Giving the exact value allows readers to make their own judgements about whether it is possible that a type I or type II error has occurred.
<table>
<thead>
<tr>
<th>Rule</th>
<th>Correct expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numbers less than 10 are words.</td>
<td>In the study group, eight participants underwent the intervention.</td>
</tr>
<tr>
<td>Numbers 10 or more are numbers.</td>
<td>There were 120 participants in the study.</td>
</tr>
<tr>
<td>Words not numbers begin a sentence.</td>
<td>Twenty per cent of participants had diabetes.</td>
</tr>
<tr>
<td>Be consistent in lists of numbers.</td>
<td>In the sample, 15 boys and 4 girls had diabetes.</td>
</tr>
<tr>
<td>Numbers less than 1 begin with a zero.</td>
<td>The $P$ value was 0.013.</td>
</tr>
<tr>
<td>Do not use a space between a number and its per cent sign.</td>
<td>In total, 35% of participants had diabetes.</td>
</tr>
<tr>
<td>Use one space between a number and its unit.</td>
<td>The mean height of the group was 170 cm.</td>
</tr>
<tr>
<td>Report percentages to only one decimal place if the sample size is</td>
<td>In our sample of 212 children, 10.4% had diabetes.</td>
</tr>
<tr>
<td>larger than 100.</td>
<td>In our sample of 44 children, 10% had diabetes.</td>
</tr>
<tr>
<td>Do not use decimal places if the sample size is less than 100.</td>
<td>In our sample of 18 children, two had diabetes.</td>
</tr>
<tr>
<td>Do not use percentages if the sample size is less than 20.</td>
<td>Only use one decimal place more than the basic unit of measurement when reporting</td>
</tr>
<tr>
<td>Do not imply greater precision than your measurement instrument.</td>
<td>statistics (means, medians, standard deviations, 95% confidence interval,</td>
</tr>
<tr>
<td></td>
<td>interquartile ranges, etc.)</td>
</tr>
<tr>
<td>For ranges use “to” or a comma but not “—” to avoid confusion with</td>
<td>The mean height was 162 cm (95% CI 156 to 168).</td>
</tr>
<tr>
<td>a minus sign and use the same number of decimal places as the</td>
<td>The mean height was 162 cm (95% CI 156, 168).</td>
</tr>
<tr>
<td>summary statistic.</td>
<td>The median value was 0.5 mm (interquartile range -0.08 to 0.7).</td>
</tr>
<tr>
<td></td>
<td>The range of heights was 145 to 170 cm.</td>
</tr>
<tr>
<td></td>
<td>The page range was 145–70.</td>
</tr>
</tbody>
</table>

Rules for data numbers do not apply to citations to the literature.
Tables

• Consider using a table to present large amounts of data/results.
  – Must refer to all tables in text.

• Use the “Stand alone” tables.
• Tables should not be too large.
• Make sure totals add to 100%
• Table legends go above the Table;
• Why?
• Tables are read from top to bottom.
Table 4. Population variation in hatch success (mean percent) of unfertilized eggs for females from populations sampled in 1997. N = number of females tested.

<table>
<thead>
<tr>
<th>Population</th>
<th>mean (%)</th>
<th>Standard deviation</th>
<th>Range</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaver Creek (^T)</td>
<td>7.31</td>
<td>13.95</td>
<td>0-53.16</td>
<td>15</td>
</tr>
<tr>
<td>Honey Creek (^T)</td>
<td>4.33</td>
<td>7.83</td>
<td>0-25.47</td>
<td>11</td>
</tr>
<tr>
<td>Rock Bridge Gans Creek (^T)</td>
<td>5.66</td>
<td>13.93</td>
<td>0-77.86</td>
<td>38</td>
</tr>
<tr>
<td>Cedar Creek (^p)</td>
<td>6.56</td>
<td>9.64</td>
<td>0-46.52</td>
<td>64</td>
</tr>
<tr>
<td>Grindstone Creek (^p)</td>
<td>8.56</td>
<td>14.77</td>
<td>0-57.32</td>
<td>19</td>
</tr>
<tr>
<td>Jacks Fork River (^p)</td>
<td>5.28</td>
<td>8.28</td>
<td>0-30.96</td>
<td>28</td>
</tr>
<tr>
<td>Meramec River (^p)</td>
<td>5.49</td>
<td>10.25</td>
<td>0-45.76</td>
<td>45</td>
</tr>
<tr>
<td>Little Dixie Lake (^l)</td>
<td>7.96</td>
<td>14.54</td>
<td>0-67.66</td>
<td>71</td>
</tr>
<tr>
<td>Little Prairie Lake (^l)</td>
<td>6.86</td>
<td>7.84</td>
<td>0-32.40</td>
<td>36</td>
</tr>
<tr>
<td>Rocky Forks Lake (^l)</td>
<td>3.31</td>
<td>4.12</td>
<td>0-16.14</td>
<td>43</td>
</tr>
<tr>
<td>Winegar Lake (^l)</td>
<td>10.73</td>
<td>17.58</td>
<td>0-41.64</td>
<td>5</td>
</tr>
<tr>
<td>Whetstone Lake (^l)</td>
<td>7.36</td>
<td>12.93</td>
<td>0-63.38</td>
<td>57</td>
</tr>
</tbody>
</table>

\(^T\) = temporary stream, \(^p\) = permanent streams, \(^l\) = lakes.
Figures and graphics

• Figures are used when we want to distinguish a result & make it prominent into readers view

• Use figures to graphically represent significant results.
  • Figure legends go below the figure;
  • Why?
  • figures are usually viewed from bottom to top
Figures and graphics

• The figure should be totally **self-explanatory** and **stand-alone**

• the **detail** has to be balanced against **simplicity**.

• **Remember....**

• you are not with your figure to present it.

• However,

• figures with **too much detail** become **complicated** and **difficult to understand**.
Graphics

• Photographs Should always maintain the anonymity of the patient.
• need to be professionally produced.
• As with tables, figures should be printed on separate pages and included at the end of the manuscript.
• Unlike tables, the figure titles, or legends as they are known, are usually listed on a separate page under the heading “Legends to figures”.

Discussion

- Key Result
- Interpretation (biological sense, CI)
- Comparison
- Limitation
- Generalizability
- Implication
Discussion

• Summarize the major (principal) findings: do not repeat the data
• Discuss possible problems with the method used (appraisal of methods)
• Compare your results with previous works
• Discuss the scientific/clinical implications of your findings
• Suggest further work

• Produce a succinct Conclusion

• Acknowledgement
Template for Discussion

Paragraph 1
What did this study show?
Address the aims stated in the Introduction

Paragraph 2
Strengths and weaknesses of methods

Paragraphs 3 to n−1
Discuss how the results support the current literature or refute current knowledge

Final paragraph
Future directions
“So what?” and “where next?”
Impact on current thinking or practice
Comparison

- Comparing the results with relevant findings from similar studies.

Example:

*Our findings are confirmed by other reviews. A review article revealed that development of HBs Ag positive is a rare and transient event in vaccinated individuals even if anti-HBs titer decreases to very low or undetectable level.*
Comparison

- Do not be tempted to discuss all the journal articles in every remotely related field.
- In this, it is best to confine yourself to discussing the work in your field that is highly relevant and reputable.
- If you have reached a different conclusion from other researchers who have conducted similar studies, try to explain why you think this has happened.
Comparison

➤ If your results are different from others, explain why your results are valid

➤ Discussing unexpected results

✓ Relate them to the results of others – why you found them.
✓ Relate them to the theory
Limitations

- Discuss limitations of the study
- Taking into account sources of potential bias or imprecision.
- Honesty is the best policy here.
Example, Limitations

There were a few limitations and potential biases in this meta-analysis, including: (a) nine studies seemed potentially eligible to be included in our meta-analysis but the full texts were not accessible. This issue may raise the possibility of selection bias. (b) There were considerable number of dropouts (37%) among the participants due to very long period of follow-up which might introduce selection bias in our results.
Generalizability

Discuss the generalizability (external validity) of the study results.

Example:

“Our study encompassed all different age groups and thus the result of this meta-analysis can be generalized to the general population.”

never generalize your results beyond the bounds of the type of participants included in your study, and never draw unjustified conclusions.
Implications

- A brief section that summarizes the implications of the work for practice and research.
- This is a time when you can extend your thinking a little without overstating the implications.
Example, Implications

The current study may have a number of implications for health care policy. First, the prevalence of several NCDs risk factors was evaluated in the target population for five sequential years. Second, the effect of age and gender on chronic diseases risk factors was indicated clearly. Furthermore, the association of BMI with blood pressure, blood sugar, cholesterol, and triglyceride was measured quantitatively as well.
Conclusion

➢ do not be too tentative if you found a strong association between the exposure and outcomes that you were investigating.

Our results suggest that vitamin consumption could be associated with a decreased risk of respiratory illness, has two hesitant parts: suggest and could be associated
Avoid...

➢ *Further studies are needed* ... *or We are now investigating whether* ....

The purpose of writing a paper is to **show what you have found** and **what it means** and **not to suggest what work you or other researchers might undertake in the future**.
What is referencing?

- Referencing is a standardized method of formatting the information sources you have used in your assignments or written work.

- The citation of a large numbers of references is an indicator of insecurity, not of scholarship.
A reference or citation is required when you:

• Whenever you quote someone else's work. This does not just include words but also tables, charts, pictures, music, etc.

• When you rewrite or summaries someone else's work in your own words.
Two main referencing Styles

• Harvard – Author Date Style
  References are identified by the name of the author(s) and the year of publication

• Vancouver – Numeric Style
  References are identified by Arabic numerals.

• Other formats
  See Instructions for authors.
Reference Types

- Book
- Conference paper
- Electronic Book
- Dictionary
- Encyclopedia
- Film or broadcast
- Interview
- Map
- Magazine Article
- Journal Article
- Government Document
- Online Database
- Thesis
- Report
- Web page
- Personal communication
- Standard
- Unpublished Work
References

• **Scientific Writing**
  Easy When You Know How
  Jennifer Peat
  BMJ, 2002

• **How to Write a Paper**
  George M Hall
  BMJ, 2013

• **Lectures & Slides of Dr. Kamran Yazdani, MD, PhD**
  Department of Epidemiology and Biostatistics, School of Public Health, Tehran University of Medical Sciences