Scientific Writing
Development Series

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Disclosure Information
Scientific Writing Development Series
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I have no financial relationships to disclose.

I will not discuss off label use and/or investigational use in my presentation.
Session 2 Objectives

1. Explain readers’ expectations for the content and organization of introductions and abstracts.

2. Identify common problems in introductions and abstracts.

3. Apply specific writing/revision strategies to improve introductions and abstracts.
Today’s Agenda

- Clarity calisthenics (sentence-level)

- Introductions
  - Readers’ expectations
  - Writing tips and techniques
  - Small group work, discussion

- Abstracts
  - Readers’ expectations
  - Writing tips and techniques

- Final questions, evaluations
Clarity Calisthenics

1. Replace abstract nouns
2. Rewrite “There…” constructions
3. Use negatives carefully
1. Replace abstract nouns

*Abstract nouns* are derived from verbs. Many end in -ion, -ing, -ness, -ment.

“Many stuffy, long-winded passages can be cleaned up by replacing *abstract nouns with verbs or verb equivalents*” (p.187).

1. Replace abstract nouns

Original:
An examination of the patients was carried out for side effect identification.

Improved:
The patients were examined to identify side effects.
1. Replace abstract nouns

*Original:*  
After reviewing the evidence, **we came to the conclusion** that an advantage with the new treatment had not been established.

*Improved:*  
After reviewing the evidence, **we concluded** that...
2. Rewrite “There...” constructions

*Original:*  
There were 63 patients with syndrome X.

*Improved:*  
Sixty-three patients had syndrome X.
2. Rewrite “There…” constructions

*Original:* There were no pulmonary emboli or deep wound infections.

*Improved:* No pulmonary emboli or deep wound infections occurred.
3. Use negatives carefully

*Original:*

Diabetes is *not uncommon* among hypertensive patients.

*Improved:*

Diabetes is *common* among hypertensive patients.
3. Use negatives carefully

Original:
We did not find that weight loss was related to age.

Improved:
Weight loss and age were not related.
Practice

1. Our results are not inconsistent with the prior hypothesis.

2. A direct correlation between serum vitamin B$_{12}$ concentration and mean nerve conduction velocity was seen.

3. There was a significant increase in weight among patients who quit smoking.
Introduction - Expectations

For an original research article, readers expect the introduction to answer the question,

“Why did you study this problem?”

“This question is important because…”
Introduction - Expectations

Remember, LIKA is not a justification.

“To our knowledge, projects studying the use of rapid HIV testing in community outreach settings have not been reported.”

“This is an important area for research because” many outreach clients:

- are at high risk for HIV
- do not access HIV testing through standard venues (clinical settings)
- are highly mobile, unlikely to return for test results after standard (non-rapid) testing.

*AIDS Education and Prevention* 2001;13(6):541-550
Introduction - Expectations

For a review article readers expect the introduction to answer the question,

“Why is a review needed on this topic?”
Introduction - Expectations

Readers expect the introduction to:

- Prepare them to understand and care about the results.
- Do this with brevity and clarity!
1. Use a “funnel” format to organize your rationale.

- **What we know**
  - What we don’t know
  - Why we did this study

- **General problem**
  - Specific problem
  - Gaps in research

**Purpose statement** (research question, hypothesis)
Example – Original Research

Sepsis is a major cause of morbidity and mortality in patients who have chronic kidney disease and are receiving dialysis.

No preventive treatment has been identified. Can statins help? (Animal trials suggest “yes.”)

Limited study in humans. Previous human trials were small, observational; one larger, population-based cohort study.

“Therefore, our aim was to assess the effect of treatment with statin medications on the rates of sepsis in a prospective cohort study of patients who had chronic kidney disease and were receiving dialysis.”

JAMA. 2007;297:1455-1464
Wrong way to write an introduction

I. Sepsis
  A. What it is, clinical presentation
  B. How common, in what populations
  C. Range of treatment options

II. Statins
  A. What they are, how many different types
  B. Who discovered them
  C. How they work
  D. Their use in different medical conditions
  E. Detailed description of studies of their efficacy, side effects

III. Chronic kidney disease
  A. What it is, clinical presentation
  B. Incidence and prevalence
  C. All known comorbidities
  D. Treatment with dialysis
  E. Complications of dialysis – of which sepsis is one
Chronic obstructive pulmonary disease (COPD) is among the leading causes of morbidity and mortality worldwide. It is caused primarily by smoking.

Beneficial **effect of inhaled corticosteroid treatment for COPD** is controversial....

Other studies and reviews evaluated the effect on FEV$_1$ decline. But this is imperfect surrogate outcome for clinically important health outcomes, e.g., health-related quality of life, functional capacity, exacerbations.

The objective of this review was to determine the **risk-benefit ratio** of inhaled corticosteroid treatment for COPD by systematically reviewing evidence on the efficacy, **effectiveness**, and **safety** of the treatment in patients with COPD with respect to health outcomes.

Introduction - Writing Strategies

1. Use a “funnel” format to organize your rationale.

   Fluency
   Brevity
   Compelling
Introduction - Writing Strategies

1. Use a “funnel” format to organize your rationale.

2. Write a strong purpose statement.
2. Write a strong purpose statement.

- Answers the question: What was I specifically trying to do, learn, test?
- States hypothesis or research question
- Usually in last paragraph of introduction
- Focuses and guides the article’s content
In this report, we examine conventional and low-air-loss bed therapies for patients with pressure ulcers.

We conducted a *prospective randomized controlled trial* to compare the *rate of healing of pressure ulcers* in *nursing home patients* who used low-air-loss beds with the rate of healing in those who used a conventional foam mattress.
Introduction - Writing Strategies

2. Write a strong purpose statement.

*In general, the purpose statement takes this form:*

\[
\text{topic} + \text{reason}
\]
2. Write a strong purpose statement.

*In general, the purpose statement takes this form:*

```
topic + reason
```

“We wish to suggest a structure for the salt of deoxyribose nucleic acid (D.N.A.). This structure has novel features which are of considerable biological interest.”

2. Write a strong purpose statement.

*In clinical research, the purpose statement usually includes the following:*

- target population
- precise intervention
- outcome measures
- study design
2. Write a strong purpose statement.


“… our aim was to assess the effect of treatment with statin medications (INTERVENTION) on the rates of sepsis (OUTCOME) in a prospective cohort study (DESIGN) of patients who had chronic kidney disease and were receiving dialysis (POPULATION).

JAMA 2007;297:1455-1464
2. Write a strong purpose statement.

This study was designed to compare the efficacy of standard therapy X and new therapy Y for treatment of metastatic breast cancer in women under the age of 50.

We conducted a randomized controlled trial to compare the effect of two treatments – standard therapy X or new therapy Y – on one-year survival rates in women with metastatic breast cancer and under the age of 50.

Adapted from p. 66 of Huth EJ. Writing and Publishing in Medicine. 3rd ed. Baltimore, MD: Williams & Watkins; 1999
2. Write a strong purpose statement.

Signal the reader:

To determine…
The purpose of this study was to…
Therefore, we tested the hypotheses that…
This report describes…to determine whether…
We asked whether…
Introduction - Writing Strategies

1. Use a “funnel” format to organize your rationale.

2. Write a strong purpose statement.

   Centered (focused)
   Clarity
Introduction - Writing Strategies

1. Use a “funnel” format to organize your rationale.

2. Write a strong purpose statement.

3. When describing previous literature,
   a. Be selective (and therefore brief!)
   b. Focus on the findings
   c. Identify flaws if your research represents an improvement
   d. Take appropriate credit for your own work.
3b. Previous literature: Focus on the findings

**Unhelpful**
A study by Johnson *et al.*, reviewed the medical records of Navy recruits who were unable to complete basic training.

**Helpful**
Injury rates for recruits undergoing basic training were 12% per year in 1997 for the Australian Army and RAAF, but much higher at 47% for the Navy (Johnson *et al.*, 1998).

Introduction - Writing Strategies

3b. Previous literature: Focus on the findings

Too detailed

There have been six previous studies in this area. Henderson, in a study of 341 patients from Denmark, found....Miller, studying 45 patients in Milwaukee, showed....Kazan followed 211 patients and found...

Synthesize

Previous studies in the area have had conflicting results, some suggesting that...whereas others found that...

3c. Previous literature: Identify flaws if your research represents an improvement.

Example

Previous research did not account for the possible side effects of prior history of stroke, or have 100% complete follow-up. To address these problems, we...

Introduction - Writing Strategies

3c. Previous literature: Identify flaws if your research represents an improvement.

*Example*

“Most studies did not measure the actual environment experienced by a patient; instead, these studies used proxy measurements of this environment, such as average monthly occupancy rates, or compared weekend with weekday admissions as a surrogate for high and low workloads per provider, respectively.”

*Pediatrics* 2008;121;e718-e730.
Introduction - Writing Strategies

3d. Previous literature: Take credit for your own work

*Unclear*

A prior study had only an average of one week of follow-up.

*Improved*

We previously reported survival at one week in these subjects.

Introduction - Assessment

Case Examples

In *your own words,*

1. What specific question did this research address?

2. Why was this question important to study? (1 or 2 short sentences).

3. What are strengths/weaknesses of the introduction as written?
Introduction - Writing Strategies

1. Use a “funnel” format to organize your rationale.

2. Write a strong purpose statement.

3. When describing previous literature,
   a. Be selective (brief)
   b. Focus on the findings
   c. Identify flaws if your work is an improvement
   d. Take credit for your own work

4. Draft, then revise after discussion is written.

5. Check for new literature before you submit.
Introduction - Editing Tips

Ask yourself – and others – before you submit:

For the introduction as written,

- Is the purpose of the study clear?
- Does the study seem important?
- Is the rationale logically argued? (funnel)
- Is previous work well-synthesized?
- Can any studies or details be deleted?
- Are any key studies missing?
- Is the text too long?
**Introduction - Editing Tips**

*If your introduction is too long:*

- Cite more selectively, synthesize more
- Ask yourself, “Have I backed up too far in justifying my study?”
- Omit anything irrelevant or peripherally relevant to your purpose statement
- Save details on literature for discussion
“Two smaller observational studies in humans have shown lower rates of sepsis-related mortality among patients being treated with statins and a reduction in the incidence and severity of sepsis among patients treated with statins.\textsuperscript{15,16}

A recent larger, population based cohort study found a reduction in the incidence of sepsis among patients who were prescribed a statin after being hospitalized for a cardiovascular event.\textsuperscript{17}"

\textit{JAMA. 2007;297:1455-1464}
Discussion:

Three clinical studies in nonrenal disease cohorts have compared the rates of sepsis in patients treated with statins to those of control (or untreated) patients.

- In a retrospective cohort study of 388 patients with bacteremia, Liappis et al\textsuperscript{15} found… ….

- Almog et al\textsuperscript{16} conducted a prospective cohort study of 361 patients…..

- More recently, a larger study of patients hospitalized for cardiovascular events found that treatment with a statin medication was associated with a lower incidence of sepsis during a mean follow-up of 2.2 years.\textsuperscript{17}

\textit{JAMA.} 2007;297:1455-1464
Introduction - Editing Tips

Fix common problems with citations

- References not read included in ref list
- References not verified to the originals
- Personal communications and submitted manuscripts included
- Reference indicators illogically placed in text
Several clinical reports describe neonatal cerebrovascular accidents after prenatal cocaine exposure that were associated with abruptio placentae or birth asphyxia, known risk factors for neonatal cerebrovascular accidents (21, 24, 29).
Abstract - Expectations

Readers expect the abstract to be:

- Accurate
- Coherent, readable
- Self-contained
Abstract - Expectations

Readers expect the abstract to be:

- A succinct overview of entire paper
  (Informative vs. descriptive)

- In correct format

- Specific
Abstract – Writing Strategies

1. Content - Be informative, not descriptive

**Implications (descriptive):**

“In our discussion we examine the importance of autonomy and impairment levels for understanding the decision-making involvement of persons with dementia.”

Abstract – Writing Strategies

1. Content - Be informative, not descriptive

Implications (informative):

Interventions that enhance an individual’s involvement in decision making early on in the diagnosis of dementia can lead to positive outcomes (e.g., quality of life).
Descriptive abstract (review article):

This review covers the many different adverse events that have been reported for the drugs most widely used in the treatment of breast cancer. It considers them as generalized system effects and by body systems. An attempt has been made to assess their degree of life-threatening severity and to suggest how patients can be monitored for their early detection.

Abstract – Writing Strategies

2a. Format – Structured or unstructured?

Follow general guidelines for proportions:

- **Background**: 10%
- **Methods**: 30-35%
- **Results**: 35-45%
- **Conclusion**: 20-25%
Abstract – Writing Strategies

2b. Format - Follow journal guidelines

For original research reports in JAMA:

- Context
- Objective
- Design
- Setting
- Patients, other participants
- Intervention(s)
- Main outcome measure(s)
- Results
- Conclusions
- Trial registration

http://jama.ama-assn.org/misc/ifora.dtl#OriginalContribution
Abstract – Writing Strategies

For clinical reviews in JAMA:

- **Evidence Acquisition:** Data sources, search strategies, years searched, other sources of material. Methods for quality assessment and article inclusion.

- **Results:** Major findings are presented in an evidence-based, objective, and balanced fashion. Highest quality evidence receives greatest emphasis.

- **Conclusions:** Answer the questions posed based on available evidence; emphasize how clinicians should apply current knowledge.
Abstract – Writing Strategies

3a. Specificity in Objective

**Objective (vague)**
To compare “technique 1” [major surgery] with “technique 2” [less invasive, outpatient procedure] for the treatment of bladder outflow obstruction.

**Objective (more specific)**
To determine whether technique 2 is as safe and as effective as technique 1 for the treatment of bladder outflow obstruction.
Abstract – Writing Strategies

3b. Specificity in Methods

Main outcome measures:
Quality of life and sexual function

Readers will wonder:
- What quality of life indices were used?
- How was sexual function defined and measured?
Abstract – Writing Strategies

3b. Specificity in Methods

Main Outcome Measure

Hospitalizations for sepsis

Better

Hospitalizations for sepsis were determined through hospital records from the United States Renal Data System (mean follow-up, 3.4 years).

JAMA. 2007;297:1455-1464
Abstract – Writing Strategies

3b. Specificity in Methods

Methods:

We divided 57 Crohn’s disease patients into treatment and control groups.

Readers will wonder:

- Where did the patients come from? What was the study setting?
- How were patients assigned to groups?
Abstract – Writing Strategies

3c. Specificity in Results

*Problem* - *all numbers, no explanation*

*Problem* - *all words, no numbers or statistics*

*Solution* - Strive for a readable balance of words and numbers, with an emphasis on the primary outcome.
Abstract – Writing Strategies

3c. Specificity in Results

**Results:**
All eight SF-36 domain scores of mothers with chronically ill children were below those of the control mothers.

**Readers will wonder:**
How much lower were the scores? Were the differences statistically significant? Of clinical concern?
Version 1

The crude incidence rates of sepsis-related hospitalizations were 41/1000 patient-years and 110/1000 patient-years for patients receiving statins and not receiving statins, respectively.

Version 2

Rates of sepsis-related hospitalizations were significantly lower in patients receiving statins (crude incidence rate, 41/1000 patient-years) than in those not receiving statins (crude incidence rate, 110/1000 patient-years) ($P<0.001$).
Abstract – Writing Strategies

4. Be conclusive!

Overall, the risk-benefit ratio appears to favor inhaled corticosteroid treatment in patients with moderate to severe COPD. Existing evidence does not indicate a treatment benefit for patients with mild COPD.

Abstract – Drafting and Revising

- Writing to learn

- Writing to inform
  - Underline key words, concepts, sentences
  - Write 1-2 sentences for each section
  - Revise for content and length
  - Final check for accuracy, readability
Abstract – Drafting and Revising

Eliminate empty words, descriptive words:

Original

In order to accurately measure vitamin C levels in subjects’ serum, we used a modification of the Bryant technique.

Shortened

We measured serum vitamin C levels by modifying the Bryant technique.

Abstract – Drafting and Revising

Combine sentences with similar phrases:

Original

Compared with women, men were twice as likely to bicycle for exercise. This difference was statistically significant at P<.01. Compared with men, women were 1.5 times more likely to walk for exercise. This difference was also statistically significant at P<.02.

Shortened

Men were twice as likely as women to bicycle for exercise (P<.01); women were 1.5 times more likely to walk (P<.02).

Abstract - Common Problems

- Too long
- Too many abbreviations
- No purpose statement
- Too much background
- Results don’t match text, tables, figures
- No statement of main conclusion
- Unfounded main conclusion
- Importance of study not clear
Introduction - Common Problems

- Review of literature is incomplete, inaccurate, outdated
- Too much literature is reviewed
- Importance of the study is not clear
- Purpose of the paper is omitted or stated too generally
Recommended Reading

Additional Resources

ICMJE Guidelines: Uniform requirements for manuscripts submitted to biomedical journals
www.icmje.org

Editorial advocating that authors use the cover letter to explain why the new work should be published in a top-tier journal.
*Nature Immunology* 2008;9(2):107

How to write an evidence-based clinical review article.
Evaluation!
Clarity practice - Possible revisions

1. Our results are consistent with the prior hypothesis.

2. The mean velocity of nerve conduction correlated directly with the vitamin B12 concentration in serum.

3. Weight increased in patients who quit smoking.