

# IMRAD: What goes into each section

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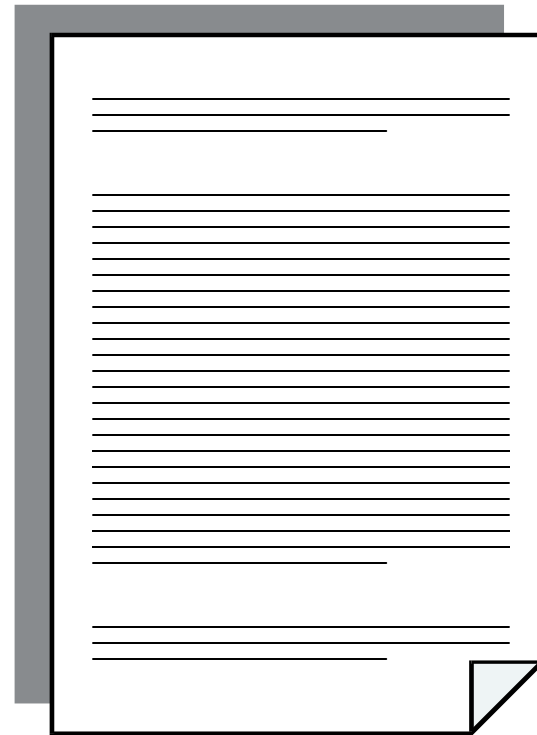
# Parts of an Essay

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Beginning

Main Body

End



# Parts of a Paper: IMRAD

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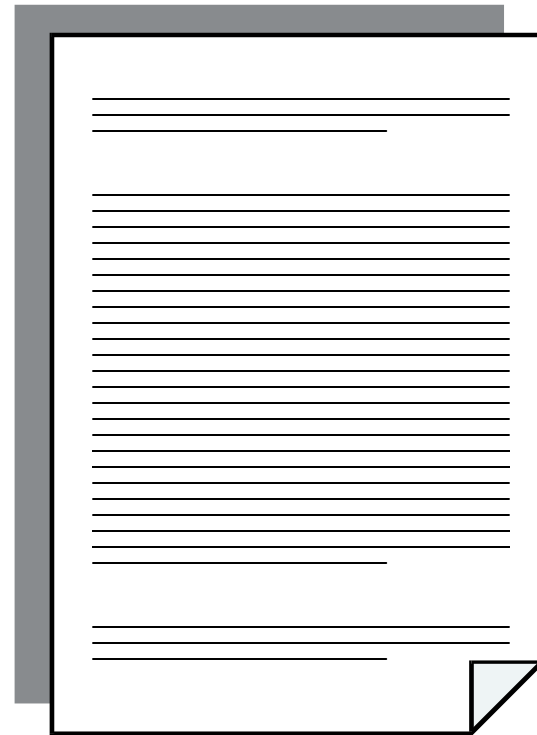
**I** Introduction

**M** Methods

**R** Results

**a** and

**D** Discussion



# Bradford Hill's Questions

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**I**ntroduction

Why did you start?

**M**ethods

What did you do?

**R**esults

What did you find?

**a**nd

**D**iscussion

What does it all mean?

# Introduction (Why did you start?)

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- Rationale of the study
- Supply sufficient background information to allow a reader to understand and evaluate the results of present study without referring to previous publications on the topic

# Introduction

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- Review pertinent literature to orient the reader
- Define lacunae and shortcomings in current state of knowledge
- Provide rationale for the current study
  - What gap in knowledge did you try to fill?
  - What controversy did you try to resolve?
- State aim of the study

# Introduction

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- Brief, clear, to the point
- Written mostly in present tense
- May state the study group, study design and methods used  
(How and why are these better than those of previous studies)
- May state the principal result/conclusion

# Introduction

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- Key references supporting background information provided in this section
- Refer to your previous preliminary work
- Refer to your own closely related papers appearing elsewhere
- Define any specialized terms, definitions or abbreviations you intend to use



# Introduction: Common problems

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- Historical details
- Too long
- Too general and vague
- Imitative
- Contains 'discussion' material

# Introduction: Example

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For investigations done in the emergency laboratory costs are higher<sup>1</sup> and quality more difficult to ensure.<sup>2</sup> These investigations are also more frequently misused.<sup>3</sup> We therefore decided to study which investigations really contributed to clinical decision making in acute care medicine.

# Introduction

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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 importance.

*Watson JD, Crick FHC. A structure for deoxyribose nucleic acid. Nature 1953; 171: 737-8.*

# Methods (What did you do?)

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*(Materials and Methods; Patients and Methods)*

Who? What? When? Where? How? Why?

Study design

Study material (what did you work with?)

What was done to the study material (intervention)?

How was the effect assessed (outcome measures)?

Analysis and statistical methods

Ethical considerations

(Sections and subsections help)

# Methods

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## Study design

Case-control, cohort, cross-sectional

Prospective, retrospective

Controlled, uncontrolled

Randomized, non-randomized

Open, Blinded (single or double)

# Methods

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What did you work with?

Humans, animals, *in vitro* preparation

Volunteers/patients

Controls

How selected?

Eligibility, definitions, inclusion/exclusion criteria

Population-based, hospital-based

Particular age group, gender, SE status

Consecutive or not

Urban, rural, suburban

# Methods

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Randomization/blinding: any violations

Intervention

Drugs, chemicals (amount, route, frequency, source)

Techniques and procedures, modifications

Equipment used (model, settings)

Compliance

Measurements

By whom? Was it objective and accurate?

How often? Repetitions --> how averaged?

Who administered the questionnaire? Where?

# Methods (What did you actually do?)

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Endpoints and outcome: how assessed

Response, partial response, failure, relapse

Mild, moderate, severe

Side-effects

Withdrawals and dropouts

Sample size calculation

Statistical analysis

Hypothesis testing: How? Are assumptions OK?

Multiple testing. Software used

Intention-to-treat *versus* per protocol



# Results (What did you find?)

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Results of all experiments  
in natural order  
in subsections similar to methods

Text, tables and figures  
do not duplicate

Statistical analysis (RR, 95% CI)

# Results

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Data collection and recruitment (Response rate)

Study group

- Number, baseline characteristics

- Drop-outs, withdrawals

- Absent data on some subjects

Key findings

- Primary outcome measures

Secondary findings

- Secondary outcome measures

- Subgroup analyses

# Results

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What does  $56.78 \pm 12.34$  mean?

What does 16.7% mean?

What is the denominator?

What is

normal, abnormal?

raised, high, low?

Cite all tables/figures in text

# Results

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Should not include

- Any methods

- Data for which methods are not included

- Interpretation of data (--> discussion)

- References

Careful with use of words like

- significant, random, correlation

# Discussion (What does it mean?)

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Recapitulation of major findings

Discussion of findings cf. available data

Why the difference, why more reliable, etc

Discussion of important minor findings

Alternative explanations

Strength and pitfalls

Implications of the findings

Unanswered questions and future research

Final summary / conclusion

# Discussion

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## Should not include

History

Repetition of results

Discussion of points other than those generated by the study's data

Unreasonable extrapolation of results

Superlatives

# Discussion: Common pitfalls

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- First study in the world/India/Parel ... ..
- Megalomania
- Emphasizing strengths, not weaknesses
- Reiterating selected results
- Inflating the importance and generalizability of findings
- Going beyond the evidence and drawing unjustified conclusions