APSR International Conference, Seoul, Korea

ESAP, Saturday 14th November 2009

Manuscript preparation and presentation of research in the English language

Session 1

9.00-10.30: Keynote presentations

Chair – Associate Professor Kwun Fong

9.00 Professor YC Gary Lee: ***Why clinicians should do research, and why they must publish.***

9.20 Professor Phillip Bardin: ***Why journals accept or reject papers.***

9.40 Professor J Patrick Barron: ***Writing a journal article – the "Uniform Requirements"***

10.30-11.00 – Morning tea

Session 2 : Masterclass on manuscript preparation

Faculty: Professor YC Gary Lee, Professor J Patrick Barron, Dr Cheryl Salome, Associate Professor Kwun Fong

Facilitator: Dr Cheryl Salome

(Each session will comprise an introductory presentation, using exercises and examples, followed by work on your own manuscript, with the opportunity for one-on-one interaction with the Faculty.)

11.00: ***Basic writing skills***

11.45: ***Preparing to write***

12.00: ***The Introduction***

12.30pm – 1.30pm Lunch

1.30: ***Methods Section***

2.00: ***Results Section***

2.30: ***Discussion Section***

3.00- 3.30pm - Afternoon tea

3.30- 4.30pm - Professor Patrick Barron: ***Submitting the manuscript and dealing with reviewers comments***

4.30pm – 5pm – ***Question and answer session***

Educational Seminar of the Asia-Pacific Society of Respirology

Manuscript preparation and presentation of research in the English language

Saturday 14th November 2009
9.00am to 5.00pm

Faculty:

- Professor J Patrick Barron, Professor and Chairman, Department of International Medical Communications, Tokyo Medical University

- Professor Y C Gary Lee MBChB PhD FCCP FRACP, Winthrop Professor of Respiratory Medicine, University of Western Australia, Consultant Chest Physician, Sir Charles Gairdner Hospital; Head, Pleural Disease Unit, Lung Institute of Western Australia
  Editor-in-Chief: Respirology www.blackwellpublishing.com/journals/res/

- Dr Cheryl Salome, Research Fellow and Leader, Airway Physiology Research Group, Woolcock Institute of Medical Research, University of Sydney

- Associate Professor Kwun Fong, School of Medicine, University of Queensland

- Professor Phillip Bardin, Monash Univeristy and Medical Centre, Editor-in-Chief elect, Respirology

We are looking forward to welcoming you to the ESAP on Manuscript Writing

This ESAP is recommended for early career researchers who are preparing to write or are currently writing a manuscript, based on a hypothesis-testing study, to be submitted to a scientific or medical journal. The program will include a Masterclass, which will be very interactive and "hands-on". It will give attendees the opportunity for both informal and formal interaction with the Faculty to get advice on how to go about writing and publishing their research.

To get the best out of this ESAP we strongly recommend that you:

1. Bring with you a manuscript you are currently working on or an abstract or data you are planning to turn into a paper. If you are presenting data at the APSR Congress in poster or oral form, you could bring a small scale printout of your presentation.

2. Complete the exercises on the following pages before you come to the ESAP. You will gain the most from the ESAP if you have already thought about the issues raised by each of these exercises, and attempted to resolve the problems

3. Download and read the papers listed on the last page as recommended reading.

Word choice

In each of the following sentences, what is wrong with underlined word? Can you rewrite the sentence to solve the problem?

Exercise 1

1. Arterial oxygen saturation was drastically compromised when the airway was obstructed
2. We tested this hypothesis in anaesthetized animals
3. Methacholine inhalation was associated with changes in airway resistance and FEV1
4. In patients with COPD there was an increase in Borg score with an increase in walk distance.
5. With inhalation of salbutamol, FEV1 increased
6. Maximal bronchoconstriction with methacholine had other effects
7. The salicylates are rapidly absorbed with a peak plasma salicylate concentration within 2 hours
8. The osmotic pressure of plasma was subtracted from the osmotic pressure of plasma with heparin

Exercise 2

1. Spirometry was measured in 15 female children and 23 male children at 1 week prior to the initiation of ICS treatment and at 1 week post treatment
2. The subject reached the entrance to the laboratory utilizing a pedestrian relocation modality
3. The methodologies employed for this study conformed to the standards of the American Thoracic Society

Exercise 3

1. After 4 hours of hemodialysis, we abruptly ended the hemodialysis procedure
2. Oxygen uptake in response to drugs was examined and found to vary considerably
3. Methacholine increased airway resistance and decreased FEV1. Both the increase in airway resistance and the decrease in FEV1 were greater when the subject was in the supine position
4. To date, no recent information is available from meta-analyses of cross-sectional studies of the association between asthma and obesity.
5. Previous studies have shown that airway hyperresponsiveness is a characteristic feature of asthma (24 – 27).

Exercise 4

1. Airway hyperresponsiveness is a characteristic feature of asthma (24-27). In asthma, increased bronchial hyperreactivity is associated with greater risk of symptoms and greater morbidity.

Exercise 5

Which word is correct? Use a dictionary if necessary.

1. The methacholine (amount, concentration, content, level) was (increased, augmented, enhanced) from 25 to 50mg/ml

2. Smooth muscle (contraction, constriction) decreased lung compliance

3. Drug therapy (included, consisted of) salmeterol 50mg bd, budesonide 400mg bd and salbutamol prn. No other drugs were permitted.

4. At frequent (intervals, periods) we measured pH, PO2 and PCO2 in arterial blood and during each (interval, period) of study we measured spirometric function three times

5. Deep inspirations before methacholine challenge (affect, effect) the severity of airway closure, but have no (affect, effect) on airway narrowing.

Sentence structure

The following sentences are grammatically correct, but they could be written in a more simple and direct style. Can you suggest changes that will clarify the message of each sentence?

1. The patient was begun on 500mg fluticasone daily and had resolution of his acute asthma symptoms within two weeks
2. A progressive decrease in the death rate occurred
3. Evaporation of ethanol from the mixture takes place rapidly
4. Measurements of blood pH were made with a Radiometer capillary electrode
5. Prolongation of life for patients with lung cancer may be made possible by improved treatment
6. An abrupt increase in minute ventilation occurred in all patients as exercise began
7. Separation of sputum plugs was achieved by centrifugation for 5 minutes
8. The new drug caused an increase in FEV1 and peak flow
9. We made at least two analyses on each sample
10. Inhalation of salbutamol produced an increase in peak flow
11. Beta-2 agonists exert their action by the relaxation of airway smooth muscle
12. Patient compliance with medication regimens is an area which is seen as being important because of the relationship between health-related behaviours and the short- and long-term outcomes of disease
13. Brown et al (23) found that the airways of asthmatic subjects are less distensible than those of non-asthmatics.

Paragraph structure

This is a paragraph from the discussion section of a paper about the predictors of adult-onset asthma, *(this has been modified from the original for the purposes of this*)

The questionnaires used in the present study did not include any questions about nasal allergies, so it was not possible to differentiate between allergic and non-allergic rhinitis. The presence of nasal allergies has been suggested to differentiate between these two forms of rhinitis (24, 25). Recent studies have suggested that while approximately one-quarter of rhinitis in adults is non-allergic (25) even non-allergic rhinitis is a strong predictor of adult onset asthma (24). According to the "unified airway" hypotheses (21, 22) rhinitis and other upper airway disorders are thought to be linked with the development of adult onset asthma (18, 23). In the present study, rhinitis in 1981 predicted newly diagnosed asthma in 1994-5. In addition, subjects with newly diagnosed with asthma in 1994-1995 were more likely to have developed "new rhinitis", demonstrating the close relationship between the two conditions.

What is this main message of this paragraph?

How do you know which is the important message?

Can you rewrite the paragraph to clarify the message?

Recommended Reading

- Barron JP. The uniform requirements for manuscripts submitted to biomedical journals recommended by the international committee of medical journal editors. Chest 2006; 129:1098-1099.
- Foote MA. Some concrete ideas about manuscript abstracts. Chest 2006; 129: 1375-77.
- Foote MA. How to make a good first impression. Chest 2006; 130: 1935-37.
- Foote MA. Materials and Methods. Chest 2008; 133: 291-93.
- Green J. Graphs. Chest 2006; 130: 620-1.
- Foote MA. The proof of the pudding: How to report results and write a good discussion. Chest 2009; 135:866-68.
- Sterk PJ, Rabe K. The joy of writing a paper. Breathe 2008; 4 (3): 224-235. http://www.ers-education.org/pages/default.aspx?id=590&idBrowse=35459&det=1

Further Reading

- Zeiger M, Essential of writing biomedical research papers. McGraw Hill. 1991
- Peat JK, Elliott E, Baur L, Keena V. Scientific writing. Easy when you know how. BMJ Books, 2002

Should clinicians perform research - why, how and on what?

Y C Gary Lee
MBChB PhD FCCP FRACP

Editor-in-Chief, *Respirology*

Editor, *International Pleural Newsletter*

Winthrop Professor of Respiratory Med
University of Western Australia

Head, Pleural Disease Unit
Lung Institute of W Australia

- **How many have a research degree (MD, PhD)**
- **How many have experience in research and publishing papers (say >5)**
- **How many want to publish some papers and be involved in research**

Medical Research Why should you bother!

I am a clinician not an academic…

I like seeing patients only…

I have no time…

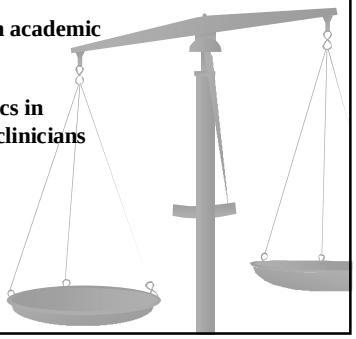
My wife spends a lot. I need to earn more money…

Medical Research Why should you bother!

I am a clinician not an academic

You can be both!

Most leading academics in medical research are clinicians



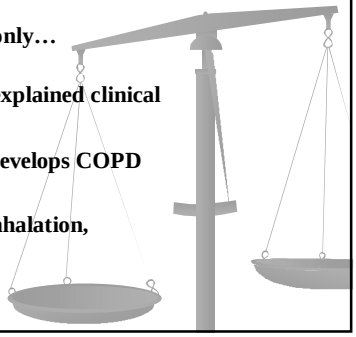
Medical Research Why should you bother!

I like seeing patients only…

Try answer many unexplained clinical observations!

eg Why this smoker develops COPD but others don't?

- genetics, quantity, inhalation, cofactors



Medical Research Why should you bother!

I have no time.

Many way to participate in research – not all require heavy time commitment.

Use your time wisely.

Don't watch so much cricket!

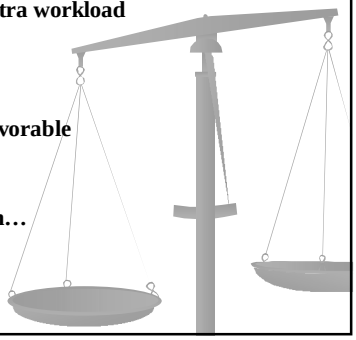
Medical Research - the Cons

Can create stress / extra workload

Takes up time

Results not always favorable

Very competitive:
- funding, publication…



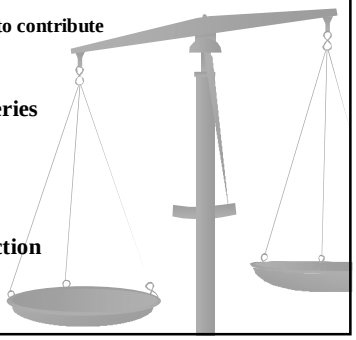
Medical Research - the Pros

Make a difference
- Don't need big projects to contribute
- Lee *et al* Chest 2003

Satisfy intellectual queries

Improves CV; Kudos; Promotion

Fun! Personal satisfaction

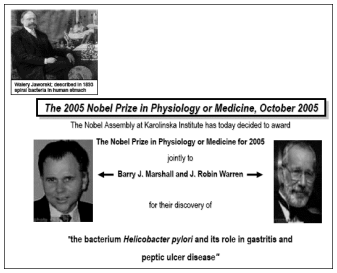


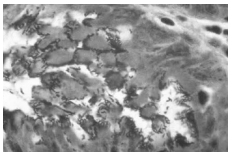
Start with a question…

- Idea, idea, idea
- Start with a question which often arises from clinical observation

- Read the literature
- Talk to people with similar interests

  The more you think about it, the more ideas you develop





Don't stop at 'WHAT it is'

Ask '*WHY* it is'

'Be a child' – keep questioning

How to get started…

Read extensively on what is known / been published on the subject

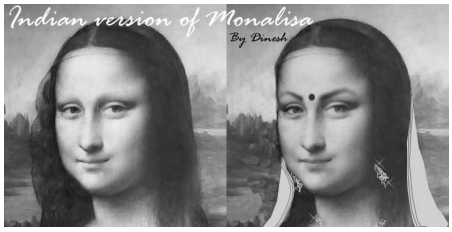
Run your ideas pass more experienced colleagues

Involve helpers/collaborators who can contribute
- statistician
- resident/registrar/medical students
- clinical trial specialists

Be open minded with criticisms – better to know early

Repeating other studies using a local population usually does NOT make a good publication

e.g. ADA has been shown useful in diagnosing TB pleural effusion… but this has not been tested in Chinese population in xyz province…



A few hints on projects

Conditions that are common in your practice/region will give you an advantage

Estimate how much time you need to complete … then double it

If you start, you must finish. Don't give up half way

Many ways to be involved in research – if 'too busy' eg collect patients or samples from busy clinical practice

JUST DO IT.

IMPACT FACTORS

Its Use, The Debate and Alternatives

Lieve Bultynck, Y.C. Gary Lee, Christel Norman, Naomi Alexander

Respirology

Statement from Respiratory Journal Editors

IMPACT FACTOR AND ITS ROLE IN ACADEMIC PROMOTION

This statement was adopted unanimously at the May 17, 2009 meeting of the International Respiratory Journal Editors Roundtable.*

Alan R. Leff, MD (Chair), Proceedings of the American Thoracic Society
Edward Abraham, MD, American Journal of Respiratory and Critical Care Medicine
Kenneth B. Adler, PhD, American Journal of Respiratory Cell and Molecular Biology
Vito Brusasco, MD, European Respiratory Journal
Peter Calverley, MD, Thorax
Anh Tuan Dinh-Xuan, MD, European Respiratory Journal
Robb W. Glenny, MD, Journal of Applied Physiology
Mark Levy, FRCGP, Primary Care Respiratory Journal
Reynold Panettieri, Jr., MD, Respiratory Research
Helen K. Reddel, MBBS PhD, Respirology
Dave Singh, MD, International Journal of COPD
J. Christian Virchow, MD, Respiratory Medicine

** This statement is published in all journals represented at the May 17, 2009 meeting of the International Respiratory Journal Editors Roundtable.*

What is the Impact Factor

- Measure of the average citation frequency to a particular journal
- Calculated each year by Thomson Scientific (formerly ISI) and published in the Journal Citations Reports

Background

- 1955: Proposed by Eugene Garfield (now Chairman Emeritus of Thomson Scientific)
- Early 1960s: Journal IF created
- 1975: ISI started publishing the IF for 152 top journals as part of the *Journal Citations Report*
- Now: ISI publishes IF for 6650 journals across 150 disciplines and growing by 200 journals/yr

Initial purpose

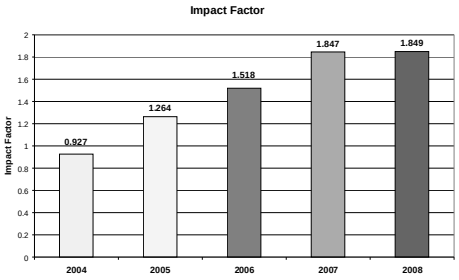
- Track history of scientific ideas through their citations in future publications
- Rank scientific journals according to their ability for picking up popular papers
- Aid to librarians for making budget decisions

Current use

IF has become measure for quality of journals and researchers, influencing decisions on:

- Where to publish
- Who to promote/hire
- Salary bonuses
- Success of grant applications
- Research agenda

Respirology Impact Factor



Timing

- IF for given year → published in June of following year
- Calculated based on citations in that year to papers published in previous two years

  2008 IF
  → Calculated in June 2009
  → Based on citations in 2008 papers to papers published in 2006 and 2007

Delay of up to 3.5 years before the impact of published material appears in the IF

Impact Factor Formula

$$IF_{year} = \frac{\text{\# citations received to articles published in previous 2 years}}{\text{\# source items in previous 2 years}}$$

How to increase IF?

↑ # citations	→ what citations count?!
↓ # source items	→ what counts as source item?!

What citations count?

Every reference in all reference lists in every regular journal issue received by ISI

Except:

- Supplements containing only abstracts (unless top 500)
- Other supplements (if not online or no hard copy received)

→ They are not 'citing articles' but citations to these articles will be counted

What counts as source item?

Varies from journal to journal, but generally

- the following ARE counted:
  - Original Articles
  - Review Articles
  - Case Reports
  - Articles in Symposium Supplements
- the following ARE NOT counted:
  - Letters
  - Abstracts
  - Commentaries
  - Editorials

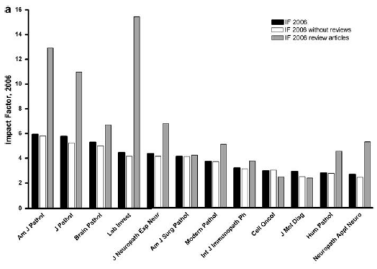
Strategies for increasing IF

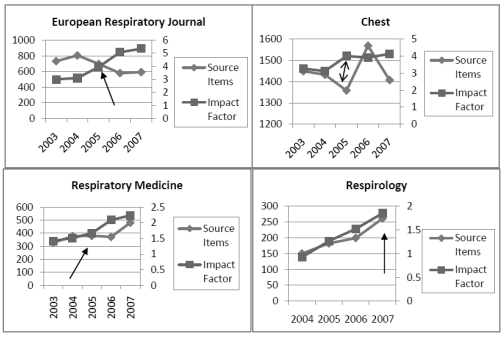
- Optimize relationship between citations and publication time
- Increase Review content
- Decrease acceptance rate
- Decrease zero citation articles
- Optimize dissemination of content

The impact of review articles

Catherine M Ketcham and James M Crawford

Laboratory Investigation (2007) 87, 1174–1185





Criticism of Impact Factor

Many researchers are calling for IF not to be used as a performance indicator because of its many flaws

- "Beware the tyranny of impact factors".
- "Challenging the tyranny of impact factors".
- "Corruption of journal impact factors".
- "Impact factors 'flawed, misleading and unfair'".
- "Journal impact factors for the individual scientist: an unnecessary evil".
- "Let's dump the factors".
- "Nightmare impact factor".
- "The dreaded impact factor is back to haunt us!".
- "The impact factor – 'Misleading, unscientific and unjust'".
- "The impact factor – what it is and where it is useless".
- "The journal 'impact factor': a misnamed, misleading, misused measure".
- "The malign influence of impact factors".
- "The perfidy of impact factors".
- "The tyranny of the impact factor".
- "Worshiping false idols: the impact factor dilemma".

Impact Factor Weaknesses

- Journal IF not reflect quality of individual paper
- A fraction of papers attract majority of citations
  eg Nature 2005: 89% of citations from 25% of papers
- IF 2008 not relate to papers published in 2008
- Inadequate temporal window
- Some journals play game more than others
- Technical flaws: self-citations and retracted articles

Is IF here to stay?

- Simple quantitative measure of journal's influence and impact
- Widely accepted, regularly updated and widely available
- Broad coverage
- Useful for intra-disciplinary journal comparison

Y.C. Gary Lee

Lieve Bultynck

Christel Norman

Naomi Alexander

Joyanne Matthew

Neil Misso

Margaret Stevens

Why journals accept or reject papers

Philip Bardin
Monash Lung and Sleep
Monash Medical Centre, Melbourne

What is the journey of your and my beloved paper at a medical journal?

- Submit paper
- First hurdle: Editorial Committee/group review
- Outcome will depend mostly on type of and data in paper

Example

Endometriosis of the lung:
case report and review of literature

→ editor's decision?

Example

Lung endometriosis:
Case report and review of literature

→ data not novel: no review offered

Example

Prevalence of mesothelioma in South-west Kurdistan

→ editor's decision?

Example

Prevalence of mesothelioma in South-west Kurdistan

→ data not of broad interest:
no review offered

Decision to accept/reject is simple and depends on 2 factors – that may interact

1. Data presented
2. Presentation itself (manuscript preparation)

How does this interaction work?

Superior data and good presentation
- editor's decision?

Inferior data and poor presentation
- editor's decision?

How does this interaction work?

Superior data and good presentation
= Accept

Inferior data and poor presentation
= Reject

What if?

Superior data and poor presentation
- editor's decision?

Inferior data and good presentation
- editor's decision?

What if?

Superior data and poor presentation
= reject!

Inferior data and good presentation
= reject

What is 'inferior' data?

- Generally: data that does not advance knowledge enough – or may be unreliable
- Causes: many, but key ones are:
  - ►poor study design (e.g. no control group)
  - ►poor execution/methods (e.g. assays out of date)
  - ►irrelevant research question (eg. prevalence of cough in TB)

What is 'superior' data?

- Generally: contributes new, reliable information
- Specifically: novel, important, believable and applicable (mostly)

Superior data is:

- **Prospective** not retrospective
- Why? – accuracy
  – control of variables
  – control of populations under study

Example

Study: Retrospective outcome of pneumococcal pneumonia in ICU in 200 patients

Problems: Potentially missing data, variable treatments (e.g. AB use), no control population

→ editor's decision?

Example

Study: Retrospective outcome of pneumococcal pneumonia in ICU in 200 patients

Problems: Missing data, variable treatments (eg AB), no control population

→ Reject – data not reliable, incomplete

Example

Study: Prospective outcome of pneumococcal pneumonia in ICU in 200 patients

Strengths: Data systematically collected, variable controlled, control population feasible (e.g. atypical pneumonia)

→ editor's decision?

Example

Study: Prospective outcome of pneumococcal pneumonia in ICU in 200 patients

Strengths: Data systematically collected, variable controlled, control population studied (eg atypical pneumonia)

→ Reject – not novel

Superior data is:

- Observational and mechanistic
- Why?
  Journals (and their readers) want the 'why' and 'how'

Example

Increased prevalence of viral pneumonia in city X

→ editor's decision?

Example

Increased prevalence of viral pneumonia in city X

→ Reject – descriptive

Example

Increased prevalence of viral pneumonia in city X due to high HIV rates

→ editor's decision?

Example

Increased prevalence of viral pneumonia in city X due to high HIV rates

→ Reject (still mostly descriptive)

Example

Increased viral pneumonia due to a new strain of HIV

→ editor's decision?

Example

Increased viral pneumonia due to a new strain of HIV

→ Possibly accept/reject (still predominantly descriptive)

Example

Increased viral pneumonia associated with a new HIV strain causing CD8 T cell apoptosis

→ editor's decision?

Example

Increased viral pneumonia associated with a new HIV strain causing CD8 T cell apoptosis

→ Accept (at last!)

Remember

Ask the next question – think mechanisms!

What is good manuscript preparation?

1. Concise
2. Journal 'rules' followed
3. Concise
4. No spelling errors etc.
5. Concise
6. Internal consistency
7. Concise
8. Correct (and updated) references

Be Concise!

- State research question clearly
- Keep methods short
- Results: use figures and tables
- Discussion: to the point and avoid speculation

‘The joy of writing a paper’

Sterk PJ and Rabe K
Breathe, March 2008
(ERS publication)

Finally:

Be persistent – and do not give up!

- Answer criticism(s)
- Shorten paper
- Accept it’s a fickle process (and not a personal one)
- Try again

GOOD LUCK!

Masterclass in writing a journal article

Cheryl Salome

Research Fellow
Woolcock Institute of Medical Research

cms@woolcock.org.au

WOOLCOCK INSTITUTE of MEDICAL RESEARCH

Masterclass goals

- To describe some simple principles to make writing easier, to produce papers that
  - have a clear, unambiguous message
  - accurately represent your science
  - are short, meaty and a pleasure to read
- (Not about the science!)

WOOLCOCK INSTITUTE of MEDICAL RESEARCH

Writing a clear, unambiguous paper

- Building blocks of writing
  - Word choice
  - Sentence structure
  - Paragraphs
- Writing the paper
  - Introduction
  - Methods
  - Results
  - Discussion

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Take home message

- Good writing is a learned skill!
  - Learn the techniques
  - Practice, practice, practice

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Why write journal papers?

- To inform others about your discoveries
  - Ethical obligation
- Good for your CV
  - Grants
  - Jobs
- Best of all..

Clear thinking ⇄ Clear writing

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Word Choice

"There are two things you can do with words: choose them and arrange them"

Mimi Zeiger, Essentials of writing biomedical research papers. McGraw-Hill 1991

WOOLCOCK INSTITUTE of MEDICAL RESEARCH

No, it's most likely a dork malfunction, by-passing the spondle-tube's grink chamber, madam

Avoid Gobbledegook

- Words in scientific papers should be
  - Precise
  - Simple
  - Necessary
  - Familiar
    - No jargon
    - Few non-standard abbreviations

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Words should be precise

- Arterial oxygen saturation was ***reduced by 80%*** when the airway was obstructed
- We tested this hypothesis in anaesthetized ***rats? dogs?***
- Methacholine inhalation ***increased*** airway resistance and ***decreased*** FEV_1.

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'With' is often imprecise

- In patients with COPD there was an increase in Borg score with an increase in walk distance.
- With inhalation of salbutamol, FEV1 increased
- Maximal bronchoconstriction with methacholine had other effects
- The salicylates are rapidly absorbed with a peak plasma salicylate concentration within 2 hours
- The osmotic pressure of plasma was subtracted from the osmotic pressure of plasma with heparin

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'With' is often imprecise

- In patients with COPD there was an increase in Borg score ***as / but*** walk distance increased.
- **After** inhalation of salbutamol, FEV1 increased
- Maximal bronchoconstriction ***induced by*** methacholine had other effects
- The salicylates are rapidly absorbed **reaching** a peak plasma salicylate concentration within 2 hours
- The osmotic pressure of plasma was subtracted from the osmotic pressure of plasma **containing** heparin

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Words should be simple

- Spirometry was measured in 15 ***girls*** and 23 ***boys*** 1 week ***before*** ICS treatment ***began*** and 1 week ***after*** treatment ***ended***.
- The subject ***walked*** to the laboratory ***door***
- The ***methods used*** in this study conformed to the standards of the American Thoracic Society

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Fancy, Heavy	Simple, Light
Initial	First
Prior to	Before
Subsequent to	After
Following	After
Post	After
Utilize	Use
At this point in time	Now
Methodology	Method

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Words should be necessary

- After 4 hours, we abruptly ended the hemodialysis procedure
- Oxygen uptake in response to drugs ***varied*** considerably
- Methacholine increased airway resistance and decreased FEV_1. Both ***of these changes*** were greater when the subject was in the supine position
- There have been no meta-analyses of cross-sectional studies of the association between asthma and obesity
- Airway hyperresponsiveness is an important characteristic of asthma (24-27).

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Avoid abbreviations, if possible

- Standard abbreviations (eg DNA, ml, all SI units)
  - OK for any journal
- Semi-standard abbreviations are standard for a specialty eg FEV_1, $PC_{20}FEV_1$, FRC
  - OK in specialty journals, not in general journals
- Non-standard abbreviations are made up by the author
  - **Don't use them!**
  - Eg: "Group A" "Group B"

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Principles of word choice

- Precise
  - As precise and accurate as your science
- Simple
  - Use technical words when appropriate
  - use simple words for the rest of the sentence
  - If an idea is simple, don't make it complex. If an idea is complex, write it as simply as possible
- Necessary
  - Use the fewest words possible, consistent with clarity
  - If it takes more words to be clear, use more words
- Familiar
  - No jargon
  - As few abbreviations as possible

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Repeating key terms

- Key terms = words or phrases that name important ideas
- Repeating key terms throughout the paper provides an unmistakeable link between sentences
- Key terms should be repeated exactly – varying the term is distracting, if not downright confusing

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Example: repeating key terms

- Airway hyperresponsiveness is a characteristic feature of asthma (24-27). In asthma, increased bronchial hyperreactivity is associated with greater risk of symptoms and greater morbidity.

  Is there any difference between airway hyperresponsiveness and bronchial hyperreactivity? What is the relationship between these two sentences?
- Airway hyperresponsiveness (AHR) is a characteristic feature of asthma (24-27). In asthma, AHR is associated with greater risk of symptoms and greater morbidity.

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Example: repeating key terms

- Key terms can be non-technical words too…

There are three different theories put forward for the very slow relaxation of catch muscles of molluscs.
One theory holds that catch is due to …
In this theory, paramyosin would have no special role…
The second theory holds that tension is developed by…
Because the thick filaments …
A third theory, to which I subscribe, …

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Say what you mean

1. The methacholine (amount, concentration, content, level) was (increased, augmented, enhanced) from 25 to 50mg/ml
2. Smooth muscle (contraction, constriction) decreased lung compliance
3. Drug therapy (included, consisted of) salmeterol 50mg bd, budesonide 400mg bd and salbutamol prn. No other drugs were permitted.
4. At frequent (intervals, periods) we measured pH, PO2 and PCO2 in arterial blood and during each (interval, period) of study we measured spirometric function three times
5. Deep inspirations before methacholine challenge (affect, effect) the severity of airway closure, but have no (affect, effect) on airway narrowing.

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Sentence structure Avoid Confusion

- Put important information in a prominent place
- Keep it simple - cut the clutter

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Power positions

- Power positions
  - First in a sentence, paragraph or section (most prominent)
  - Last in a sentence, paragraph or section (2nd most prominent)
  - First noun of the sentence as the subject (very prominent)
  - First noun of the sentence, not as subject (less prominent)
- Weak positions
  - Middle of a sentence, paragraph or section
  - Words in parentheses
  - Adjective or noun in the middle of a sentence

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Straightforward sentences

Subject – verb - object

- Make the topic of the sentence the subject
  - Puts an important word first
- Put the action in the verb

The patient showed a change in symptoms

The patient's symptoms changed

The patient's symptoms ***reduced***

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Make the topic the subject

Example

- The patient was begun on 500mg fluticasone daily and had resolution of his acute asthma symptoms within two weeks

Revision

The patient's acute asthma symptoms were resolved within two weeks by 500mg fluticasone daily

OR

Fluticasone (500mg daily) resolved the patient's acute asthma symptoms within two weeks

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Put the action in the verb

Action *Verb*

Example: An increase in heart rate occurred

Revision: Heart rate increased

Verb *Action*

Example: The new drug caused a decrease in heart rate

Revision: The new drug decreased heart rate

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Straightforward sentences

- A progressive decrease in the death rate occurred — *The death rate decreased progressively*
- Evaporation of ethanol from the mixture takes place rapidly — *Ethanol evaporates rapidly from the mixture*
- Measurements of blood pH were made with a Radiometer capillary electrode — *Blood pH was measured with a Radiometer capillary electrode*

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Straightforward sentences

- Prolongation of life for patients with lung cancer may be made possible by improved treatment — *Improved treatment may prolong the life of patients with lung cancer*
- An abrupt increase in minute ventilation occurred in all patients as exercise began — *Minute ventilation increased abruptly in all patients as exercise began*
- Separation of sputum plugs was achieved by centrifugation for 5 minutes — *Sputum plugs were separated by centrifuging (the sample?) for 5 minutes*

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Straightforward sentences

- We made at least two analyses on each sample — *Each sample was analysed at least twice*
- Inhalation of salbutamol produced an increase in peak flow — *Peak flow increased when salbutamol was inhaled*
- Beta-2 agonists exert their action by relaxation of airway smooth muscle — *Beta-2 agonists relax airway smooth muscle*

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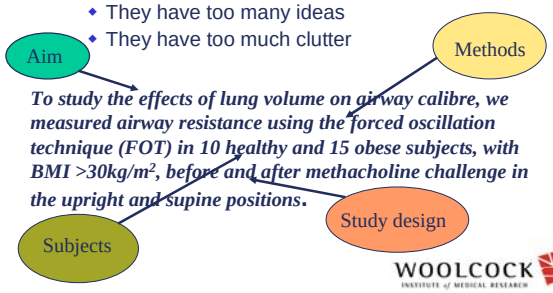
Keep your sentences short!

- Long, convoluted sentences are hard to follow
- Sentences are too long because
  - They have too many ideas
  - They have too much clutter



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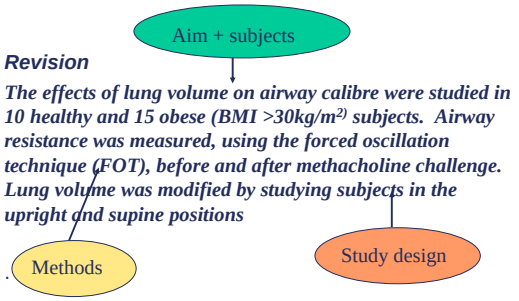
Talk about one thing at a time



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Cut the clutter

- Unnecessary words cause confusion for both writer and reader

Patient compliance with medication regimens is an area which is seen as being important because of the relationship between health-related behaviours and the short- and long-term outcomes of disease

Brown et al (23) found that the airways of asthmatic subjects are less distensible than those of non-asthmatics

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Cut the clutter

- Unnecessary words cause confusion for both writer and reader

Compliance with medication regimens is an important research area because health-related behaviours are related to the short- and long-term outcomes of disease

The airways of asthmatic subjects are less distensible than those of non-asthmatics (23).

Quote the science, not the scientist

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Paragraphs

Building your argument

- State your message clearly
- Organize your supporting information logically
- Show the relationship between ideas
- Display the structure of your argument

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State the message

- Use topic sentences at the start of each paragraph to
  - indicate what the paragraph is about
  - state the message of the paragraph
- Supporting sentences fill in the details
  - Evidence from the literature / your data

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What's the message?

The questionnaires used in the present study did not include any questions about nasal allergies, so it was not possible to differentiate between allergic and non-allergic rhinitis. The presence of nasal allergies has been suggested to differentiate between these two forms of rhinitis (24, 25). Recent studies have suggested that while approximately one-quarter of rhinitis in adults is non-allergic (25) even non-allergic rhinitis is a strong predictor of adult onset asthma (24). According to the "unified airway" hypotheses (21, 22) rhinitis and other upper airway disorders are thought to be linked with the development of adult onset asthma (18, 23). In the present study, rhinitis in 1981 predicted newly diagnosed asthma in 1994-5. In addition, subjects with newly diagnosed with asthma in 1994-1995 were more likely to have developed "new rhinitis", demonstrating the close relationship between the two conditions.

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The findings of this study are consistent with the "unified airway" hypotheses (21, 22) in which rhinitis and other upper airway disorders are thought to be linked with the development of adult onset asthma (18,23). In the present study, rhinitis in 1981 predicted newly diagnosed asthma in 1994-5 and those newly diagnosed with asthma in 19994-1995 were more likely to have developed "new rhinitis", demonstrating the close relationship between the two conditions. In the present study it was not possible to differentiate between allergic and non-allergic rhinitis as no questionnaire item covered nasal allergies specifically (a criterion that has been suggested to differentiate between these two forms of rhinitis (24,25)). Recent studies have suggested that while approximately one-quarter of rhinitis in adults is non-allergic (25) even non-allergic rhinitis is a strong predictor of adult onset asthma (24).

Message

Supporting evidence

Explanatory detail

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Examples

- Respirology p836 "TGF-β1…
  - Topic sentence: overview of the role of TGF-β1
  - Sentence 2: specific implications for remodelling
  - Sentences 3-5: evidence from the literature
  - Final sentence: relates this to the findings of the present study
- Respirology p835 "Fibroblasts…
  - Similar structure

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To avoid Confusion

- Choose words that are
  - accurate
  - simple
  - familiar
- Keep your sentences straightforward
  - Put an important word first
  - Put the action in the verb
- Keep your sentences short
  - Don't pack too many ideas into one sentence
  - Cut out the unnecessary words

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To build a strong argument

- Use topic sentences to state the message of a paragraph
  - Provide supporting evidence in the following sentences
  - In the last sentence, sum up the argument and provide a link to the next paragraph
- Allow the reader to read in a directed way
  - Tell them what you want them to know
  - Focus on your message

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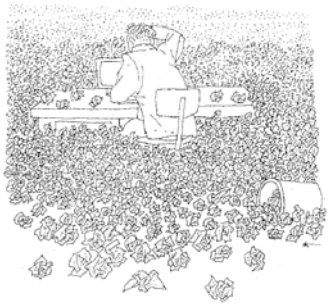
Preparing to write



The most common reason why papers are not published is that they are not written!

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Preparing to write

- When are you ready to write a paper?
- Choosing a journal
- Authorship
- The title page
- Getting started

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What's in a paper?

- A Question
- An Answer
- New Knowledge
  - A primary scientific paper must contain something new (a first disclosure)

If you have an important question and a valid answer then your paper should be publishable

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Your task as a writer..

- Pose the question
- Give the answer
- Show why the question is important
- Show why the answer is valid
- Show how the answer advances knowledge *– what's new and why does it matter?*

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When are you ready to write a paper?

- When you have something new to say
- Your experimental work is completed
- You have a clear question and an answer to that question
- You have a coherent story, that links the question, the methods, the data and the results to the final outcome

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Choosing the right journal

- Criteria
  - Novelty and likely impact of your findings
  - Readership, content, style, focus, length,
  - Likely referees
- General (eg BMJ) vs specialist (eg AJRCCM)
- Regional?
- Open access?
- Impact factors
  - Aim high, but appropriate to the content of the paper
- When you've selected the journal, check the "Instructions for authors"

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Authors

- Decide on the authors and their roles as early as possible
- Guidelines for authorship
  - Substantial intellectual contribution to the content
  - Read and approved the final version
  - Able to take responsibility for content and message
- No gift authorship
- There are no rules about the order of authors, but in general
  - The first author writes the first draft and is responsible for style
  - The last author may be the supervisor / senior researcher
  - Everything else is up for grabs!

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Acknowledgements

- Participants who do not meet the criteria for authorship should be listed in the acknowledgements
- Acknowledgements can include (as appropriate)
  - General support from head of department
  - Technical help
  - Financial and material support
  - People who have helped, but not enough to justify authorship. Their contribution can be stated eg "data collection", "critical review of protocol".
- Written permission is required from anyone acknowledged by name

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The title

- Identifies the main message & attracts readers
  - The first information a potential reader has about your paper
- A good title is
  - Accurate
    - use the same key terms in the title as in the paper
  - Complete
    - Include independent, dependent variables and population
  - Specific
    - Terms in the title should be usable as indexing terms
- Put an important word first

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Getting started

- When you have decided on the journal, the title and the authors, make a title page!
  - Psychological boost
- Start the paper where it is easiest
  - Usually the methods
- Use what you have available
  - Protocol
  - Abstract
  - Poster / presentation
- Make time for it
  - Break the paper into manageable chunks

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A logical, structured plan

Introduction	*Why you asked this question*
Methods	*What you did to answer the question*
Results	*What you found to answer the question*
Discussion	*The answer to the question and why it matters*

- Takes the reader with you
- Puts information where you expect to find it

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Split the thinking from the writing

- For each section of the paper, work out
  - Topic / message for each paragraph (dot points)
  - Relevant literature (Endnote / Ref manager)
- Check that
  - The overall message is correct
  - The flow of ideas / reasoning is logical

Sterk & Rabe, Breathe, 2008

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Reference database

- Essential!
- Keep your library up to date
- Use it from the beginning
  - Initial notes
  - Rough draft
  - Finished paper

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Finally..

- Most authors need many drafts, so don't get discouraged
- Get feedback from your co-authors and others
- Don't get obsessed with perfection
  - scientific papers are working knowledge, not poems
- When the paper has a clear message, clearly stated, and all the pieces are in place, send it off and open the champagne!

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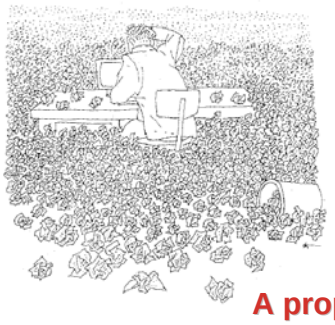

A proper introduction

The Introduction

- Awakens interest in the paper
- Defines the problem, and shows its importance
- Describes what is known already
  - Briefly! – this is not a literature review
  - Explain why what's already known doesn't solve the problem
- Explain the rationale for the study
  - How this study will provide answers that will solve the problem
- **Pose the research question**

The Introduction
the 3-phase approach

Identify the general topic (clinical problem) — *Important*

↓

Identify the gap in knowledge — *New*

↓

How can this gap be filled? — *Valid*

THE QUESTION

The clinical problem

- Medical research (even basic science) is focussed on a clinical problem
  - Importance / relevance
  - What benefits are likely if it is solved?
- Understandable by non-specialist

The gap in knowledge

- What is known about the problem?
  - Focus specifically on what is relevant to this paper
  - Cite only important, relevant papers
- Why does this not solve the problem?
- What is your new idea?
  - New techniques?
  - New experimental approach?

The Research Question

- The question is the most important statement in the paper
  - It is the specific topic of the paper
  - All other sentences, paragraphs and sections of the paper relate to the question
- The question should state or imply
  - The independent variables (intervention)
  - The dependent variables (outcome)
  - The subject population (or the species, organ, cell line etc)
  - The controls

Advantages of a precise question

- It creates an expectation about what reader is going to find in the the rest of the paper
  - They can read in directed way rather than reading blindly
- The question indicates what you measured and who you studied
- The question implies the
  - The study design
  - The presentation of data
  - The type of answer

Example of an Introduction

Asano et al, Respirology 2009; 14(6): p822

¶1: The clinical problem

- Sentence 1 & 2: essential background
  - Action of cysteinyl leukotrienes and their effects on the airways
  - Note the use of a key term (cysteinyl leukotrienes) in the power position in the first sentence
- Sentence 3: the clinical problem
  - Inter-individual variability in efficacy of LTRA drugs
  - Compare s3 with s1 in the abstract
    - More straight forward in the abstract

¶2: What is known

- Genetic determinants of inter-individual variability in efficacy
  - Only cites a few references (4-7)
  - Gives details of the authors own findings (4)

¶3: The gap in knowledge

- Other sources of variability in efficacy: pharmacokinetics
  - Note topic sentence (s1)
  - S2 and s3 give details and develop the argument
- The gap in knowledge (implied) is whether pharmacokinetics of LTRAs affects variability in efficacy

¶3: Research question

- "Therefore, this study was performed to determine how the pharmacokinetics of pranlukast influence its efficacy, and whether other factors, such as LTC4S genotypes, may be related to the therapeutic effects…"
- Specific aims
  1. Pharmacokinetics in adult asthmatics
  2. Combined analysis of pharmacokinetics and pharmacogenetics of pranlukast..
- For aim 1
  - Intervention (independent variable) = pranlukast
  - Outcome (dependent variable) = oral clearance (CL/F)
  - Population = adult asthmatics
  - Control = ?

Exercise:
using your own manuscript
(or select a paper from the journal)

Identify:

- The clinical problem addressed by the paper
- The gap in knowledge
- The research question
  - The independent variable (intervention)
  - The primary dependent variable (outcome)
  - Any secondary outcome variables
  - The population
  - The controls

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If you are having problems with this exercise you can

- Talk to other people at your table
- Put up your hand and ask for help from the Faculty

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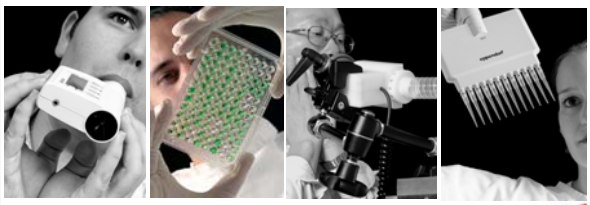
The Methods Section



Methods

- Function
  - To provide enough detail and references to enable a trained scientist to evaluate or repeat your work
- Essential information
  - What you used (chemicals, subjects, animals, tissues)
  - What you did
  - How you did it
  - Why you did it
- Other information
  - Any assumptions and definitions of indicators
- Check guidelines for presentation of studies
  - CONSORT for randomised controlled trial
  - STROBE for observational studies

Content of the Methods section

- Subjects (or animals, tissues etc)
- Study design – overview of the experiments or protocol
- Interventions
- Methods of measurements
- Data handling and analysis
- References, where appropriate

- Do not include results

Subjects

- Provide sufficient information to allow readers to compare your population with others
  - Generalisability of your findings
- Did you study the right subjects to answer the question?
  - Potential for bias?
- Essential information
  - Source of subjects
  - Inclusion and exclusion criteria
  - Ethics approvals and informed consent
- Other information
  - Drop-outs
  - Planned sample size and justification

Study design

- A one paragraph overview of the experiments
  - Is the study design appropriate for the question?
- Do not include detailed information about the specific methods of measurement
- Should give
  - A brief description, including the order and duration, of all interventions (= independent variables)
  - A brief statement of what outcome variables were measured and when (= dependent variables)
  - A clear statement of all controls, such as subject groups, placebo interventions etc
  - A statement of the duration of each study
- Clinical trial registry and registration number

Study design - example

Duration of study and order

Intervention

Outcome variables - what was measured when

This was a 12 week study, comprising two four week treatment periods, a one week run-in period, a two week washout period between treatments and a one week follow-up period after completion of the second treatment intervention. During the run-in, washout and follow-up periods, subjects took salbutamol as required to relieve symptoms. During the treatment periods, subjects took beclomethasone (100mg/puff) or placebo, at two puffs morning and night. Lung function and airway hyperresponsiveness were measured at the end of each treatment period and at the end of the run-in, washout and follow-up periods. Each subject recorded symptoms and PEF in a diary card twice daily throughout the study. The study was registered with the Australian Clinical trials registry, trial number ACTR 123456789

Interventions

- If the interventions can be described adequately in a few words or sentences, include them in the study design
- If the interventions are complex or non-standard and need detailed descriptions put them under separate sub-heading
- Drugs should be identified by their generic name
  - eg salbutamol or budesonide (not Ventolin or Pulmicort),
  - include dose, route of administration and manufacturer

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Methods of measurement

- Describe the methods for measuring each of the variables mentioned in the question or study design
  - For every result in Results, there must be a method in Methods
- Established methods – just give the reference:
  - *In these samples, lipids were extracted (Bligh and Dyer, 1959) for phosphorus determination (Bartlett, 1959) and for thin-layer chromatography (Poorthuis et al, 1976)*
- If slightly modified from the published method, just describe the parts that are different in your study
  - *To determine allergic status skin prick tests were performed according to the method of Pepys et al (7). Wheal size was measured after 10 minutes and wheals ≥4mm mean diameter were considered positive.*

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Methods of measurement

- Extensively modified methods or new methods should be described in more detail
  - Describe both the modification and the reason for it
- Standard descriptions are OK
  - Check protocols or SOPs from your laboratory
- Include definitions, assumptions or indicators eg
  - *Wheals ≥4mm mean diameter were considered positive*
  - *Subjects were atopic if they were positive to any allergen*
  - *Resistance was measured as an indicator of airway calibre*

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Data analysis and handling

- State how data are summarized eg mean and standard deviation; median and IQR
  - Describe any data transformations (eg log transformation)
- State the statistical tests used – for tests that are not well known, provide a reference
- Well known tests don't need references
  - Students t test, Chi square
  - Standard forms of analysis of variance
  - Linear regression and correlation
  - Standard non-parametric tests eg Wilcoxon, Mann-Whitney
- State any computer program you used (including version number and manufacturer details)

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Data analysis - significance

- Which measurements were compared, using what tests
  - Make sure the analysis and tests are appropriate to the research question and the study design
- Was the analysis by "intention to treat" or "per protocol"
  - How were dropouts or missing data handled?
- If the sample size for each analysis is not clear from the study design, state it either in Data Analysis or in Results
- State the p-value at which differences are considered statistically significant in Data Analysis; give exact p-values in Results

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Writing style for Methods

- Verb tense = past tense
  - Eg We measured…, methacholine was administered..
  - ***Except*** when describing how data are presented in the paper eg data are summarized as .. Data are reported ..
- Methods section should be as long as necessary to accurately describe what was done
  - Use the fewest words possible, avoid fussy detail
- AJRCCM:
  - Methods section for print version is ***500 words*** only
  - Additional information may be submitted for peer review – posted in Online-Only Repository

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More details

- At first mention of any item of equipment or apparatus, give the manufacturer and their location (city, state, country).
- Units of measurement should conform to scientific usage (use SI units)
  - can be abbreviated when they follow a number (eg cm, nm, g, mg, ml) but not otherwise
- Numbers as numerals or words:
  - Never start a sentence with a numeral
  - Integers from one to ten are often written in words
  - Numbers greater than ten are written as numerals

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Example of a Method section

Antoniades et al, Respirology 2009; 14(6): p874

The content of the Methods section is determined largely by the research question!

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Research question

- Can topical lidocaine through the bronchoscope reduce cough and stridor rate during flexible bronchoscopy with light sedation?
  - Independent variable: lidocaine (2%)
  - Dependent variable: cough and stridor rate
  - Population: (patients undergoing bronchoscopy)
  - Control: (placebo – normal saline)

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What does the question lead us to expect in the Methods?

- Patient population:
  - All comers or patients with history of cough??
- Study design:
  - Treatment study should be a RCT
  - Randomization procedure?
  - Blinding?
  - Controls?
- Outcome variables
  - Objective or subjective?
  - Blinding?
  - Secondary outcomes?
- Data analysis
  - Power calculations?

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Exercise:
using your own manuscript
(or select a paper from the journal)

- Based on your research question, what do your expect to find in the subsections of your Methods?
  - Subjects – source, inclusion / exclusion criteria
  - Study design
  - Intervention
  - Outcome variables
  - Data analysis / handling

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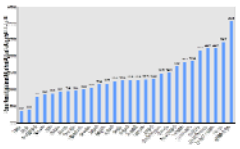
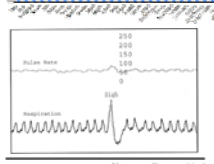
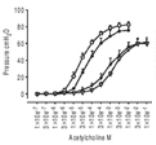


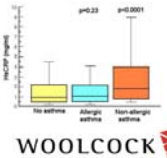
	Sigh rates, mean (range), No./h	P value*
Controls (n = 18)		
Reading	19.7 (7.1–29)	< .002
Videotape	14.4 (1.8–26)	
Patients with asthma† (n = 9)		
Reading	18 (13–25)	< .01
Videotape	12.3 (4.7–16)	
Total (N = 27)		
Reading	19.3 (7.7–30)	< .001
Videotape	13.7 (1.8–26)	



The Results Section

	Naive	Sham-sensitized
Baseline R_L, $cmH_2O \cdot L^{-1} \cdot s$		
Day 14	22.2±2.7	17.9±2.0
Day 20	20.2±1.8	16.8±2.3
Baseline C_L, $mL \cdot cmH_2O^{-1}$		
Day 14	12.9±2.2	16.2±3.9
Day 20	14.4±1.4	19.1±5.0
Max R_L, $cmH_2O \cdot L^{-1} \cdot s$		
Day 14	52±7	65±13
Day 20	57±7	57±9
Log PC_{20}		
Day 14	3.26±0.04	2.80±0.78
Day 20	3.22±0.33	2.74±0.15





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Results

- Function
  - To state the results of the experiments described in Methods
  - To cite figures or tables that present supporting data
- Essential information
  - Report only those results that are pertinent to the question
  - Results should be reported whether or not they support your hypothesis
  - Data are presented in tables and figures
- Keep it brief and focused
- Only report the results from your study
- Does not usually include references

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Data vs Results

- Data = facts, often numbers, obtained from experiments or observations
- Data can be
  - Raw: eg all the FEV_1 measurements from a group of patients
  - Summarized: eg means and SDs or 95% confidence intervals
  - Transformed: FEV_1 % fall, log PD_{20}, doubling dose change
- Result = meaning of the data
  - Data can rarely stand alone – the meaning must be stated

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Results and data

- ***Example – data but no result***
  - In 20 asthmatic subjects, mean FEV_1 was 1.9 ± 0.5L at baseline, and 2.3 ± 0.3L after inhalation of 200µg salbutamol.
- ***Revision – result stated***
  - In 20 asthmatic subjects, mean FEV_1 increased after inhalation of 200µg salbutamol from 1.9 ± 0.5L to 2.3 ± 0.3L (p=0.02).
- ***Revision – result and effect size***
  - In 20 asthmatic subjects, mean FEV_1 increased by 21 ± 7% after inhalation of 200µg salbutamol from 1.9 ± 0.5L to 2.3 ± 0.3L (p=0.02).

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Organization of Results

- ***Subject details*** first
  - Numbers, anthropometrics, baseline values
    - Data are in a table – do not repeat them in the text
    - Result (comment on any significant features) in text
  - Information about comparability, representativeness, severity of disease
- Account for exclusions or drop-outs
  - Example – Huang et al, Respirology, page 860
  - CONSORT diagram

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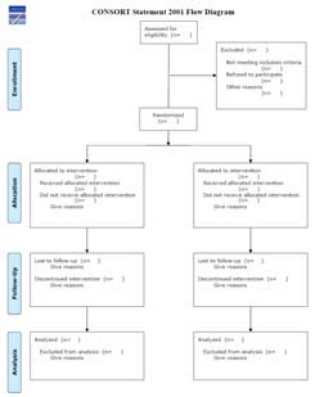

No. excluded

No. randomised

No. allocated to intervention

No. lost to follow up

No. analyzed

- For more information www.consort-statement.org

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Organization of Results

- Chronological – in the order the experiments were done
- Most to least important
  - Results that answer the question first
  - Secondary outcomes next
  - Unexpected findings last (briefly)
- Determined by the logic of the science
  - The same order as your questions (if you have a series of questions)
- Simple to complex analyses
  - Summary data → univariate → multivariate analyses

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Emphasize the Results

- Make sure that your main findings stand out
  - Power positions!
- Put important results first
- Omit data from the text
- Use topic sentences to state the results and give an overview
  - Example: Marchi et al, page 886 – Leukocyte counts..

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Omit data and condense results

- ***Example***

  In 20 asthmatic subjects, mean FEV1 increased by 21 ± 7%, after inhalation of 200µg salbutamol (from 1.9 ± 0.5L to 2.3 ± 0.3L, p=0.02). Mean FVC increased by 13 ±5%, from 2.6 ± 0.4L to 2.9 ± 0.3L, p=0.01). After placebo inhalation there were no significant changes in FEV1 (1.8 ± 0.4L vs 1.9 ± 0.3L p=0.5) or FVC (2.6 ± 0.3L vs 2.5 ± 0.4L, p=0.62).

- ***Revision***
  - Remove data to a figure
  - Condense repetitious results
  - If the control data (placebo) are given in the figure, they don't need to be mentioned in the text

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Omit data and condense results

Revision

In 20 asthmatic subjects, 200µg salbutamol by inhalation increased mean FEV1 by 21 ± 7%, (p=0.02) and mean FVC by 13 ±5%, (p=0.01) (Figure 2). Placebo inhalation had no significant effect.

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Details

- Do not use initials to identify subjects
  - If you refer to an individual subject, use a descriptive term (eg typical asthmatic curve) or a number or letter code
- Verb tense = past tense
  - Results of this experiments are discrete events that occurred in the past
- Statistical details
  - Provide appropriate information to show the strength of the result – give exact p values even if not significant
- Give effect sizes wherever possible or appropriate
  - Differences can be statistically significant, but clinically unimportant

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Figures and tables

- Provide evidence for the statements in the text
- Use graphs wisely
  - Most important findings (high visual impact)
  - Illustrate important relationships and patterns in the data
  - Figures may be "borrowed" (copied) by people who want to describe your results to others
- Figures and tables should form a clear sequence that relates clearly to the text
- Check the journal requirements for figures and tables – they can be very specific

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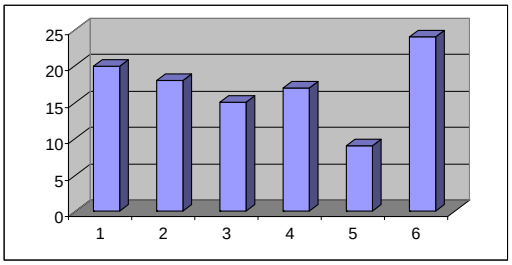
Types of graphs

- Line graphs
  - two continuous variables eg changes over time, DRCs
- Scattergram
  - Two continuous variables – correlations or regressions
- Bar graph
  - A continuous and a categorical variable – eg prevalences
- Histogram
  - Frequency distributions

Don't ever use a 3D graph for effect!



3D graphs are visually ambiguous and should never be used if there is no third dimension

Tips for clear graphs

- Make sure lettering is large enough to read after the graph is reduced for the journal
  - at least 1.5mm high after reduction
- Make sure symbols are large enough and easily distinguished
  - Easiest to distinguish: ● and ○, then ▲and △
- Draw figures so the data are emphasised
  - Make the curves the darkest lines
  - Make axes, tick marks, error bars, keys etc less dark
- Make sure the point of the graph is clear
  - An "increase" should look like an increase

Figure legends

- Title
  - Goes in the legend, not on the figure
  - Should state the independent variable, dependent variable and the population eg
    - *Effect of salbutamol on FEV1 in 10 asthmatic subjects*
    - *Increase in FEV1 after salbutamol in 10 asthmatic subjects*
- Definitions of symbols, line or bar patterns
- Statistical information – explain error bars, p values

Tables

- Tables, like figures, need to be able to stand alone, separate from the text
- They need to tell a clear story – the point of the table should be obvious
- Tables are a visual medium, so it important to design them so they have maximum visual impact
  - Not too cluttered
  - Not too big – consider breaking into smaller tables or omitting columns
  - Not too small – consider putting data in the text

Title of the table

- States the topic or the point of the table
- Should state the independent variable, dependent variable and the population – can also state the point
- Keep titles brief by using a category term in place of the names of two or more variables
  - Eg "Clinical characteristics" can refer to diagnosis, drug therapy, severity markers
  - Anthropometric features – age, height, weight, gender etc
- Use the same key terms in the title, column headings and the text of the paper

Column headings

- One type of information / column
- Use subheadings to divide columns into categories
- Measurement units should be in the column headings, not the table body
  - Use International system (SI) abbreviations
  - Choose units that avoid unnecessary zeros

Table body

- Present data in a logical order
  - Control data usually goes first
- If sample sizes vary, put them in a column or row
- Arrange the data to reveal trends down a column or across a row
  - Put SD or CI to the right of, or below, the means to allow the eye to run down the column or across the row
- Use the fewest possible decimal places,
  - use the same number of decimal places in all values of the same variable,
  - use the same number of decimal places in SD and mean
- Align values on the decimal point
- Indicate missing data – don't just leave a blank
  - "-" or "ND", with an explanation in the footnote

Footnotes

- Use footnotes to explain items in the title, column headings or body of a table, such as experimental details or abbreviations
- Put information in footnotes in the same order as in figure legends:
  - experimental details
  - Definitions of abbreviations and symbols
  - Statistical details
- Use superscript symbols or lowercase letters to identify footnotes

Example: Antoniades et al, p874

The content of the Results section is also determined largely by the research question!

- Can topical lidocaine through the bronchoscope reduce cough and stridor rate during flexible bronchoscopy with light sedation?
  - Independent variable: lidocaine (2%)
  - Dependent variable: cough and stridor rate
  - Population: (patients undergoing bronchoscopy)
  - Control: (placebo – normal saline)

What does the question lead us to expect in the Results?

- Patient population:
  - Characteristics, dropouts or exclusions?
  - Comparable treatment groups, any risk of bias?
- Primary outcomes (cough and stridor)
  - Result stated?
  - Data in figures or tables
- Secondary outcomes?
- Safety issues

Exercise: using your own manuscript (or select a paper from the journal)

- Based on the research question, what do you expect to find in the Results section?
  - Subject characteristics
  - Results for primary outcome variables
    - Have you stated the result?
    - Where are your supporting data shown?
  - Do your graphs show the important relationships clearly?
    - Are there too many figures?
  - Check for excessive repetition of data

The Discussion

Purpose of the Discussion

- To answer the question posed in the introduction!
- To explain how the results support the answer
  - show why the answer is valid
- To explain what's new about this discovery
  - How does it fit with existing knowledge on the subjects
  - What have we learned that we didn't know before
- To explain why this discovery is important,
  - what are the implications for the clinical problem

Organization of the Discussion

- Discussions have a beginning, a middle and an end:
- Beginning
  - what we found (the answer), and who it applies to (the study population)
- Middle
  - why we believe the answer is valid
  - How the findings compare with others
  - What the answer means (mechanisms)
  - Clinical implications
- End
  - the point of the answer (the "so what" factor)

Beginning the Discussion

- The beginning of the discussion is very powerful position – use it to give the most important statement of the paper: the answer to the question
- Give a signal that this is the answer eg
  - This study shows that…
  - In this study of subjects with mild asthma, we found that…

Appropriate population

- Indicate the population that this answer applies to
- It can sometimes be sufficient to simply state the population group in the answer eg
  - …mild to moderate bronchoconstriction in adults
  - In this study of newborn guinea pigs, we found that..
- Sometimes, it may be necessary to comment in detail about the study population (usually in the second paragraph)
  - Issues of selection bias, randomisation, drop outs
  - Definitions of clinical severity
  - Specific limitations to the applicability of the findings

Why the answer is valid

- Indicate why any weaknesses in the study are acceptable
  - Limitations of the methods
  - Weakness in study design
  - Validity of any assumptions
- Point out the strengths of the study that make the answer more believable
- Explain any of your results that do not support the answer

How the findings compare with others

- Show where your findings are comparable with others
  - If your answer is consistent with previous studies it's more likely to be accepted as valid
- Explain discrepancies between your findings and others
  - If your answer goes against the trend, you need to work harder to convince the readers it's valid
- Explain how your findings extend the results of others
- Focus on your findings, and relate them to others (not *vice versa*)

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What the answer means

- What mechanisms might explain your results?
  - Support your explanation using your own data and that of others
  - Are there alternative explanations or interpretations of your findings?
- What's new about this?
  - What has been solved by your findings
  - Relate your findings to the gap in knowledge identified in the Introduction
- Why is it important?
  - What is the clinical relevance of your findings?

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A big finish

- Use the last paragraph of the discussion to show the importance of the answer by stating
  - Applications of the answer
  - Recommendations based on the answer
  - Implications for future research
  - Speculations based on the answer
- If you started with a clinical problem, finish with the implications of your study for that clinical problem

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Example: EMT in mTEC

Kuroishi et al, pp 835-6

- Beginning
  - P1: restates the question and gives the answer
  - Specifies the population: "..primary cultures of mTEC.."
    - S1 restates the question
    - S2 and S3 gives the results that support the answer
    - S4 gives the answer, and the implication
- Middle
  - Middle paragraphs have similar structure:
    - Topic sentence, including key term (fibroblast, TGF-β1)
    - Mechanisms
    - What's new in this study, what others have shown
    - Message
- End
  - Last paragraph restates the answer and gives the implication for the diseases mentioned in the introduction

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Example: Predictors of adult onset asthma

Jamrozki et al, pp 818-20

- Beginning
  - P1: answers the question
    - S1: incidence of adult onset asthma
    - S2: predictors of adult onset asthma
- Middle
  - P2-10: discusses each predictor (note the topic sentences)
    - Relates findings to previous studies
    - Mechanisms / implications where appropriate
  - P11: limitations (definition of asthma by questionnaire)
- End
  - P12: summary, plus implications for targeting risk factors

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Example: Swimming & lung function

Wang et al, page 840

- Beginning
  - P1: Answers the question and give some implications
    - S1 "The main findings of this study are…"
    - S2 "These data suggest …"
- Middle
  - P2: potential confounders and limitations of the study
  - P3: Potential mechanisms, what others have shown
  - P4: Potential adverse effects
- End
  - P5: conclusion and clinical implications

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Exercise:
using your own manuscript
(or select a paper from the journal)

- Does your Discussion
  - Give an answer to the question posed in the introduction
  - Discuss the strengths and weaknesses of your study, and show why your results are believable, despite any study limitations
  - Show what's new about your findings
  - Explain the meaning of your findings
  - Relate your findings to the clinical problem raised in the first paragraph of the introduction
  - Have a very clear take-home message in the final paragraph

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