Scientific skills

Learning objectives:

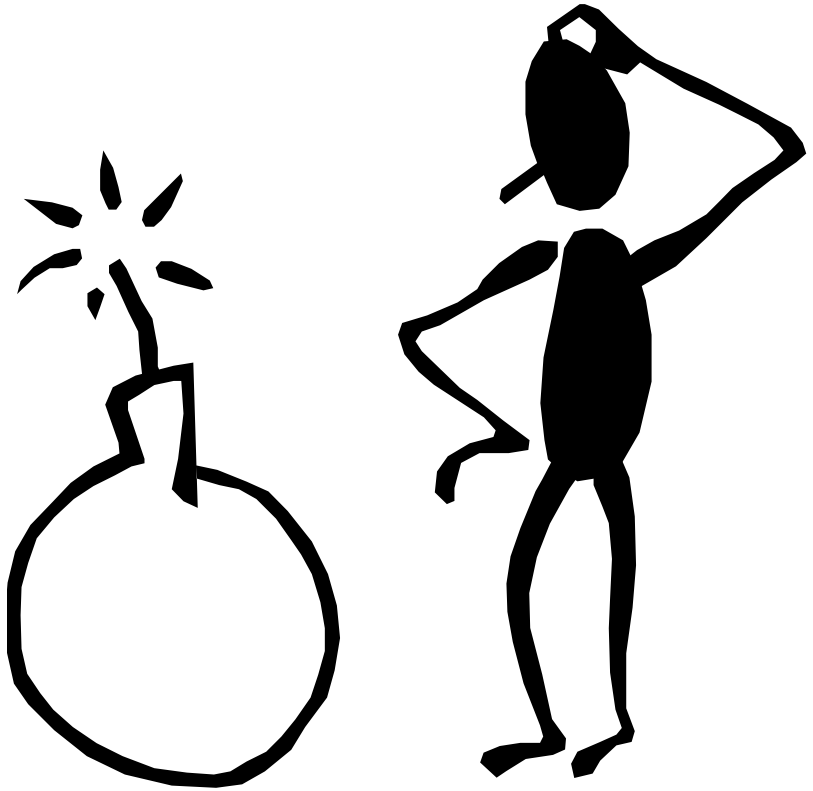
After successful completion of this class you will be able to critically evaluate the quality of a research paper

Group discussion -1

- Have you ever read a scientific paper?
- What was the purpose of reading the paper?
- How did you select the paper?
- Did you read the whole paper?
- Did you take the quality of the paper into account?
  - If yes: how did you evaluate the quality

The Problem

- Vast and expanding literature.
- Limited time to read.
- Different reasons to read – mean different strategies.
  - Keeping up to date.
  - Answering specific clinical questions.
  - Pursuing a research interest.



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Stages

- Clarify your reasons for reading.
- Specify your information need.
- Identify relevant literature.
- Critically appraise what you read.

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Clarify Your Reasons for Reading

- Reviewing a paper.
  - Paper send to you by the editor
- Keeping up to date.
  - Skimming the main journals and summary bulletins.
- Answering specific clinical questions.
  - Finding good quality literature on subject.
- Pursuing a research interest.
  - Extensive literature searching.

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Specify Your Information Need.

- What kind of reports do I want?
- How much detail do I need?
- How comprehensive do I need to be?
- How far back should I search?

- The answers to these questions should flow from the reasons for reading.

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Critically Appraise What You Read.

- Separating the wheat from the chaff.
- Time is limited – you should aim to quickly stop reading the dross.
- Others contain useful information mixed with rubbish.
- Simple checklists enable the useful information to be identified.

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Questions to Ask

- Is it of interest?
- Why was it done?
- How was it done?
- What has been found?
- What are the implications?
- What else is of interest?

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Group discussion -2

- Can you name 3 different types of scientific papers?
- For what is each of them useful?

Types of papers

- Research article / Original report
- Short report
- Review / Systematic Review / Meta-analysis
- Letter
- Comment

Research article / short report

- Latest information on a specific research topic
- Useful if you want to define a new research question
- Useful if you write a paper on a specific subject
- Useful to get ideas about how other authors did their studies

(Systematic) Review / Meta-analysis

- To get an overview about existing knowledge in a research topic
- Quality (in general):
  - – Review
  - + Systematic review
  - ++ Meta-analysis
- You miss information about the methods and other details
- You cannot judge the quality yourself

Which parts does a typical “original paper” contain?

Parts / Paper Structure

Title

Abstract

Introduction (objective)

Methods

Results

Discussion

Acknowledgements

References

Group work 4: Title and abstract

- Please read the title and the abstract of the three papers
- Which paper is the most/ least interesting for you? Why?
- What information do all authors provide?
- What information is only provided by some authors?
- Which abstract convinces you the most?

Questions to Ask

- Is it of interest?
  - Title, abstract, source.
- Why was it done?
  - Introduction.
    - Should end with a clear statement of the purpose of the study.
    - The absence of such a statement can imply that the authors had no clear idea of what they were trying to find out.
    - Or they didn't find anything but wanted to publish!

Questions to Ask

- How was it done?
  - Methods.
    - Brief but should include enough detail to enable one to judge quality.
    - Must include who was studied and how they were recruited.
    - Basic demographics must be there.
    - An important guide to the quality of the paper.

Questions to Ask

- What has it found?
  - Results.
    - The data should be there – not just statistics.
    - Are the aims in the introduction addressed in the results?
    - Look for illogical sequences, bland statements of results.
    - ? Flaws and inconsistencies.
    - All research has some flaws – this is not nit picking, the impact of the flaws need to assessed.

Questions to Ask

- What are the implications?
  - Abstract / discussion.
    - The whole use of research is how far the results can be generalised.
    - All authors will tend to think their work is more important than the rest of us!
    - What is new here?
    - What does it mean for health care?
    - Is it relevant to my patients?

Questions to Ask

- What else is of interest?
  - Introduction / discussion.
    - Useful references?
    - Important or novel ideas?
    - Even if the results are discounted it doesn't mean there is nothing of value.

What Is the Method?

- The first task – alternative check lists for different methods.
- How was the study conducted to confirm the method?
- Authors sometimes use the wrong words to describe their work!

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Group work 5: Methods

- Please find someone who read the same paper as you did.
- Please discuss with him/her the points provided by the STROBE check-list for the methods part

The Results

- The major mental challenge.
- What do I think this really means?
- CAUTION.
  - Large unexpected results are rare.
  - Flawed studies and misleading findings are common.

Statistics

- A subject in itself.
- Important:

Size matters.

Pitfalls

- Black box analyses. Modern computers make statistical testing easy – the authors may not know what they are doing!
- Bias – play devils advocate.
- Confounding.
  - A very common problem in medicine.
  - Colour televisions do not cause increases in hypertension.

Group work 6: Results

- Please find someone who read the same paper as you did.
- Please discuss with him/her the points provided by the STROBE check-list for the results section

Registration at vhb

- Did you face any problem registering at the virtual university of Bavaria (vhb)?

Homework

- Until next Wednesday, please
  - work through chapters 1 + 4 of the e-learning course “Scientific writing”
  - come up with one research question you might be interested in.
  - Complete STROBE methods and results

What did you learn today?

- Please note on a paper
  - 1 aspect that was new for you
  - 1 aspect that you already knew
  - 1 aspect that is still not clear to you