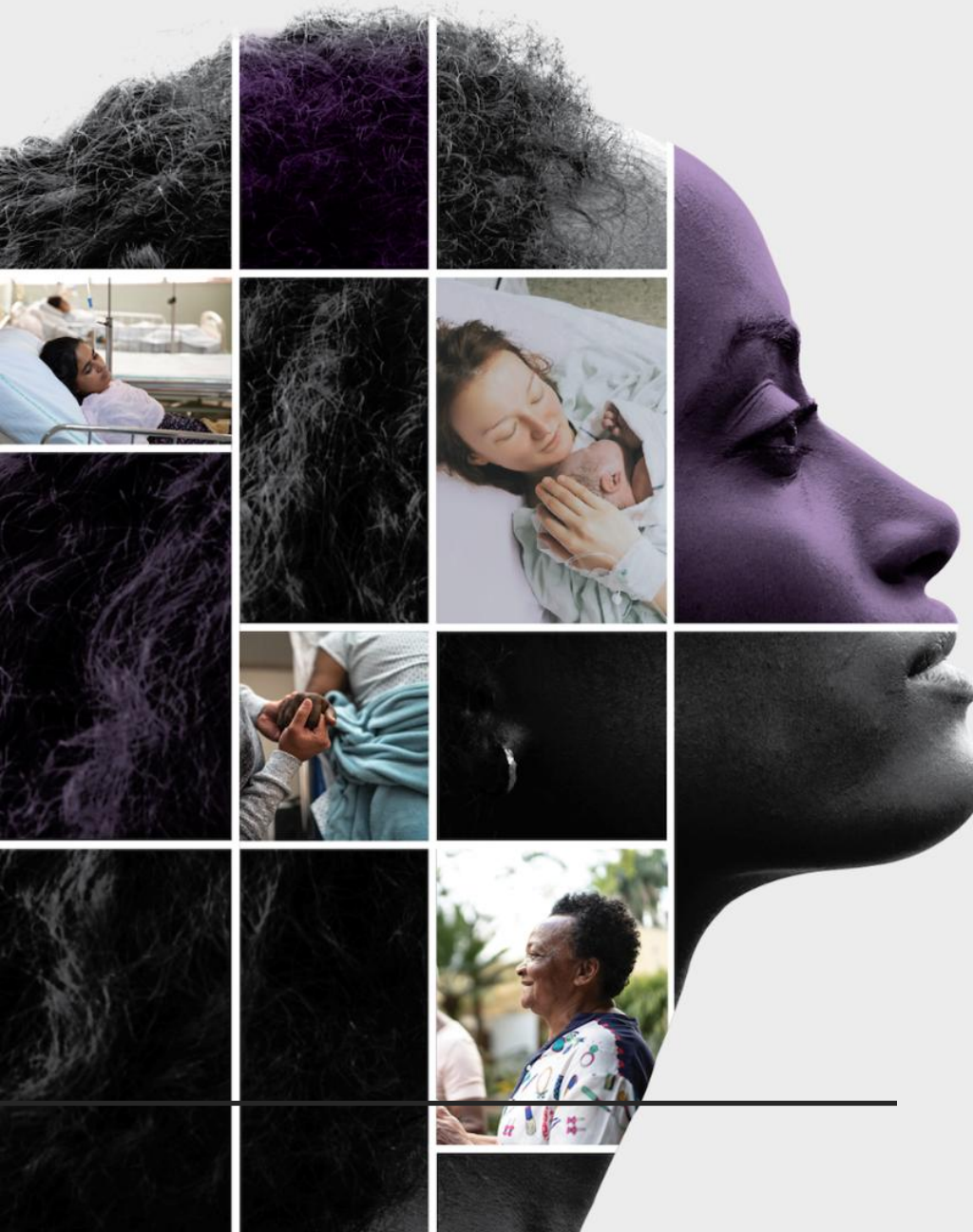




Scientific Writing, AI and critical appraisal

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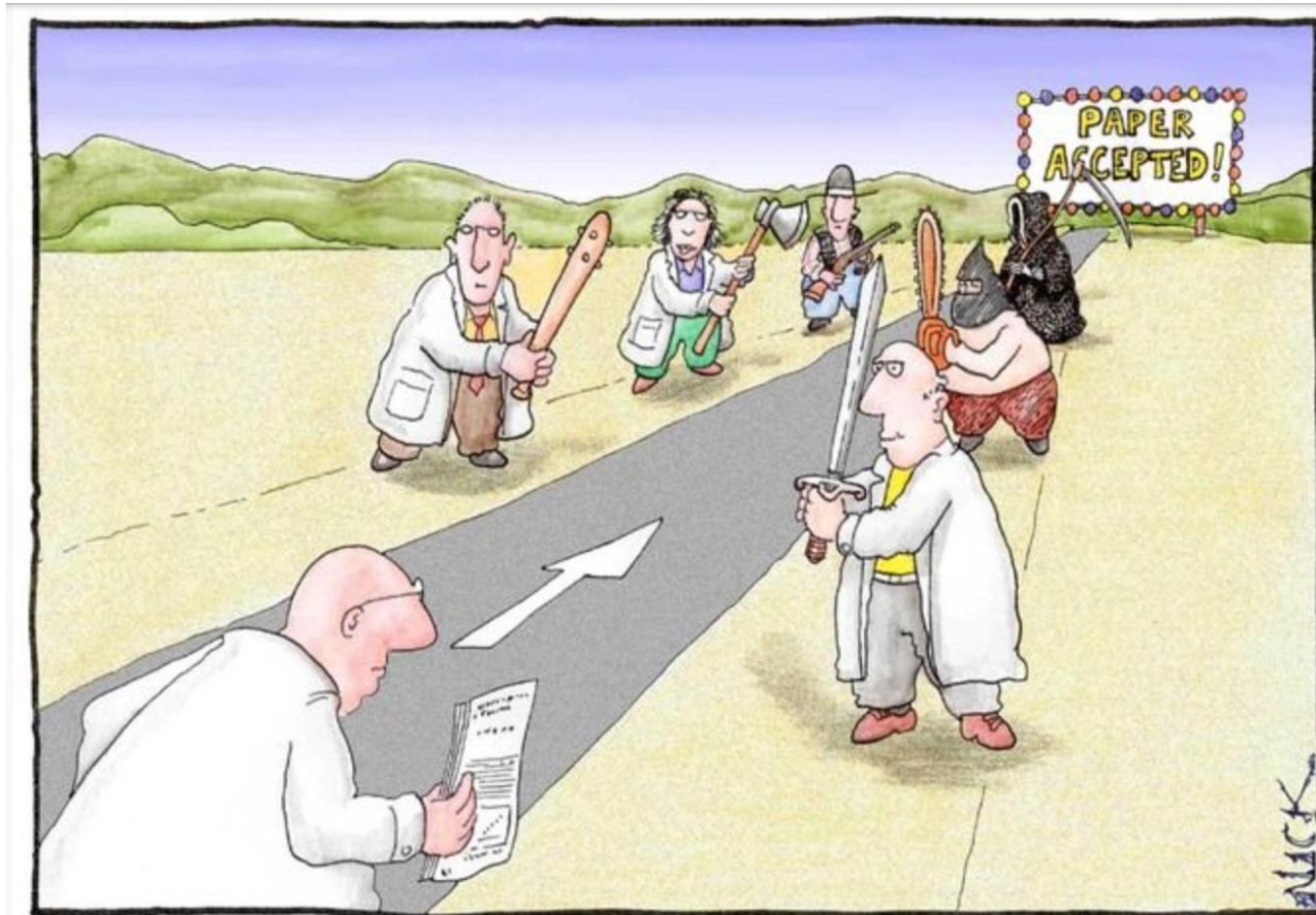
Co-Editor in Chief BMJ Women's Health

Publish or perish



**Welcome to the Team. Remember, if you follow
the University Motto, you'll do fine...**

Why would I put myself through this!



Most scientists regarded the new streamlined peer-review process as "quite an improvement."

Scientific writing

Scientific writing is how ideas are communicated and documented

You could face career growth limitations if you lack the skills to publish in international peer-reviewed journals.

There is an ethical obligation to report research findings

Why do I need to publish?

Communicate with other scientists/practitioners

Advance human knowledge

Stop harmful practices

Describe new ways of conceptualizing a problem

Ethical duty to the participants and public funders of the research

Other reasons: personal motivation

Career progression

Establish your reputation

Help future grant or fellowship funding

Raise awareness around an issue that needs more public recognition or funding

What is scientific writing?

A precise way to explain what you did, what you found, and why it matters



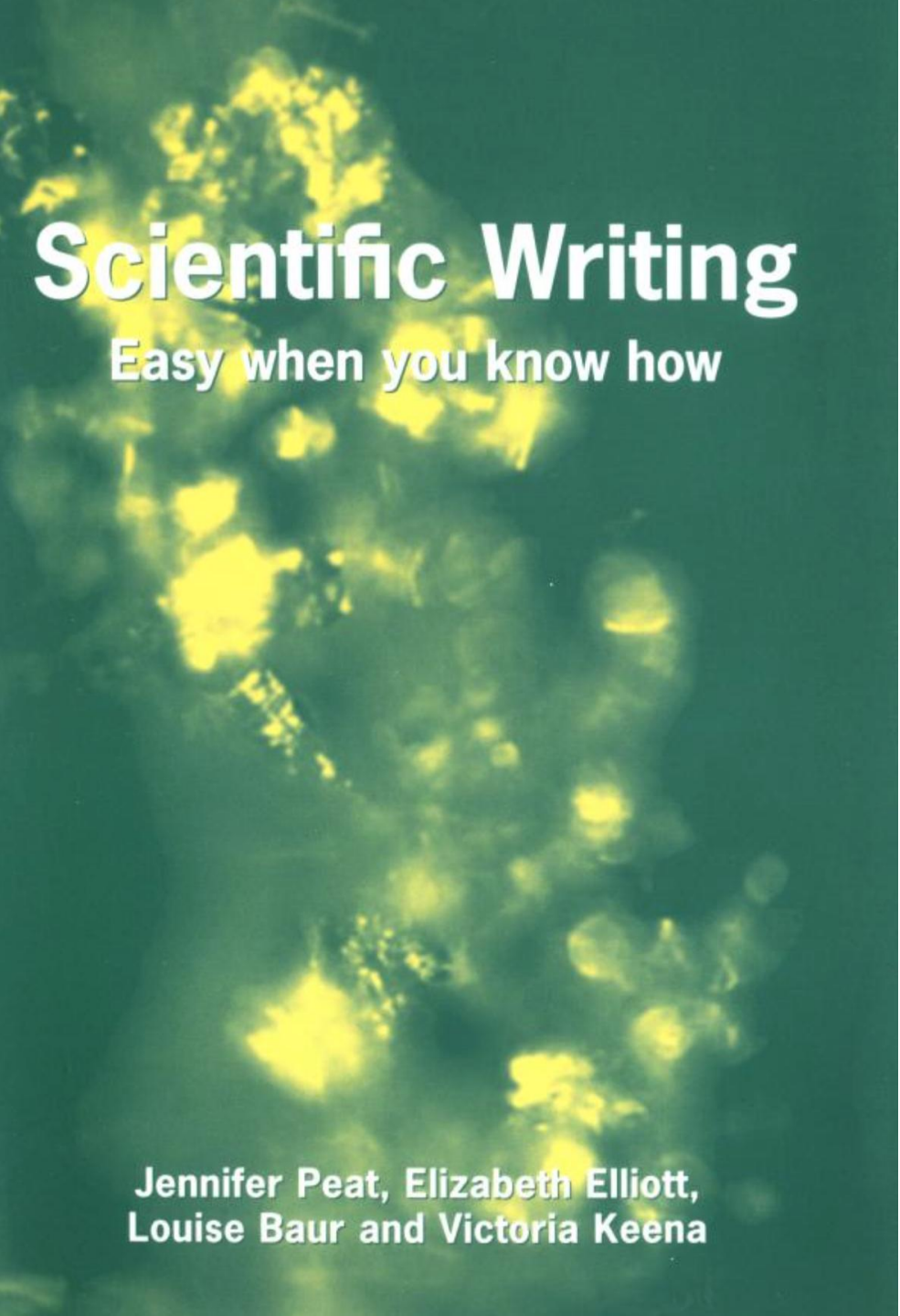


Who should be an author on your paper?

- Generally, the person who has done most of the work for the research and writing the paper should be the first author
- Usually the supervisor or senior author is the last author.
- ICMJE guidelines

ICMJE criteria for authorship

1. Substantial contributions to the **conception or design** of the work; **or** the **acquisition, analysis, or interpretation of data** for the work
2. **Drafting** the work **or revising it critically** for important intellectual content
3. **Final approval** of the version to be published
4. Agreement to be **accountable** for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.



Scientific Writing

Easy when you know how

Jennifer Peat, Elizabeth Elliott,
Louise Baur and Victoria Keena

BMJ Publications 2002

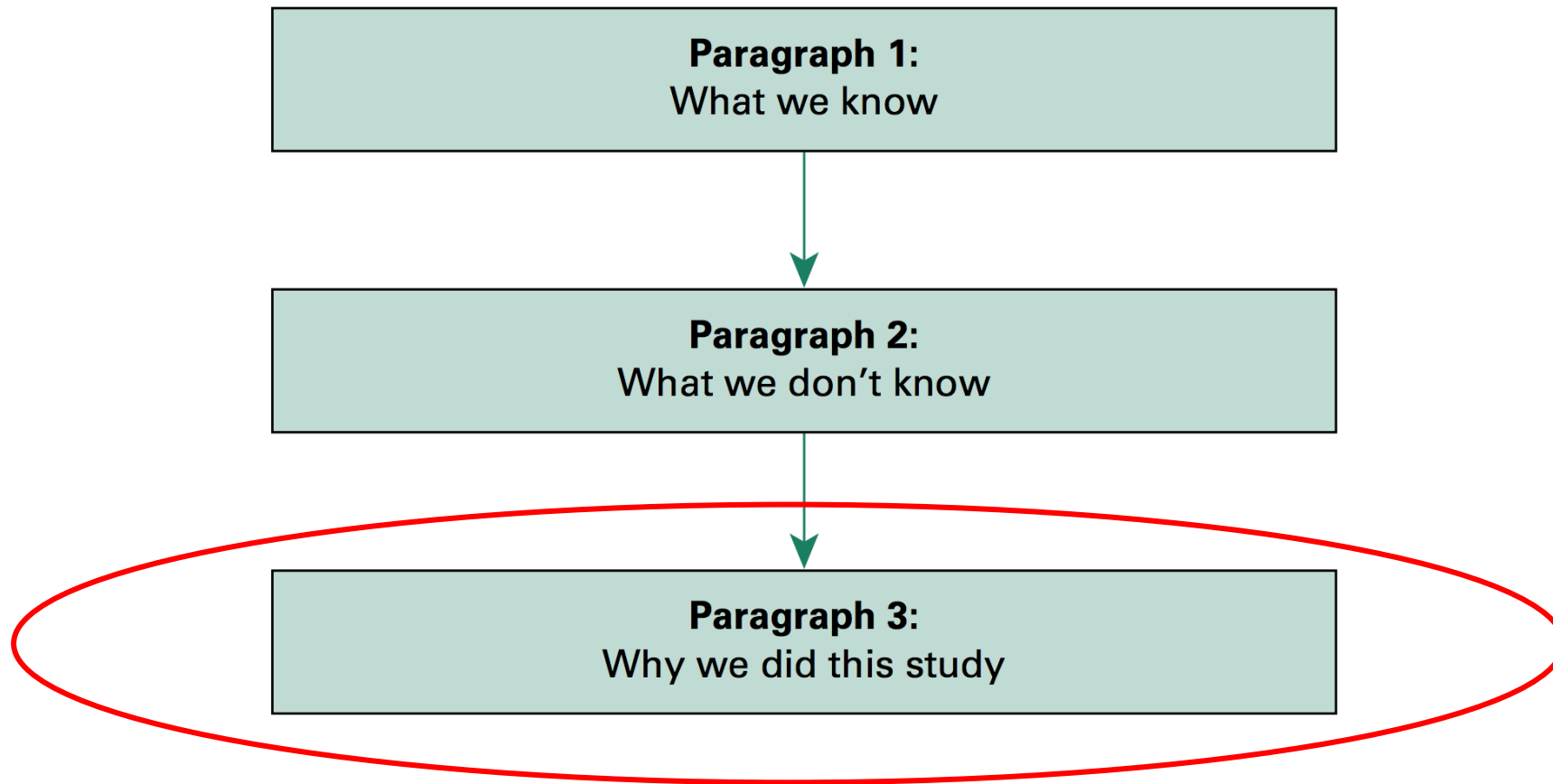
Writing the paper: The abstract

- Only convey the most interesting and important parts of your work
- Most journals require you structure the abstract
- Limit to 250 words (MEDLINE limit)
- Results are supported by data (i.e. OR/RR/HR and 95% CI or equivalent)
- Interpretation of findings is clearly stated in the conclusion: why is this work important and to whom?

Introduction

- Need to draw the reader in.
- Decide on the level of background information needed; do not just repeat the obvious first line you have read in every paper
- Be clear about what the problem you are addressing is and how your study proposes to answer this

The introduction



Methods

Describe how you obtained your results in a way that others could replicate them.

Use the [Equator-network.org](https://equator-network.org) for reporting templates

- Study design
- Participants
- Sample size calculation
- Define exposures and outcomes
- Statistical analysis
- Ethical approval

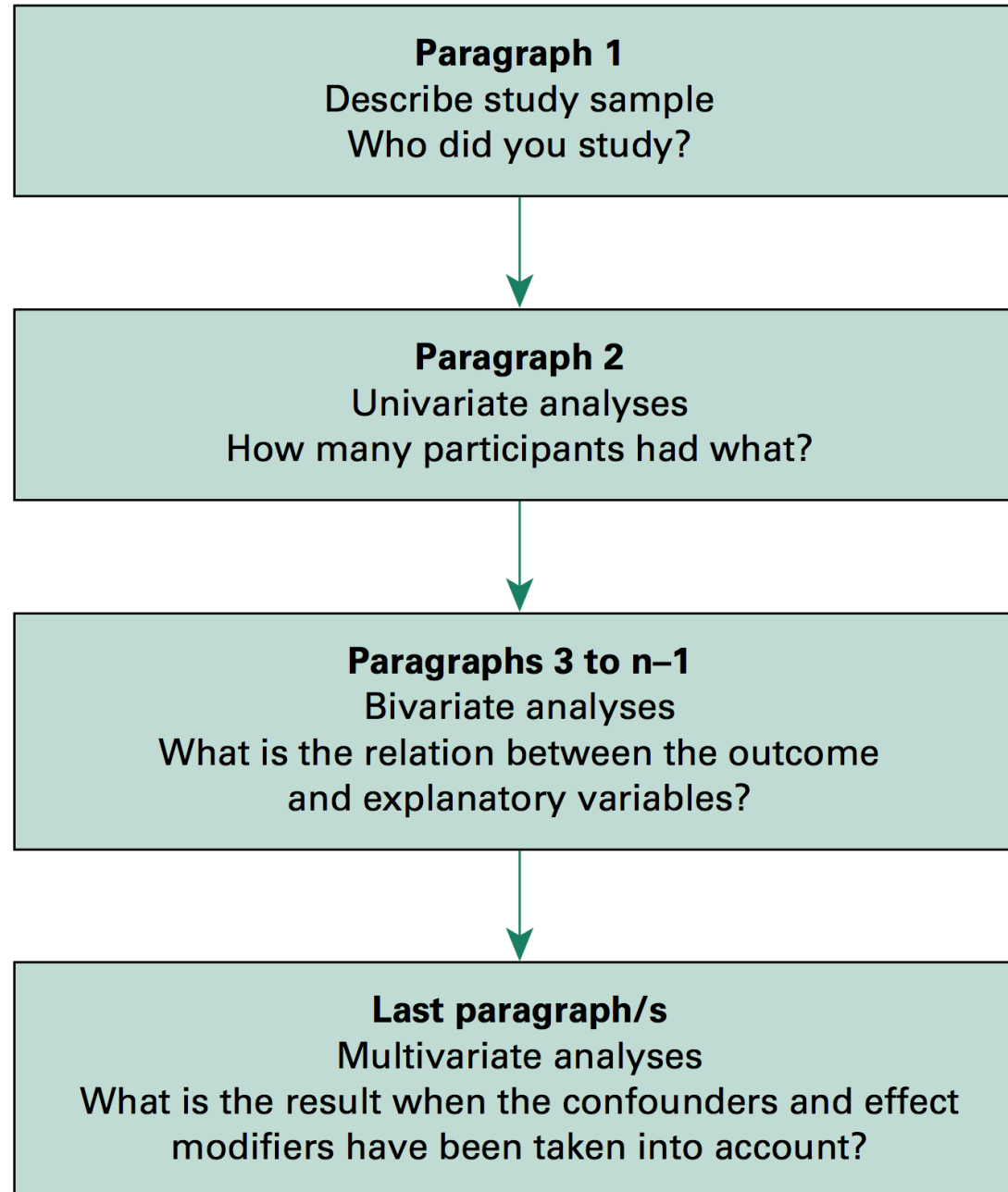
Results

Walk the reader through the **most interesting parts** of your results in the text.

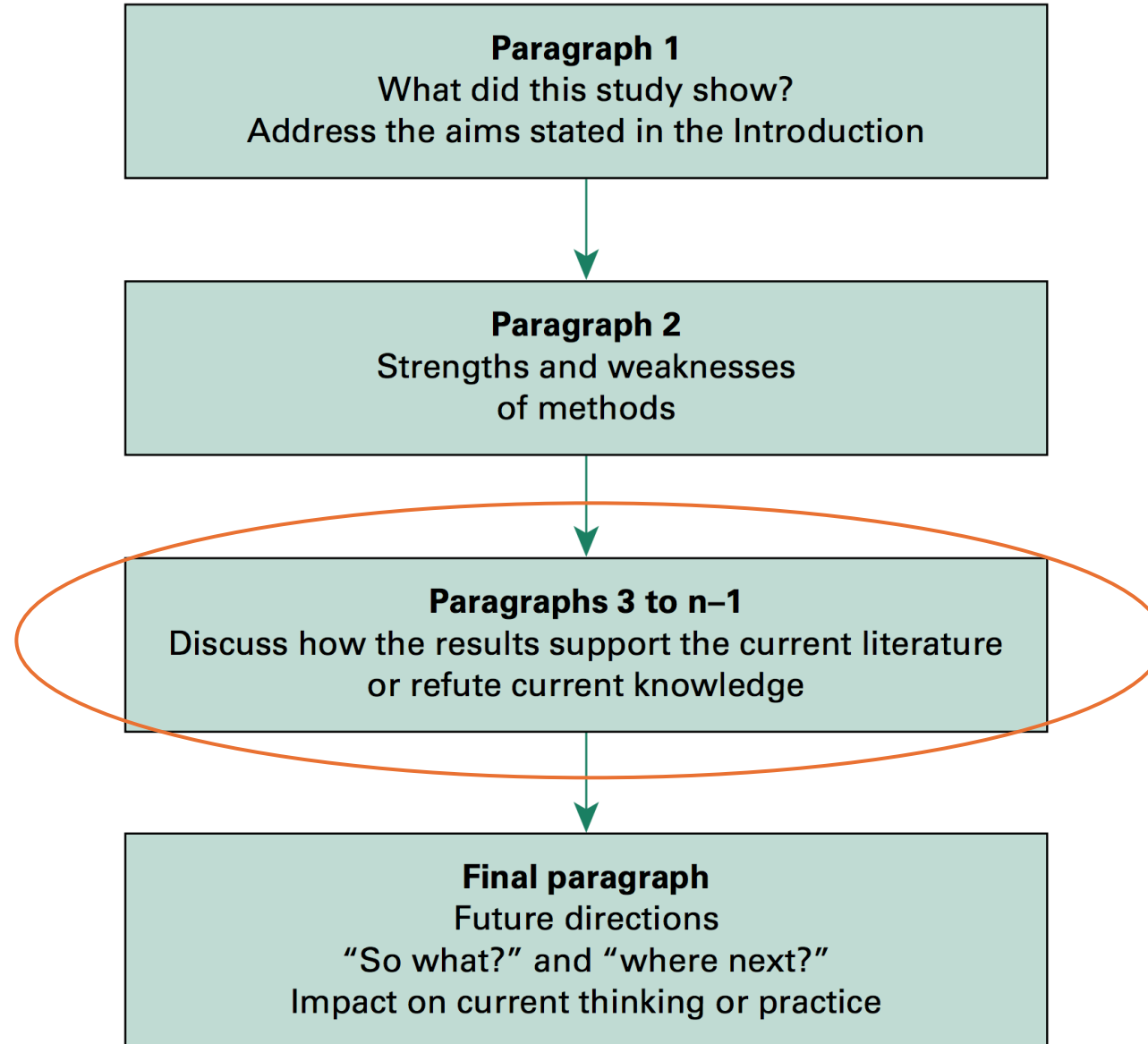
Follow your structure in the methods and do not introduce any unexpected analyses here

What do you want the reader to take away from your tables and figures?

Spend time making tables and figures as clear as possible: this can be the difference between a mediocre paper and a great one



Discussion



Conclusion

- Try to avoid concluding that “further research is needed”
- Think about how your research could change the way medicine is practiced and what this could mean for patients and health systems.
- **A good paper answers the questions it set out to study and has a clear message of how this adds to what is known and for whom this is important**

What about using AI for scientific writing?

- *Scientific writing is essential* for sharing discoveries—but it's time-consuming and language-intensive.
- *LMIC researchers* often face barriers: limited mentorship, English proficiency, and access to editors.
- *AI tools* are rapidly changing how research is **written, reviewed, and published**.

What AI can (and can't) do

AI Can:

- Suggest structure and flow
- Simplify language and improve clarity
- Summarise long texts or abstracts
- Check grammar and readability
- Generate outlines or key points 

AI Can't:

- Interpret data or understand context
- Ensure factual or ethical accuracy
- Assume intellectual responsibility

Example: ChatGPT rephrasing

“The pathophysiological mechanisms underlying preeclampsia remain incompletely understood.”
becomes

“We still don't fully understand what causes preeclampsia.”

Examples of AI tools for scientific writing

Text Generation & Editing:

ChatGPT • Claude • Wordtune • Grammarly

Literature Summarising:

Elicit • Scite • Research Rabbit

Referencing:

Zotero + plugins • ScholarAI • Paperpile

Figures / Tables:

ChatGPT • AI Excel add-ons • DiagramGPT

Practical Benefits for LMIC Researchers

AI can potentially help democratise scientific communication.

Overcome language barriers: improve clarity and grammar in English-language journals.

Reduce time spent on mechanical tasks: formatting, summarizing literature, checking style.

Increase confidence in writing and submission.

Access to “virtual mentorship”: structured guidance on tone, structure, or logic when local mentorship is limited.

Drafting an Abstract with AI

✓ *Before:*

“This study evaluate the maternal outcome after implementation of new obstetric triage system at district hospital in Kenya.”

✓ *AI rewrite:*

“This study evaluated maternal outcomes following the introduction of a new obstetric triage system in a district hospital in Kenya.”

Beware: summarizing literature with AI

✅ *Prompt to AI:*

“Summarize evidence on the impact of climate change on maternal health outcomes.”

✅ *AI Output:*

“Heat exposure and air pollution increase risks of preterm birth and stillbirth. Evidence from low-income countries is limited.”

💡 *Key lesson:* AI can summarize trends, but **may omit key studies or fabricate citations.**

Always **cross-check with PubMed** or a proper database.

Ethical and Academic Integrity Dimensions

Authorship: AI cannot be listed as a co-author.

Transparency: Some journals now require disclosure if AI tools were used.

Plagiarism & fabrication: AI can invent references, misquote studies, or create “data.”

Equity: While AI can reduce language barriers, it can also amplify bias (e.g., Western-centric phrasing, inaccessible tools).

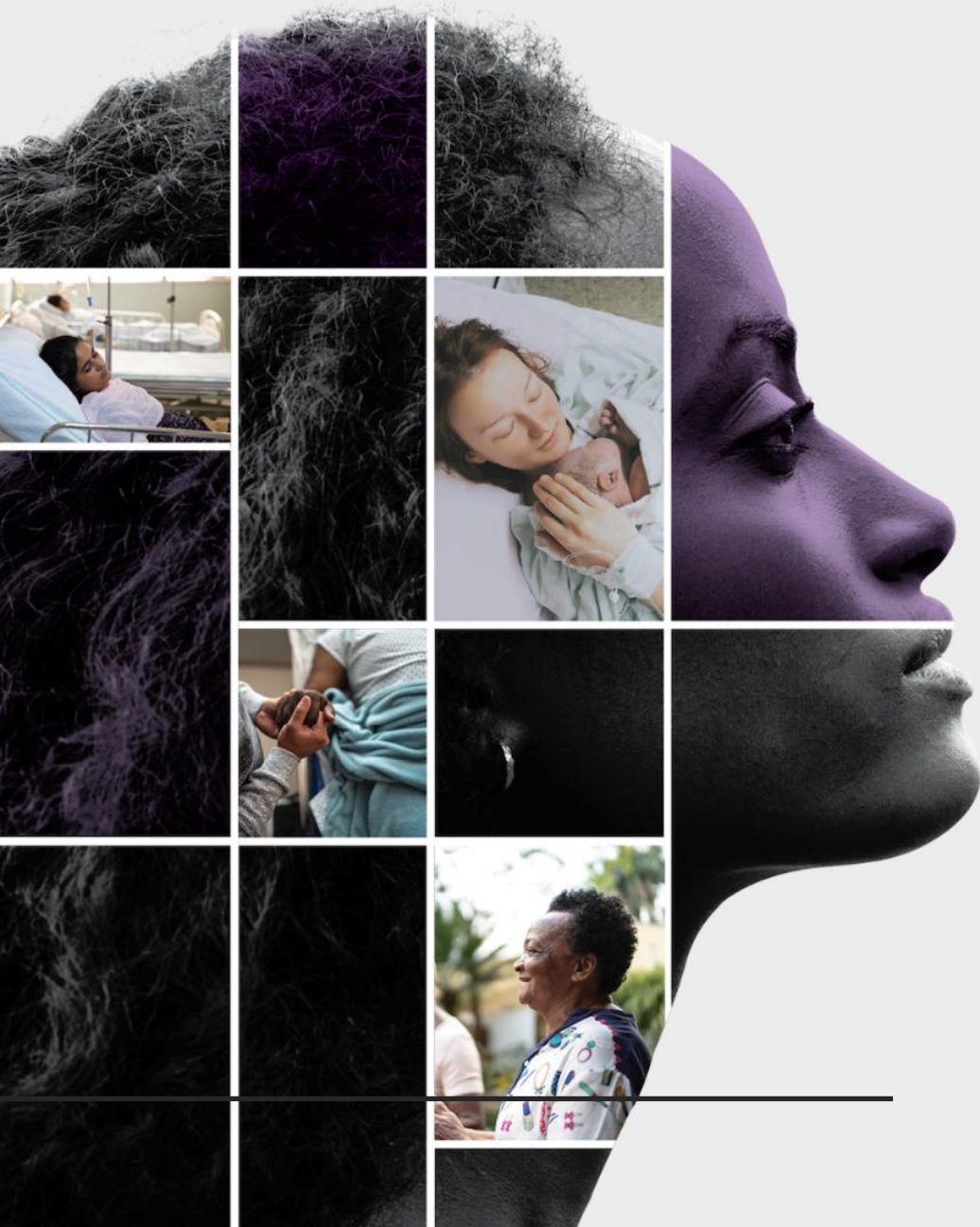
Best practice: Use AI as an assistant, not an author.

💡 *Example disclosure statement:*

“We used ChatGPT (OpenAI, 2025) to refine grammar and clarity of the manuscript draft. The authors reviewed and verified all content.”

Conclusion

- Scientific writing is a skill that we all have to learn
- A structured approach and being clear about your main message is the key
- Always use simple and non- emotive language, however keep your writing interesting and emphasise the bigger picture
- Use AI tools as assistants and always remember to question outputs. You are responsible for the integrity of your own work.



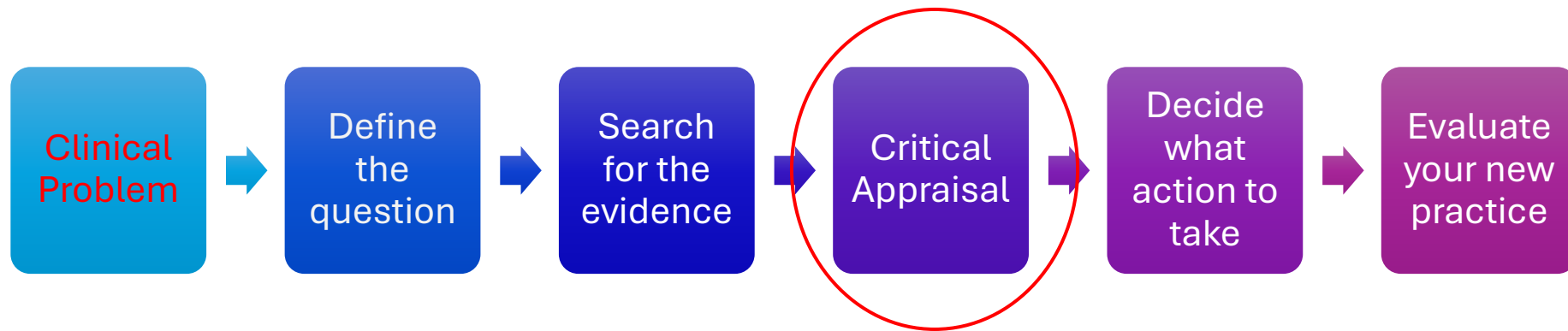
Part 2: Critical appraisal

What is critical appraisal?

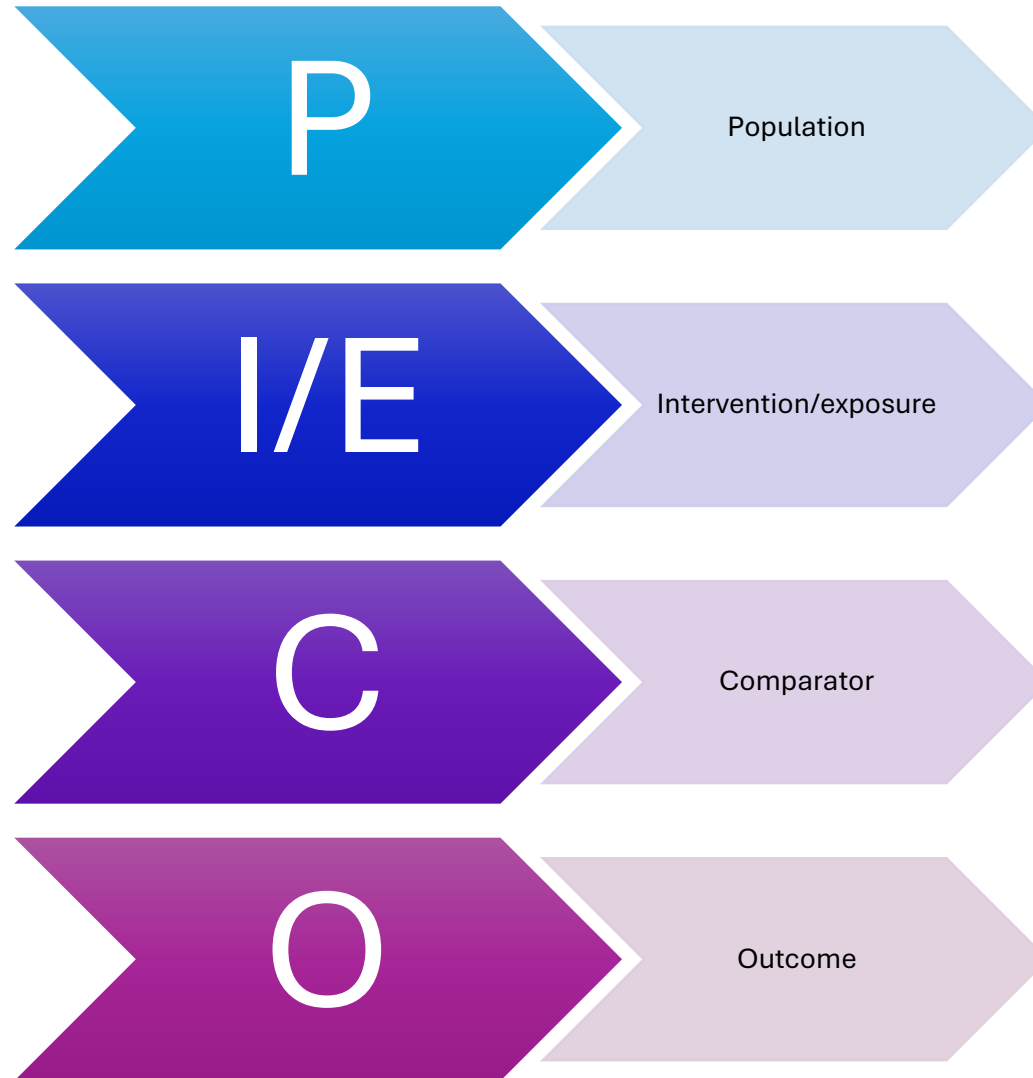
- Carefully and systematically evaluate research to assess:
 - Validity (is these findings trustworthy?)
 - Value (what do the results show?)
 - Relevance (How do these results relate to my clinical practice?)



Critical appraisal: a key component of evidence based medicine



Asking the right question



	1	2	3	4
	Patient or Problem	Intervention (a cause, prognostic factor, treatment, etc.)	Comparison Intervention (if necessary)	Outcomes
Tips for Building	Starting with your patient, ask “How would I describe a group of patients similar to mine?” Balance precision with brevity.	Ask “Which main intervention am I considering?” Be specific.	Ask “What is the main alternative to compare with the intervention?” Again, be specific.	Ask “What can I hope to accomplish?” or “What could this exposure really affect?” Again, be specific.
Example	“In patients with heart failure from dilated cardiomyopathy who are in sinus rhythm ...”	“... would adding anticoagulation with warfarin to standard heart failure therapy ...”	“... when compared with standard therapy alone ...”	“... lead to lower mortality or morbidity from thromboembolism. Is this enough to be worth the increased risk of bleeding?”

Choosing right study design

- Some study designs are not appropriate to answer certain questions
- All study designs are prone to different biases



Pyramid of evidence



So are RCTs the gold standard for evidence?



.....depends

Limitations of RCTs

- Excellent vs Poor RCTs – quality varies
 - Impact on interpretation of result (external validity)?
- Expensive and time consuming
 - £250k - £millions over 2-5 years+
- May not always be the right study design to answer that question

A RCT to examine if smoking causes lung cancer

- 30 healthy Oxford Students
- Randomise to 2 groups
 - Gp1 smokes 20 cigarettes per day every day
 - Gp2 no smoking



wellcometrust

NHS
National Institute for
Health Research

MRC | Medical
Research
Council

Types of research

What is the best study design for answering this type of question?

- **Aetiology**
- **Diagnosis**
- **Prognosis**
- **Harm**
- **Effectiveness**
- **Qualitative**

How to critically appraise an article

- **Validity:** methods to check that the **biases** for which that particular study design is prone have been minimised
- **Results**
- **Clinical relevance**

Validity

Internal



External

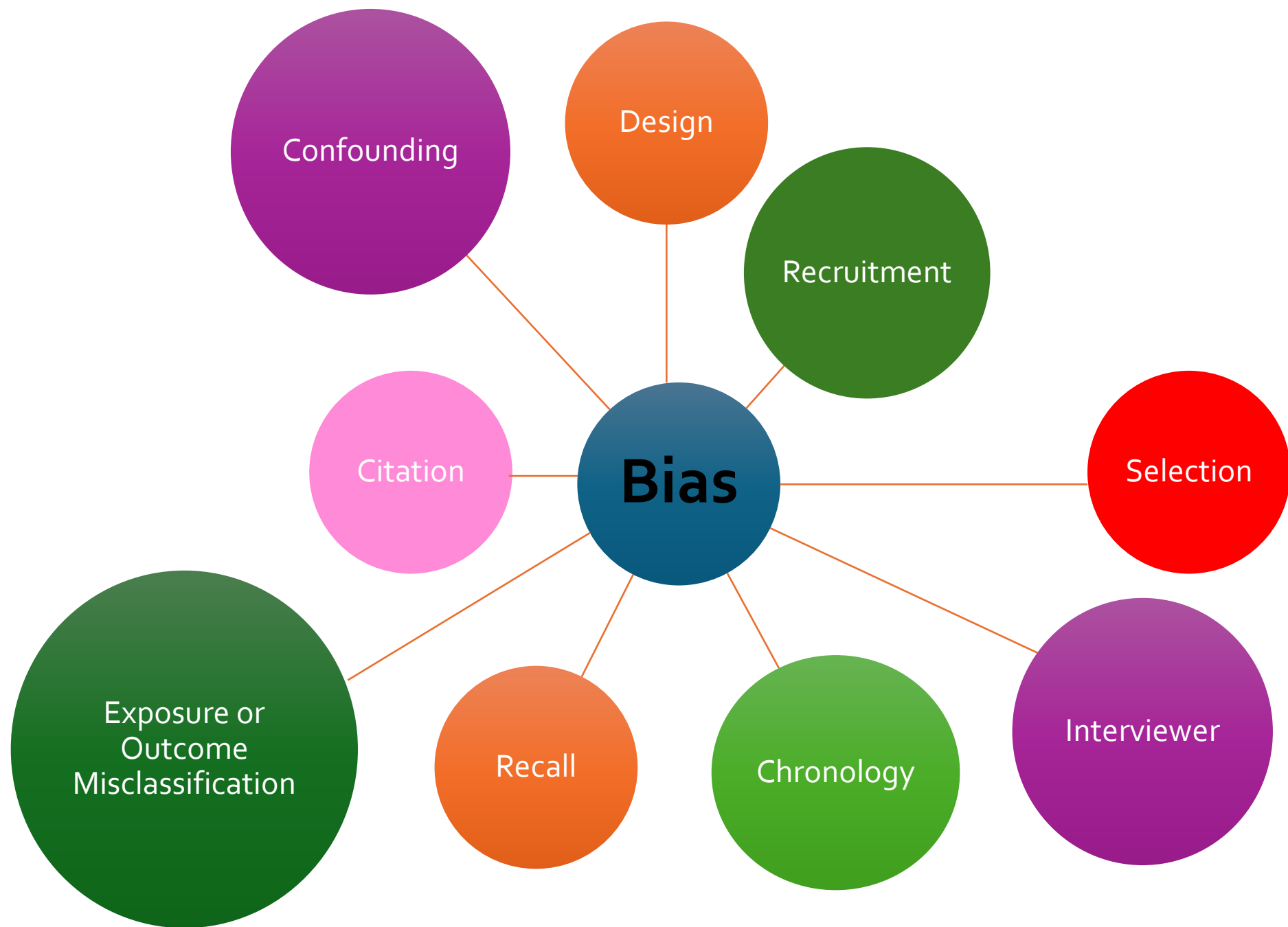


Bias

“the systematic deviation of the results of a study from the truth because of the way it has been conducted, analysed or reported”



Burls, “What is Critical Appraisal” 2009



Sources of bias in clinical trials

Table 1. Key sources of bias in clinical trials²

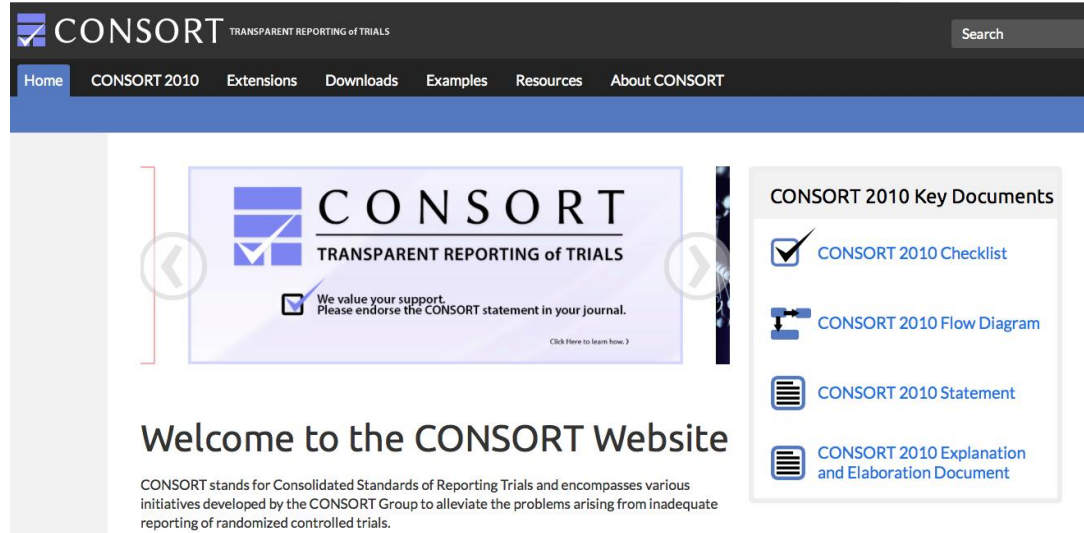
Selection bias	Biased allocation to comparison groups
Performance bias	Unequal provision of care apart from treatment under evaluation
Detection bias	Biased assessment of outcome
Attrition bias	Biased occurrence and handling of deviations from protocol and loss to follow up

Assessing Trials of effectiveness

Questions to ask:

1. Are the results of the trial valid?
2. What are the results?
3. Will the results help locally?

Checklists for clinical trials



Critical Appraisal Skills Programme (CASP)

Making sense of evidence

11 useful questions for critical appraisal of a randomised trial

1. Did the trial address a clearly focused issue?

☐ Yes

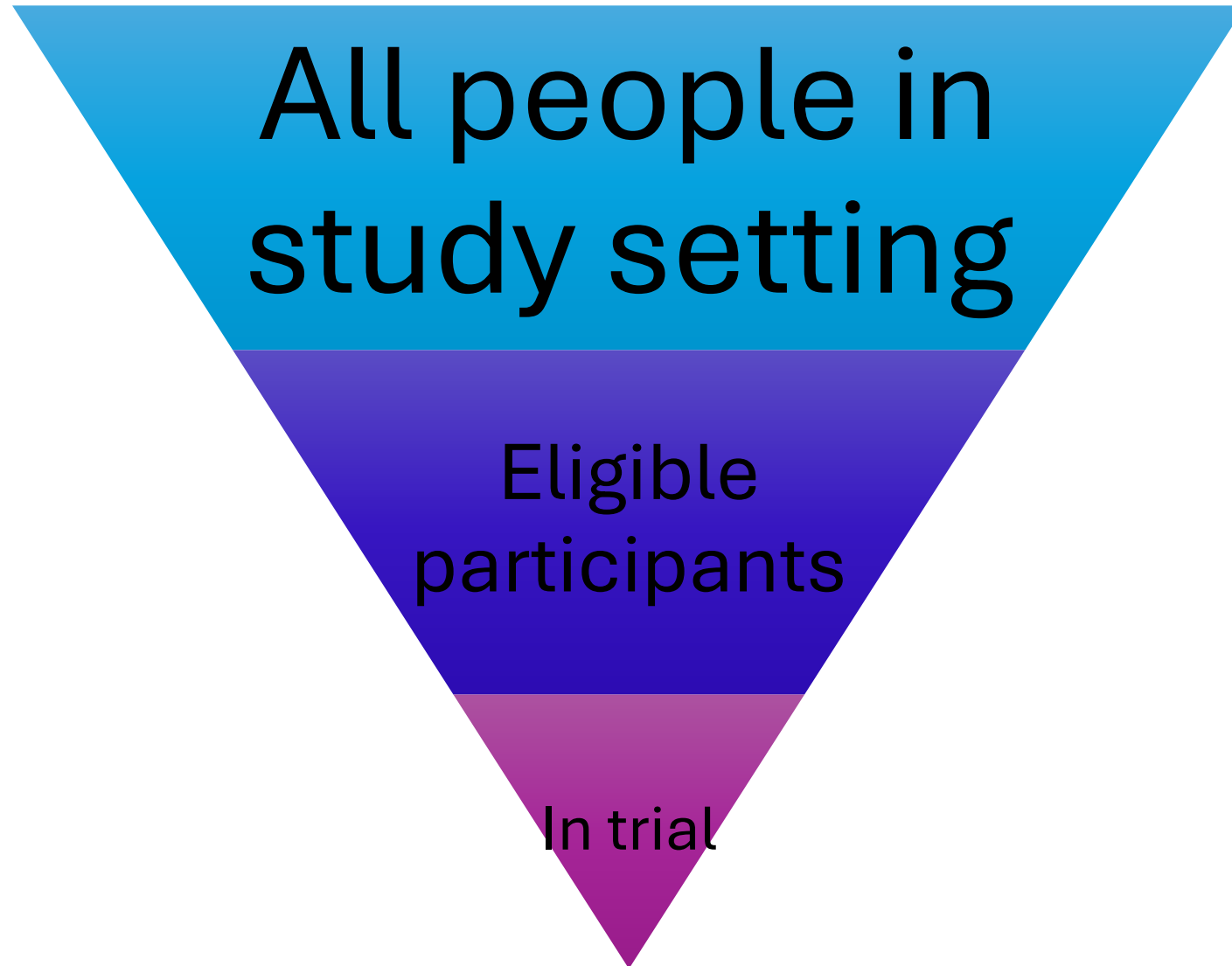
☐ Can't tell

☐ No

Consider: An issue can be 'focused' In terms of

- The population studied
- The intervention given
- The comparator given
- The outcomes considered

Representative: Are the trial subjects representative of patients in this setting?



2. Was the assignment of patients to treatments randomised?

☐ Yes

☐ Can't tell

☐ No

Consider:

- How was this carried out, some methods may produce broken allocation concealment
- Was the allocation concealed from researchers?

Why randomise?

- Minimises measured and unmeasured confounding



Minimising allocation bias

- Centralised computer randomisation the best
- Other methods such as sealed envelopes doubtful
- Non randomised: date of birth, alternate patients alternate days, etc



If answer to first two questions is no....



Detailed questions

3. Were patients, health workers and study personnel blinded?

Consider:

- Health workers could be; clinicians, nurses etc
- Study personnel – especially outcome assessors

☐ Yes ☐ Can't tell ☐ No



4. Were the groups similar at the start of the trial?

☐ Yes

☐ Can't tell

☐ No

Consider: Look at

- Other factors that might affect the outcome such as age, sex, social class, these may be called baseline characteristics



Maintenance: Were the groups treated equally?

5. Aside from the experimental intervention,
were the groups treated equally?

☐ Yes

☐ Can't tell

☐ No

6. Were all of the patients who entered the trial properly accounted for at its conclusion?

☐ Yes

☐ Can't tell

☐ No

Consider:

- Was the trial stopped early?
- Were patients analysed in the groups to which they were randomised?



From: Critical Appraisal Skills Program, Oxford
www.casp-uk.net

(B) What are the results?

7. How large was the treatment effect?

Consider:

- What outcomes were measured?
- Is the primary outcome clearly specified?
- What results were found for each outcome?
- Is there evidence of selective reporting of outcomes?

8. How precise was the estimate of the treatment effect?

Consider:

- What are the confidence limits?
- Were they statistically significant?

Intention to treat

- Once a participant is randomised, they should be analysed to the group they were assigned to
- Pros
 - Reflects “real life” e.g non compliance
 - Unbiased estimate of true effect
 - Maintains sample size thus maintaining statistical power
- Cons
 - Noncompliance provides little data on efficacy
 - Treatment effect may be conservative
 - Dropouts/non-compliant/compliant subjects are different

What does this study tell us?

- **P values** (hypothesis testing):
 - Tests to exclude the null hypothesis
- **Confidence intervals** (estimation of effect)
 - Range of values within which the true effect is likely to lie
 - Wider the confidence interval, less precision in result
- **Relative Risk**
- **Absolute Risk**
- **Odds Ratios**
- **Number needed to treat**

(C) Will the results help locally?

9. Can the results be applied in your context?
(or to the local population?)

☐ Yes ☐ Can't tell ☐ No

Consider:

- Do you have reason to believe that your population of interest is different to that in the trial
- If so, in what way?



10. Were all clinically important outcomes considered?

☐ Yes ☐ Can't tell ☐ No

Consider:

- Is there other information you would like to have seen?
- Was the need for this trial clearly described?

11. Are the benefits worth the harms and costs?

☐ Yes ☐ Can't tell ☐ No

Consider:

- Even if this is not addressed by the trial, what do you think?

Conclusion

- Critical appraisal helps us decide whether evidence is valid, what the results tell us and whether the study is relevant to our setting
- Checklists are available to help
- Don't believe everything you read in journals!