Writing a Scientific Article

Fiona Ecarnot, PhD

University Hospital Besançon, France

University Marie & Louis Pasteur, Besançon, France

Feel free to reach out !

fiona.ecarnot@univ-fcomte.fr

Standard Format of a Medical Article

- **Standard Format = « IMRAD »**
  - **I**ntroduction
  - **M**ethods
  - **R**esults
  - **A**nd
  - **D**iscussion
- **Plus title & abstract**

Standard Format of a Medical Article

Introduction

- Why did you do this study?
- What was the main aim?

Methods

- What did you do, concretely?

Results

- What did you find?

Discussion

- What do your results mean?
- How do you situate your results in relation to those of other authors?

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Introduction

- Explain what motivated you to do this study
- Identify your specific objective (hypothesis or aim)
- Describe briefly how you proceeded to attain this goal
- Underline why your study is important and interesting

General Structure of the Introduction

- Background : what is known. What do we already know about this topic?
- What is NOT known? What gap in current knowledge does your study aim to fill?
- Hypothesis or Objective
- Strategy for attaining your goal, or testing your hypothesis (briefly)

Introduction: *Background*

- Should provide enough information for the reasons motivating this study to be clear and justified
- You do not need to cite every paper in the literature
- Stay on topic! Do not go off the subject.
- Take acccount of the audience of the journal you are aiming for (general vs specialist)
- Should convince readers that you know your subject well

Introduction: *Gap in Knowledge*

- **The explanation of what is known should logically lead to the introduction of a gap in knowledge**
- **Explain what gap your study is going to fill**
- **Underline the importance of filling that gap:**
  - change medical practice
  - move general opinion forwards towards a consensus etc.…

Introduction: *Hypothesis or Objective*

- **It is crucial to formulate your main objective or hypothesis explicitly**
- **Think carefully about the phrasing. Choose one formulation and use the same one throughout.**
- **Use the same formulation for:**
  - The title
  - The abstract
  - The discussion

Introduction: *Strategy or Design*

- **The formulation of your main hypothesis or objective can briefly mention your study design:**
  - Type of study (randomised, observational, registry…)
  - Use of a specific technique (RT-PCR, flow cytometry…)
  - In which population (patients with pulmonary embolism, ST+ infarction…)

Introduction: Which tense?

- **To describe current knowledge, use the present:**
  - « Cancer is a common disease »
- **To describe previously published results, use the past tense:**
  - "In the PLATO study, Wallentin et al demonstrated that ticagrelor reduced the rate of death but did not increase the rate of major bleeding"
- **For something that started in the past but it not yet finished, use the present perfect tense:**
  - "Several researchers have investigated the effects of …..XYZ"

Introduction: Which tense?

- **For something that has not happened yet: present perfect tense**
  - "It has not yet been determined whether …."
- **To formulate your hypothesis**
  - Use the past tense for the first verb
  - Use the present tense for the second verb
  - "We hypothesized that treatment with anticoagulants increases bleeding risk"
- **For the strategy: past tense**
  - "We compared group A with group B"

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Methods

- **You must explain in detail exactly what you did**
- **You must specify:**
  - The type of study (*Design*): (prospective, retrospective, randomised, registry…)
  - Who or what did you study? (Subjects, animals, tissues, cells….)

Methods

- **Important!**
  - For retrospective studies, you should start with a description of the source data, the inclusion and exclusion criteria, and the number of patients or files studied.
  - For prospective studies, start by a description of the inclusion and exclusion criteria. The final number of patients is a **result** and should not appear in the methods.

Methods

- **You must specify:**
  - What you measured: all analyses, interventions, data
  - If necessary, explain briefy why each measure was taken
  - Use sub-titles, e.g. demographic data, angiographic data, treatment administered….
  - Detail your stastical methods
    - All tests, for which variables, and verification of conditions of use
    - Methods for constructing multivariable models, and the type of model used (logistic regression, Cox etc)
    - Software used (version, manufacturer, city, country)
    - Signifiance level ($p<0.05$), including thresholds for inclusion or exclusion from multivariate models

Methods: *Retrospective studies*

- Subjets
- Inclusion & exclusion criteria
- Ethics approval; informed consent
- Data recorded
- Source data used
- Subgroups, if any
- Number of patients/samples
- Primary endpoint
- Secondary endpoint(s)
- Statistical analysis

Methods: *Prospective studies*

- Subjets
- Inclusion & exclusion criteria
- Ethics approval; informed consent
- Data recorded
- Stud registration if randomized trial
- Calculation of sample size
- Randomization procedure (ratio, blocks, individual, stratification….)
- Interventions
- Primary endpoint
- Secondary endpoint(s)
- Statistical analysis

Methods: Which tense?

- **Don't give too much detail: if a method has been described and published elsewhere, just insert the reference.**
- **Use the past tense to describe what you did**
  - We noted age, sex and BMI.
  - To assess coronary anatomy, we performed coronary angiography.
- **Use the past perfect tense to describe things that happened before your study was performed :**
  - When thrombolysis had failed….
  - Earlier experiments had shown…
- **Make sure you describe a method for every result you are going to report**

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Results

- The aim of the Results section is to describe your results, without comment, judgement or discussion
- You should not describe any methods
- You should not interpret your findings
- Describe the results of every test or intervention
- Make sure you have a result for every method you described in the methods section! A result = a method!
- Follow the same order of presentation as used in the methods section
- Use sub-titles (ideally, the same ones as used in the methods)

Results: *Typical Paragraph*

- **Start:**
  - Recall topic under study (*QCA analysis showed*…)
- **Middle:**
  - Detail the results, refer to tables and figures (*there were significantly more lesions in the group that received bare stents*)
- **End:**
  - Specify overall meaning (*suggesting that drug-eluting stents are more effective*)
- **Which tense?**
  - For results, always the past tense
  - « Serum creatinine was correlated with GFR »

Results: *Text, Table or Figure?*

- **Text** if you can describe the result in one or two sentences
- **Table**:
  - For the most important information
  - For baseline characteristics of the population, and data that you are showing separately for 2 or more groups
  - Key results for multivariate models (Odds ratios, etc)
- **Figure**:
  - To illustrate trends and grouped results
- Avoid putting too many illustrations (many journals have a limit)
- Do not repeat in the text any information that appears in tables/figs
- Check accuracy of numbers and % (make sure they add up!)
- Follow the journal's specific instructions for formatting

A good table

Table 1. Characteristics of the Participants at Baseline.*

Characteristic	Intervention Group (N=600)	Usual-Care Group (N=601)	Total (N=1201)
Race and ethnic group — %			
Black	50.5	49.9	50.2
Latinx	49.5	50.1	49.8
Both Black and Latinx†	6.3	4.3	5.3
Age — yr	48.3±13.5	47.0±13.9	47.7±13.7
Female sex assigned at birth — %	84.7	82.7	83.7
Body-mass index‡	35.2±9.1	35.1±9.5	35.1±9.3
Obesity — %‡	70.2	67.1	68.6
Smoking status — %§			
Current smoker	11.5	12.3	11.9
Former smoker	9.0	7.7	8.3
Nonsmoker or former smoker in smoking environment — %¶	16.0	17.8	16.9
No. of pack-yr of smoking	12.4	15.8	14.1
Maintenance asthma medications — %			

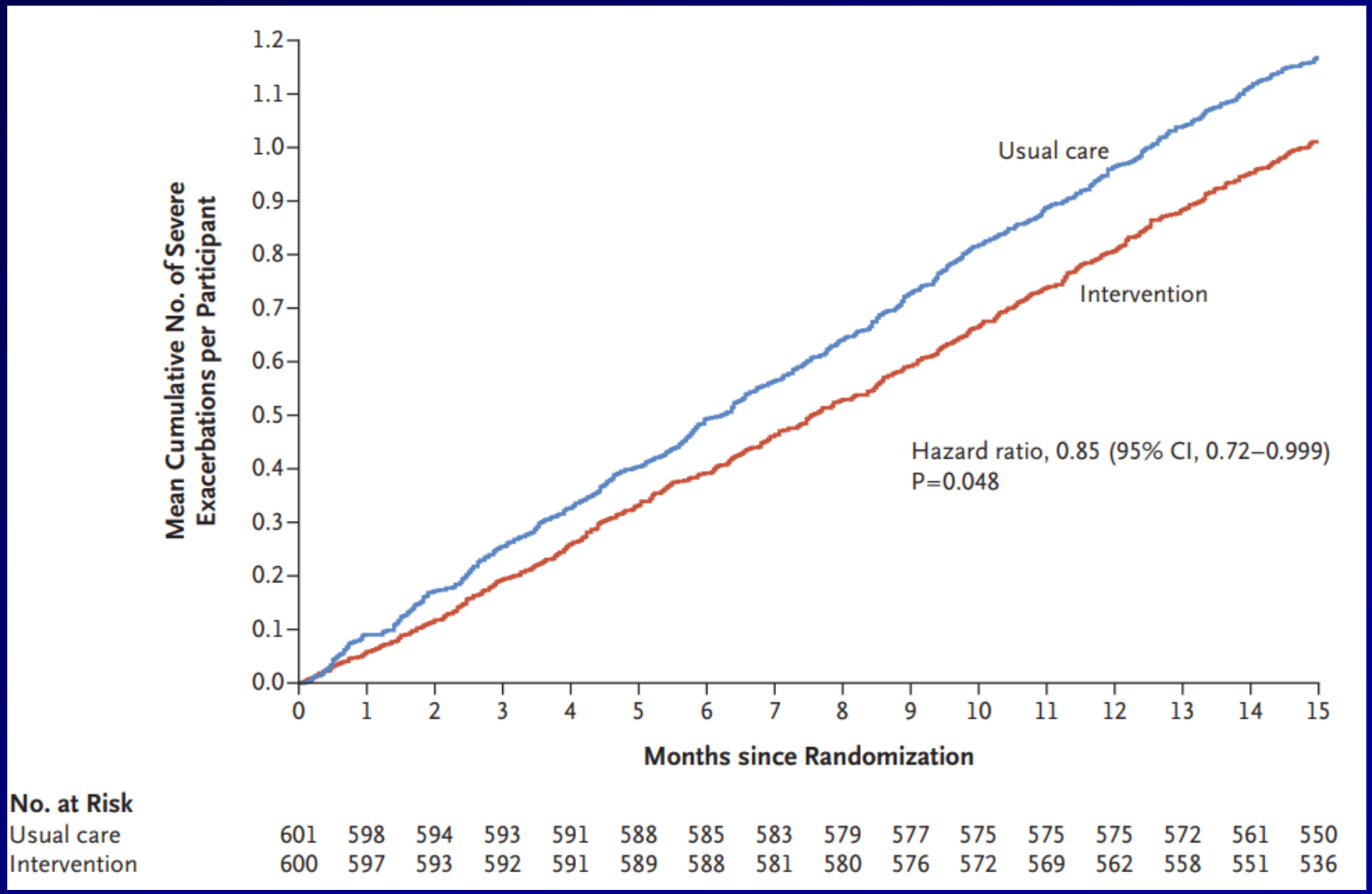
This should be avoided….

Table 3: Univariate and multivariate analyses of the factors associated with the occurrence of >5 bone metastases in the bony pelvis

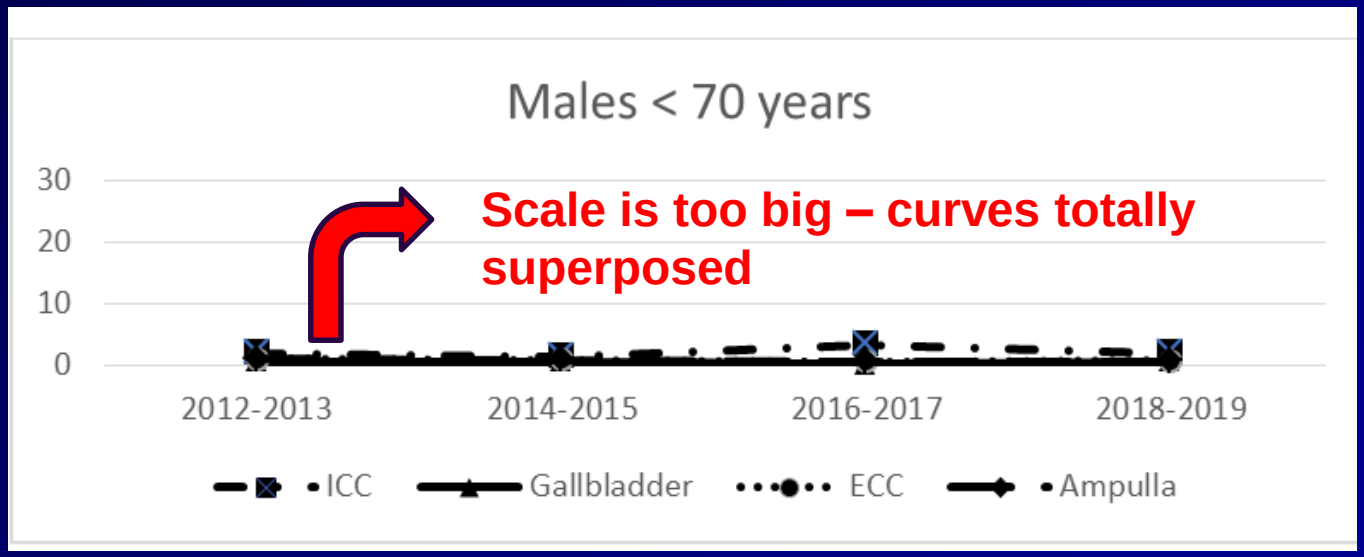
	Univariate analysis				Multivariate analysis			
	B-mets> 5 / Total	OR	95% CI	p-value	B-mets > 5 / Total	OR	95% CI	p-value
Year of diagnosis								
[1987;2005[	8 / 76	1						
[2005;2012[	3 / 33	0.85	[0.21 – 3.43]	0.82				
Time between diagnosis and occurrence of B-mets (years)								
≤ 5	6 / 59	1						
> 5	5 / 50	0.98	[0.28 – 3.43]	0.98				
Lymph node staging								
N0	7 / 81	1						
N1	0 / 7	0.66	[0.03 – 153.49]	0.80				
Age at diagnosis (years)								
< 70	5 / 63	1						
≥ 70	6 / 46	1.74	[0.50 – 6.09]	0.39				
Risk group								
Low or intermediate	2 / 27	1						
High	7 / 67	1.46	[0.28 – 7.51]	0.66				
Gleason score								
≤ 6	2 / 32	1						
> 6	4 / 60	1.07	[0.19 – 6.19]	0.94				
Initial peak PSA before treatment (ng/ml)								
< 15	3 / 45	1						
≥ 15	4 / 44	1.40	[0.30 – 6.65]	0.67				
EBRT								
No	10 / 56	1			10 / 56	1		
Yes	2 / 54	0.18	[0.04 – 0.85]	**0.03**	2 / 54	0.17	[0.04 – 0.87]	**0.03**
RP								
No	9 / 77	1						

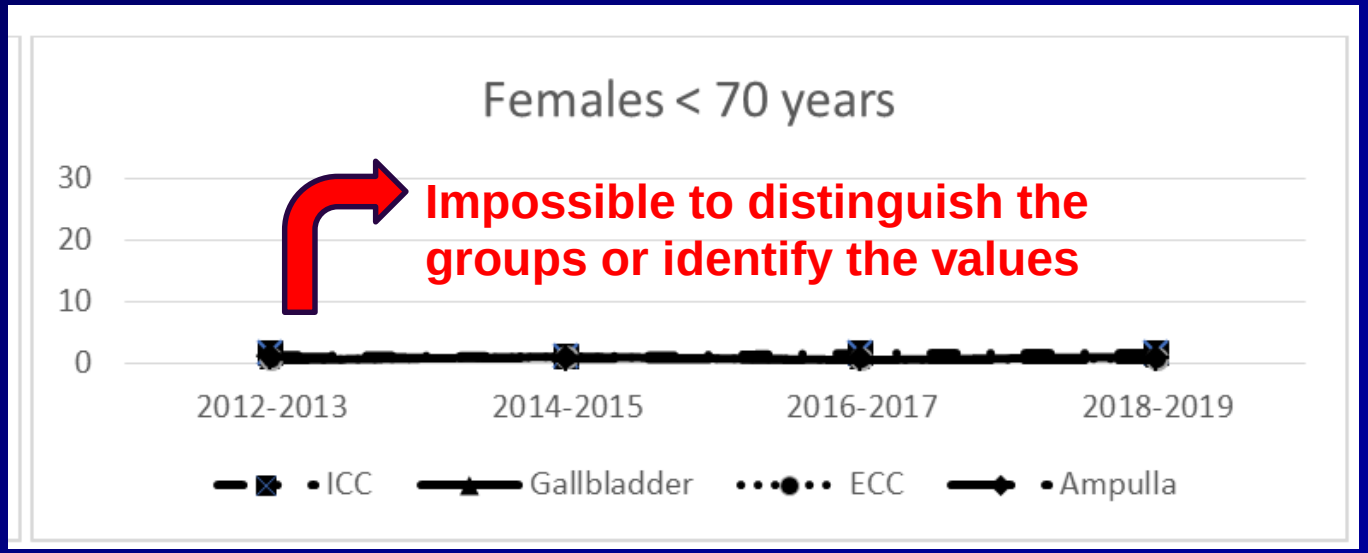
Too Much Empty White Space

A good figure….



Not so much….


Males < 70 years
30
20
10
0
2012-2013
2014-2015
2016-2017
2018-2019
ICC
Gallbladder
ECC
Ampulla
Scale is too big – curves totally superposed


Females < 70 years
30
20
10
0
2012-2013
2014-2015
2016-2017
2018-2019
ICC
Gallbladder
ECC
Ampulla
Impossible to distinguish the groups or identify the values

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Discussion

- The aim of the discussion is to interpret your results and show their significance and utility

Discussion

- **The main elements of the discussion are:**
  - Brief (1 sentence) reminder of your main finding
  - Interpretation of your observations
  - How do your results compare to existing literature?
  - What is new about your study?
  - Strengths and limitations of your study?
  - Can your results be extrapolated to other populations or contexts?
  - Did you fill the gap in knowledge and why is it important to have done so?
  - How will your results affect practice?
  - Potential avenues for future research

Discussion

- **Start with a brief summary of your main finding**
- **To do this, use the same formulation as used in the introduction and abstract**
- **Don't repeat results, rather interpret them:**
  - Aim: To test the safety of drug X.
  - Result: After administration of X, 20/25 patients experienced intracranial hemorrhage
  - Wrong conclusion: 80% of patients treated with drug X develop hemorrhage.
  - Better interpretation: Our results indicate that administration of drug X may have serious adverse consequences

Discussion: *Interpreting your results*

- Put your results in perspective
- Explain any particularly interesting or surprising observations
- Avoid misinterpretation
- Try to compensate for negative results
- Explain what your results mean, and their importance
- If you did multiple analyses or interventions, explain the relation between the individual analyses, and what they all mean when taken together

Discussion: *Comparing to other studies*

- **Describe results reported by other authors on the same topic, stating simply how your results are similar or differ**
- **Be diplomatic when commenting (they may be reviewers!)**
- **Concentrate on your study's strong points, rather than pointing out weaknesses in other authors' studies**
- **Avoid « all or nothing » statements; be nuanced.**
- **Be careful not to deform or re-interpret information when summarizing or paraphrasing**
- **Use formulae of attribution to give others credit**
  - Others have shown that….
  - Dupond et al reported that….

Discussion: *Limitations*

- List the limitations of your study in a specific paragraph, just before the conclusion.
- Do NOT start your discussion by listing your weaknesses! (unless the journal specifically instructs you to do so)
- Showing that you are aware of your limitations can help to defuse potential comments from Reviewers
- Gives you an opportunity to explain why certain points may not be limiting factors

Discussion: *Implications*

- You may want to briefly explain the implications of your results
- How will your study change practice?
- How do your results move the state of knowledge forwards?
- In light of your results, what should change?
- Avoid speculation (i.e. anything that is not directly supported by a result from your study)

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- **Plus the Titre and the Abstract**

Abstract

- **Similar format to that of the article**
  - Background and Objective
  - Methods
  - Results
  - Conclusion
- **No discussion in the abstract**
- **No references**
- **It’s a key marketing tool for your article!**
- **The abstract must be independent: it should be understandable on its own**

Abstract

- **Background (2 to 3 sentences):**
  - Describe context and rationale in 1 or 2 sentences, specifying the gap in knowledge you plan to fill
  - Describe objective (1 sentence)
- **Methods (1 to 3 sentences) :**
  - Describe population, interventions or treatments, and the endpoints
- **Main Results (3 to 4 sentences):**
  - Use means, % to summarize key data
  - Make sure there's a result for every method
  - Give enough detail to support your conclusion!
- **Conclusions with implications (2 sentences)**

Characteristics of a Good Abstract

- **Should identify the gap in knowledge that your study plans to fill**
- **Gives a clear statement of the main objective**
- **Must be concise**
- **Gives main methods, with a result for each**
- **Has a clear conclusion, directly linked to the main objective and supported by key results**
- **Can be understood on its own, without the main text**
- **No illustrations or references** (except in some congresses – specific conditions may apply)

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Finding an Effective Title

- The title should summarize the key points of the article
- It should make people want to read the full text
- It should cover the key points of the abstract
- It must contain key terms so that your article can be found easily by someone searching PubMed
- It should distinguish your work from other articles on the same topic (if possible!)

Finding an Effective Title

- **Cite the main factors studied**
  - Drug or intervention…
- **Cite the population studied**
  - Patients with PE, infarction, AIDS….
- **Cite the design**
  - Registry, randomized trial…
- **Cite the main finding**
  - Increases, reduces, prevents…
- **Be specific and precise**

Finding an Effective Title

- **Put the key aspect towards the beginning of the title**
- **Avoid imprecise phrases or formulations that serve no purpose :**
  - « A study of… »
  - « A report of … »
  - « The effects / role of » → If there's an effect, state what it is!
- **Use international non-proprietary names for drugs** (e.g. semaglutide, not Ozempic)
- **Use sub-titles sparingly**
  - Many journals don't allow – or reserve for group name

Examples of good titles

- Comparison of ticagrelor with clopidogrel in patients with a planned invasive strategy for acute coronary syndromes (PLATO): a randomised double-blind study.
- Treating Rhythmic and Periodic EEG Patterns in Comatose Survivors of Cardiac Arrest
- Effect of Sublingual Dexmedetomidine vs Placebo on Acute Agitation Associated With Bipolar Disorder: A Randomized Clinical Trial

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- **A word about References**

References

- Indicating the sources you used is your professional and ethical resonsibility
- It establishes the basis on which your research is conceived
- It is imperative to cite the sources used to underpin your hypotheses
- Refs put your work in context with other studies
- Refs give interested readers some tips for further reading
- They are the proof of your professional integrity

References: *When do I need a reference?*

- **Any idea or fact that you take some elsewhere should be referenced.**
- **Universal truths do not need a reference**
  - Cancer is a very common disease.
- **Ideas, names or phrases from other authors should be referenced.**
  - « The so-called « McConnell » sign is common »

References: *What source should I cite?*

- **You can cite:**
  - Articles published in peer-reviewed, English language journals that are cited in PubMed (**to be preferred**)
  - Books (you must indicate the chapter and page!)
  - Websites (check the link works, put access date)
  - Personal communications (**to be avoided**)
- **Give priority to the most credible and most recent sources**
- **Prefer original research, rather than reviews or meta-analyses**

References: *How to cite?*

- **Follow the instructions of your target journal regarding reference format**
- **You can use reference management software (e.g. EndNote or Reference Manager (paying), Zotero (free))**
- **Note references as you find them…** you won't remember later!
- **You must verify the accuracy of all references, even (or especially) those that you take from another article**
  - If you read something in an article and it has a reference, you must check that reference before using it yourself!

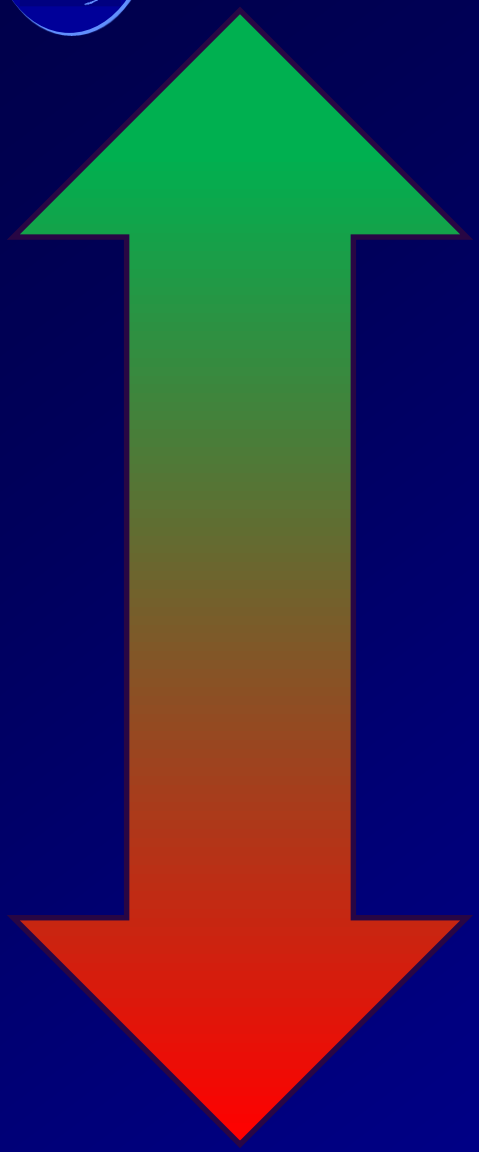
I’ve written my article and submitted it to a journal…

What next ??

How do I answer the Reviewers?

- It is extremely rare to be accepted in the first round of review, in the first journal you submit to.
- A negative decision is not a personal judgment.
- Reviewers are your potential readers—people like you, experts, (hopefully!) well-intentioned.
- If an average reader didn't understand, it probably means it wasn't clear enough.
- There is no standard or reference method; it is necessarily subjective, and very variable from one review to another.
- Reviewers' names are often known to the author

Scale of Journal Responses



Accept

Revise: Minor revision

Revise: Major revision

Reject and re-submit *de novo*

Reject definitively (± reviewing)

Preparing your Responses to Reviewers

- First, decide if you want to revise and re-submit or not.
- Think about your responses and let them mature!
- Yet, try to respond ASAP and in any case, < deadline
- If you need more time, contact the journal editorial office and ask for an extension – do this as early as possible, not the day before the original deadilne!
- Check journal instructions about mark-up vs clean versions, response styles etc
- Absent specific instructions, copy each point and answer (even the compliments)

Examples of Responses

Manuscript: ITG-2018-9-3 - Strategies to improve vaccine uptake throughout adulthood
Authors: Fiona Ecarnot (Corresponding Author),

Reviewer 1:

1.- abstract: please list the factors that influence vaccine coverage in a consistent way as described and discussed later in the text. Also, for the strategies, you only list 5 strategies, but you develop and discuss 6 in the text:
targeting HCW is missing in the abstract

Thank you for pointing out these inconsistencies, which have now been corrected as suggested.

2.- your manuscript considers mostly the EU and USA, it is not really global in scope. I was wondering if this should be reflected in the title or at least I would recommend commenting in the introduction

The Reviewer is correct. We have mentioned this in the introduction.

3.- page 7: the last paragraph "Furthermore, the manner in which the HCP..." is to be further and more clearly discussed, because although what you indicate reflects the reality, the truth is that high risk groups do need more targeted actions.
Perhaps what is required is a double strategy

We agree with the Reviewer, and this is precisely what the text says. The literature shows that broadcasting alarming messages about the severity of the disease or its consequences for high-risk individuals, may inadvertently make those at low-risk feel that they are not concerned. This in turn may unintentionally change the overall uptake rate. We believe the Reviewer is correct in suggesting that a two-pronged, double strategy may be required – one strategy specifically targeting high-risk groups; this message should be aimed at high-risk individuals only, and not used for widespread communication to the general public. A second, more generic strategy aimed at the general public (and those at low to medium risk) could formulate an appropriate message for these risk groups. We have added a few lines to this effect at the end of this paragraph.

Responses: Do's and Don'ts

- **Avoid « *his/her* »** unless you are 100% certain who it is; prefer a neutral formulation e.g. « The Reviewer » (+ capitalized)
- Make sure there is an answer for every single comment
- Indicate where you made changes (± copy modified text)
- You can say that you don't agree; but justify why, and be polite and diplomatic:
  - *We agree with the Reviewer that the rate is low. However….*
- If there is something you don't want to do, you can refer to the Editor's discretion:
  - *We leave it to the discretion of the Editor*
  - *If the Editor feels it necessary, we would be willing to…*
- Always try to answer the last comment positively (just do it!)

Responses: Examples for Criticisms

Table II. Some useful phrases to begin your replies to critical comments

We agree with the referee that ___, but. . .
The referee is right to point out ___, yet. . .
In accordance with the referees' wishes, we have now changed this sentence to___.
Although we agree with the referee that. . .
It is true that___, but. . .
We acknowledge that our manuscript might have been ___, but. . .
We, too, were disappointed by the low response rate.
We agree that this is an important area that requires further research.
We support the referee's assertion that ___, although. . .
With all due respect to the reviewer, we believe that this point is not correct.

Revised Article: Do's and Don'ts

- Always display changes (unless the journal indicates otherwise)
- Do not change the authors during the revision phase (most journals have specific procedures for this, or don't allow it)
- Do not change anything that the Reviewers did not comment on (unless it's a factual error)
- Make sure you do not leave any comments in the margin!
- If you are asked to reduce the length:
  - Preferentially reduce the background and discussion
  - Use the supplementary material for methods and extra results

What should I do if….

- **Different Reviewers request different things:**
  - Choose the one that suits you best, and do that
  - Respond accordingly
  - Explain to the editor in your cover letter why you chose to follow one Reviewer's suggestion and not the other
- **If the Reviewers are wrong:**
  - State politely that you have included the information
  - Refute their argument, with appropriate references
  - Explain to the editor in your cover letter
- **A Reviewer is impolite / biaised / derogatory :**
  - Tell the Editor politely that the tone is unacceptable
  - Ask for another round of review with a new reviewer


KEEP
CALM
AND
THANKS FOR
LISTENING