Points of relevance in writing a research proposal

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Parts of a good proposal

- **Introduction**
  - What is known
  - What is the gap
  - What is planned – leads to research question
- **Hypothesis**
- Pilot data
- **Clear and Specific Objectives**
- **Research Plan**

When writing a proposal, please make sure you have these subheadings (in bold). When writing the Introduction, please review (briefly) what is known, followed by a statement of what the research gap is. This helps the evaluation committee to see where you are fitting your hypothesis and objectives.

If you have any pilot data that you have collected, this is a good place to show that you have engaged with the problem (gap), and are a serious researcher.

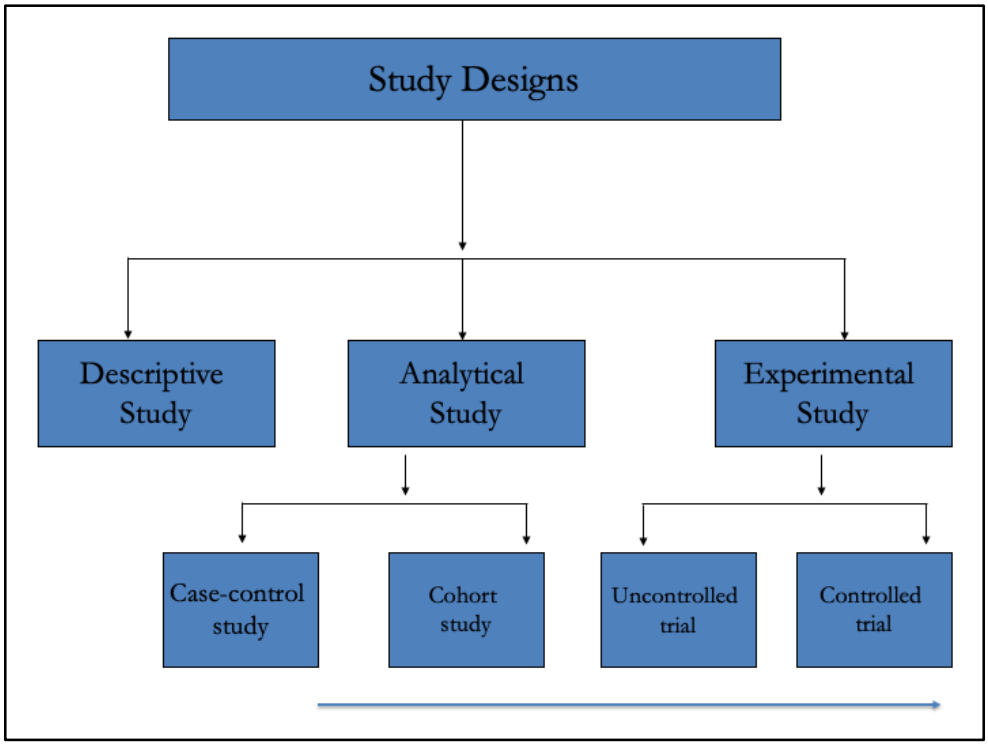
The Idea

- Could be derived from observations on several patients – pilot data
- Might arise from a gap or a problematic issue regarding prior research – pilot or prior data
- Clinical evaluation of recent advance in the field
- Be convincing!

You can get ideas for research in many ways. The most convincing is when you have already identified a gap through your won clinical observations – like pilot data in the previous slide.

You could have also identified a gap from your own previous research.

Otherwise, you might want to evaluate something that is of current interest to clinical medicine or public health.



There are three main study designs

Descriptive, analytical and experimental

Key Components of the Research Question
PICOT

CONTEXT: Low birth weight is implicated as a risk factor for type 2 diabetes. However, the strength, consistency, independence, and shape of the association have not been systematically examined. **OBJECTIVE: To conduct a quantitative systematic review examining published evidence on the association of birth weight and type 2 diabetes in adults.** JAMA. 2008 Dec 24;300(24):2886-97

Components	Example
Population	Adults (studies of adults)
Intervention (Exposure)	Low birthweight
Comparator (if applicable)	Normal (?+high) birthweight
Outcome	Type 2 diabetes
Timeframe	?Within the first 70 yrs of life (published between 19xx to 2008)

Before setting up your study design, take time to write out your objective or question.

Remember: a statement of the question or objective requires several bits of information. These are:

What population are you studying? What is the intervention? What is the control group for comparison? What is the outcome? How long will the intervention be for?

If you do this, it will help you select a study design.

For example, maybe you do not have an intervention, or do not have an exposure to a risk factor that you want to study. Maybe you want to simply explore the prevalence of a particular condition in a population.

Then, the exercise above (called the writing of a PICOT) will help you go towards a specific study design

Protocol for conducting a Descriptive study

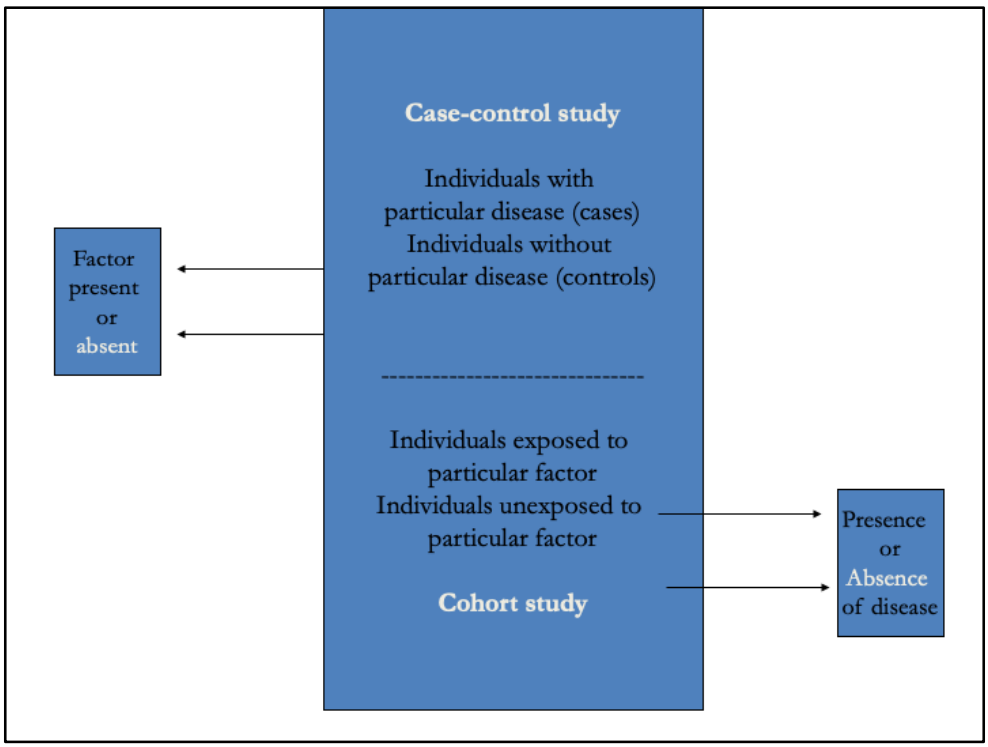
1) Define the population to be studied
2) Define the disease under study
3) Measurement of disease
4) Describe the disease by
   - Time
   - Place
   - Person
5) Compare with known indices
6) Formulation of an etiological hypothesis

Descriptive studies are useful to define areas of future research but have a low priority in the minds of evaluators. They may ask the question: "So what?"

Be prepared in your mind to answer that question.

However, the points in this slide are very important subheadings to put into your research plan.

Your chances for being funded are higher if you can show how your research will lead towards a future study that evaluates (for example) an etiological hypothesis.



This is the next study design- a step up from the descriptive cross sectional study.

Here, you will evaluate an etiological hypothesis.

You have identified some potential risk factor for developing a disease. You want to see if this risk factor is a significant one.

There are two possibilities for study design here:

1. The case control study. Here you will recruit 'cases' who have the disease under study, in whom you will get a history of exposure to the risk factor you are studying. Then, you will also recruit controls who are very similar to the 'case' in terms of age, sex, body size, residence and socio-economic status (you can choose how well you want to match the case to control). You will take the same history of exposure to the risk factor from the control. This way, you can compare the exposures, and assign a numeric value to the risk factor – this is called an odds ration or 'odds'. The statement you could make at the end of the study could be: When the risk factor 'A" is present, the odds of developing the disease 'B' is 2 (or twice as likely). The advantage of such a study design is that you can complete this fairly quickly, if the prevalence of the disease you are studying is high.
2. The cohort study. Here, you will recruit a number of healthy individuals without any disease. You will evaluate them thoroughly at recruitment, for the risk factors you think are important. You will then follow them up for a pre-determined amount of time and evaluate how many got the disease you are studying. Then you will analyze whether in those who got the disease, was the risk factor more prevalent at the time of recruitment? The downside of this approach is that it takes much more time, as usually, one has to follow up for a long period, unless it is an acute infectious disease that is being investigated.

Protocol for conducting a Case-Control study

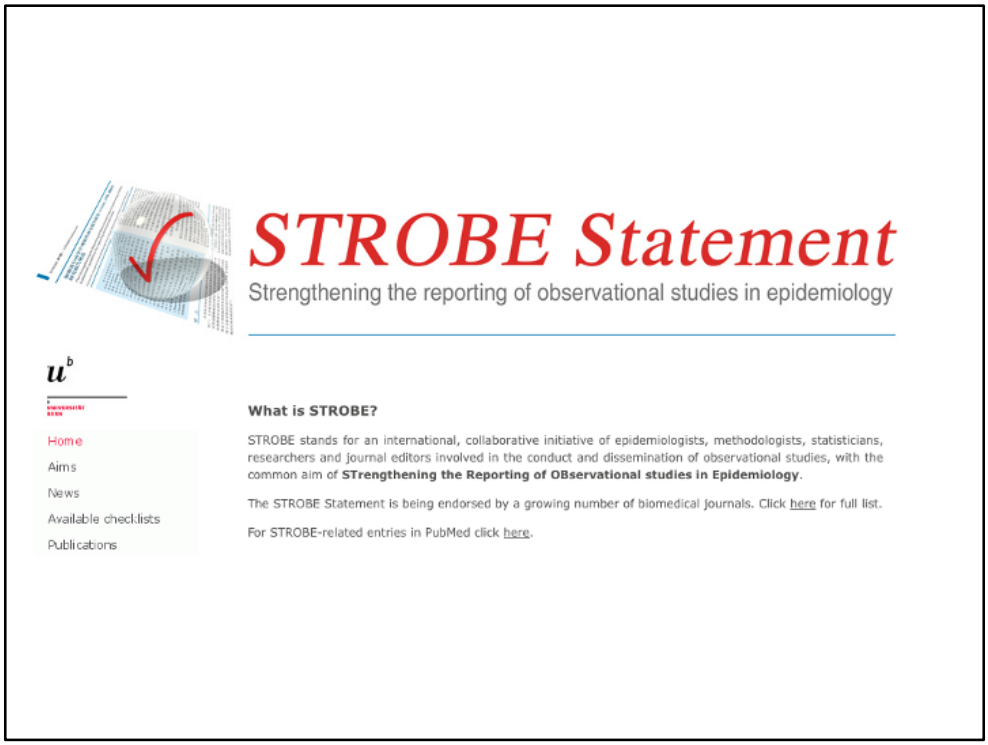
1) Selection of cases and controls
2) Matching
3) Measurement of exposure
4) Analysis & interpretation

To follow from the previous slide (#7), this details the different subheadings that you must have in your research plan. Please take the help of a statistician in deciding the number of subjects you plan to recruit.

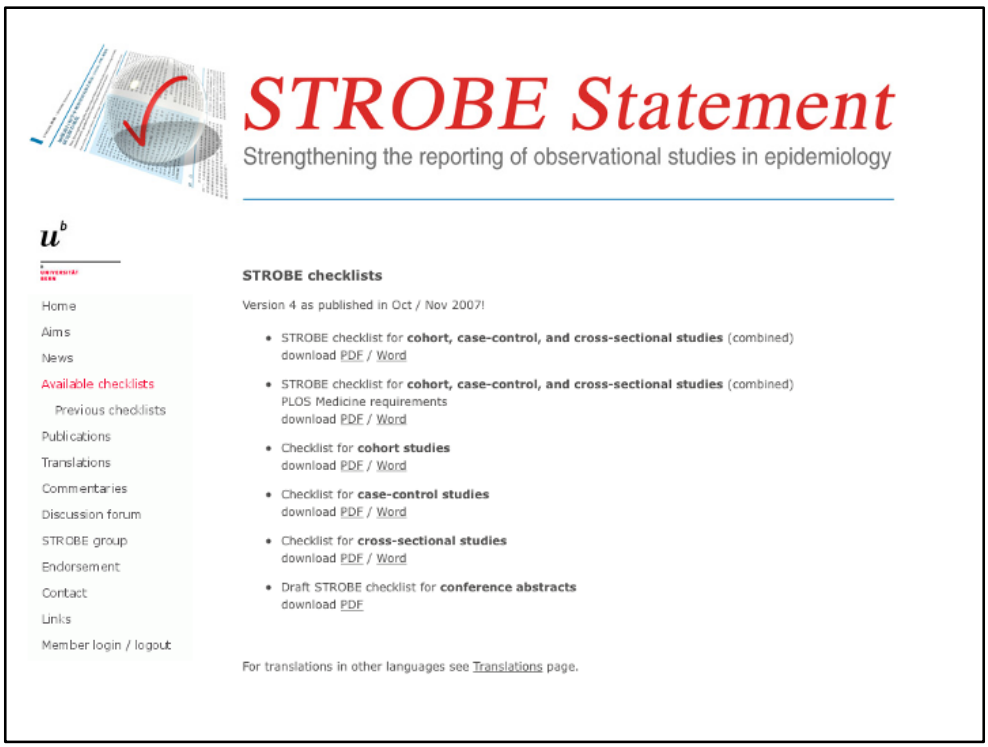
Elements of a Cohort study

1) Selection of study subjects
2) Obtaining data on exposure
3) Selection of comparison groups
4) Follow-up
5) Analysis

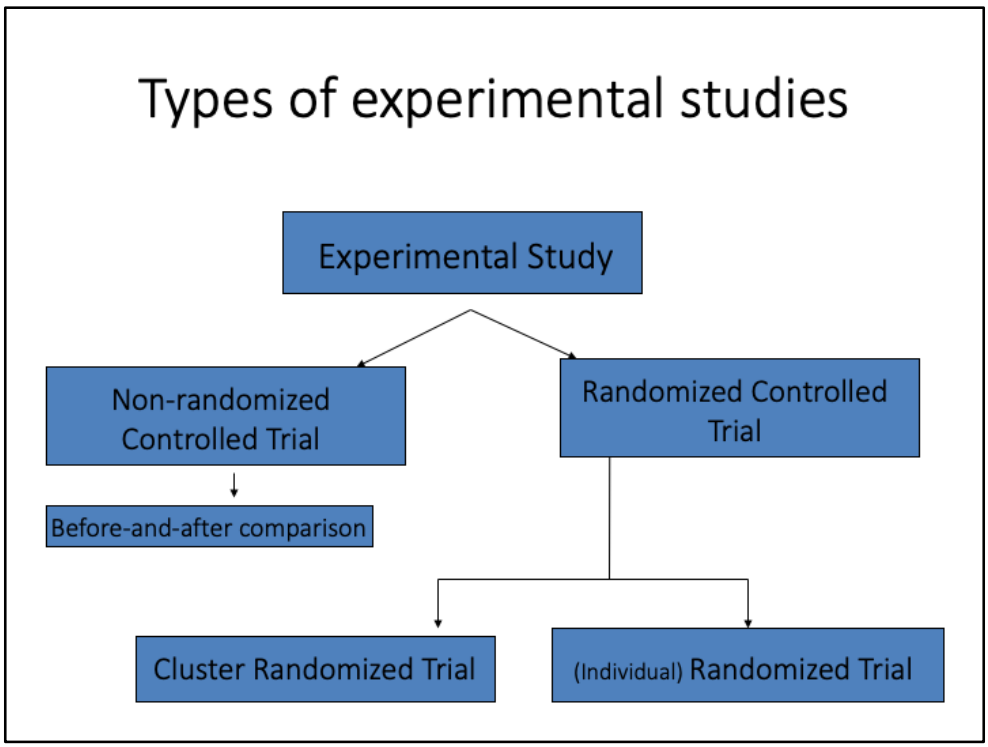
To follow from slide #7, these are the subheadings for a cohort study. Please take the help of a statistician in deciding the number of subjects you plan to recruit.



To help you further, and for more intensive details on how to construct you research plan, this slide gives you a site where you can get details of the essential elements of a cross sectional, case-control, or cohort study. Please google “STROBE”



As in the previous slide notes – click on the study design you have selected for more details.



We now move on to experimental study designs. Remember the PICOT statement you wrote? It is most relevant here.

There are two designs shown here, but actually, only one of them is acceptable.

This is the Randomized Control Trial (RCT). In this, you could choose to study an intervention, compared against a control that does not get the intervention. You can have two different designs for the RCT- one is where you randomize subjects according to a statistical plan (ask your statistician). However, sometimes, you may be concerned that subjects you have recruited could compare among themselves, what intervention you are giving, They could even exchange the intervention (and control treatment) among themselves. This can happen when the subjects live in the same area or meet in the same OPD. One way to avoid this is 'blinding', where the intervention and control treatments look exactly similar – like a tablet or pill. But this may not be possible in all studies – sometimes you may give counseling, which is easily exchanged and cannot be blinded. In this case, you could do a cluster RCT, where you choose to give the intervention in one cluster, and the control in another. The clusters are geographically separated, and the subjects do not come in contact with each other. This is a powerful design but needs even more subjects (please consult your statistician).

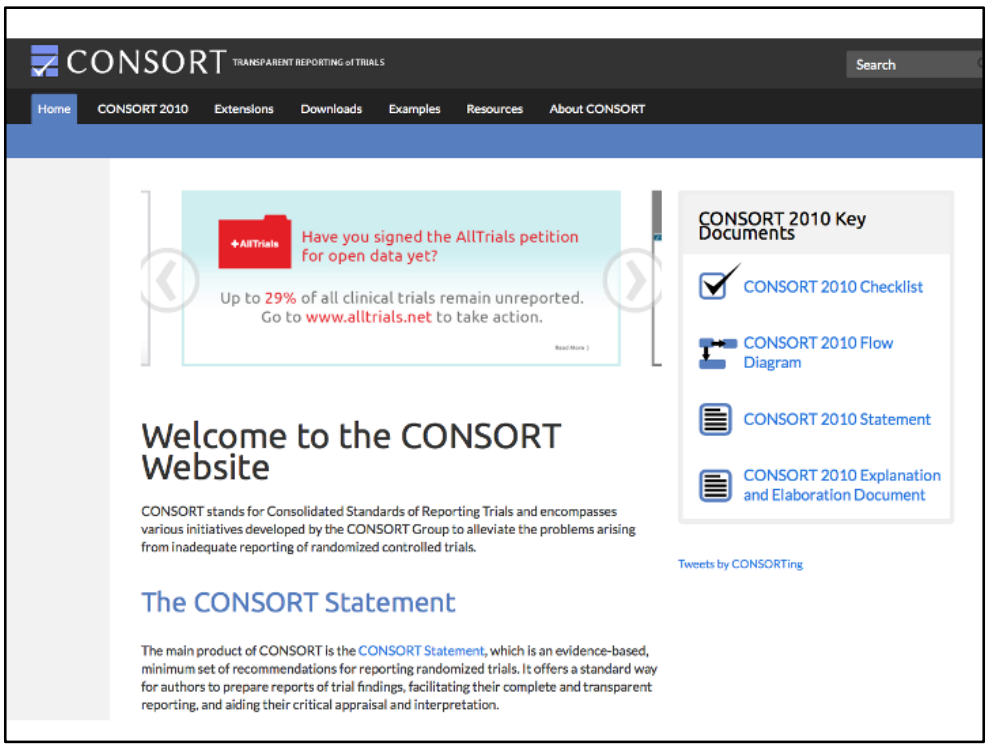
Now look at the left hand of the slide – here I have shown a "Non-randomized" Clinical Trial. PLEASE DO NOT USE THIS DESIGN. I have shown this because it is tempting to say" I would like to do a study on a drug, where I will compare a symptom before and after

treatment. So- I will do a pre-post comparison on a single group of patients/subjects. This is a tempting design, as it falls conveniently into a clinical practice, and is easily done. However, it gives results that you cannot have confidence in, since you did not have a control group. This is an unacceptable design – please do not use it.

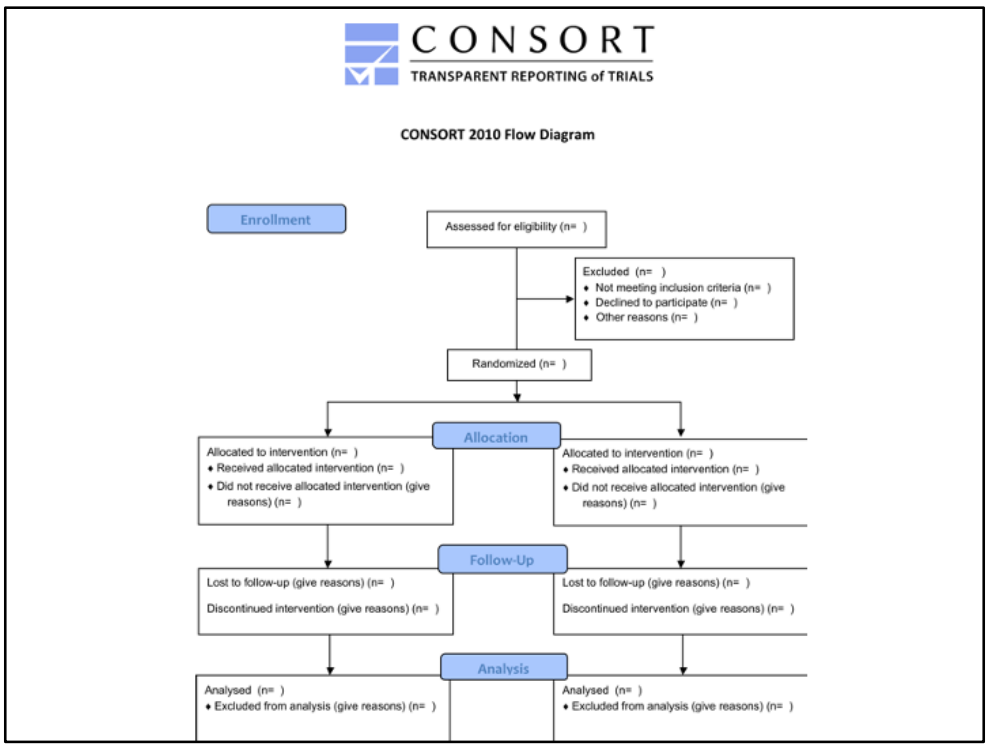
Steps in conducting a RCT

1) Drawing up a protocol (PICOT)
2) Selecting reference and experimental populations
3) Randomization
4) Manipulation or intervention
5) Follow-up
6) Assessment of outcome

Here are subheadings you should use in the research plan that describes your planned RCT



This website CONSORT, is very useful in writing your research plan. Please Google it, and read how a RCT must be planned and described.



This is a particularly important diagram, that the evaluators will look for in a RCT design. It is called the CONSORT diagram, and neatly summarizes how you will go about screening, enrolling, allocation intervention/control, and evaluating outcomes. Please have this diagram in your proposal.

Diagnostic tests

The intended use of a test can be diagnosis, screening, staging, monitoring, surveillance, prognosis, treatment selection or other purposes

Open Access Research

BMJ Open

STARD 2015 guidelines for reporting diagnostic accuracy studies: explanation and elaboration

Jérémie F Cohen,[1,2] Daniël A Korevaar,[1] Douglas G Altman,[3] David E Bruns,[4] Constantine A Gatsonis,[5] Lotty Hooft,[6] Les Irwig,[7] Deborah Levine,[8,9] Johannes B Reitsma,[10] Henrica C W de Vet,[11] Patrick M M Bossuyt[1]

Similarly, for those who want to evaluate new kits for diagnosis, this website tells you how to do it.

Overall - Outline of Research Proposal

- Background / Rationale / Introduction
  - Preliminary data
- Hypothesis
- Specific Objectives / Aims
- Methods
- Data Analysis Plan
- Limitations/ feasibility/ alternate plans
- Timeline

Here is a summary of the main headings you should have in your proposal. Detailed subheadings for selected study designs are given in slides # 6,8,9, 13

Please be detailed when you describe your team – this is important information that helps evaluate the feasibility of the research

10 Research aim the most important part of a proposal. Should clearly define the specific research question(s)

9 Many evaluators look for patient accrual rate - is it realistic? How much groundwork has been done, is there infrastructure in place? Was there preliminary data that also shows capability of the research team? Are the aims focused and specific? Is there a reasonable timeline?

8 Every grant has specifics regarding Format, Necessary sections, Length. Make sure you are carefully reading the goals of the call for applications.

7 Always ask yourself: how novel is my plan? Check the literature has it been done before.

6 Place the proposed research in the context of other work that has been done on the topic. Naturally connect current state of knowledge to the gap that the proposed research will fill. Extend known findings to the new setting you propose. End with "significance" – how the proposed work will contribute to the field

5 Ask yourself: are your methods appropriate – is the study design the correct one? Is your proposed interpretation of findings appropriate?

4 A proposal without any statistical power statements (consult your statistician) will be unfavorably reviewed

3 The budget is always important. It can break a good proposal. Ask yourself: does my budget match the scope of the proposal? Have I included resources and personnel for data analyses?

2 A well developed proposal is always internally consistent. That means, you do not contradict statements you made in previous parts of the proposal. You do not change the flow of the proposal. It is logically organized, with clarity and flow. Make sure you have updated references – evaluators will always check. Do multiple revisions, ask your colleagues to read the proposal – if they cannot understand it, the evaluators will also not understand it. Do proofreading for common mistakes.

1 This is the most important. Evaluators first read the Aims. If these are not clear, or not interesting, the evaluators also lose interest. It is important to have clear, specific aims which can be appropriately addressed with the procedures detailed in the methods.

Summary

- Good science and clear scientific writing
- Organized and self-contained
- Responsive to the RFA
- Potential for advance in the field

Please keep these points in mind at the time you are submitting – have you met these requirements?