Applying for Grants

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SHS Director of research Grant Writing Program 2018
Welcome

- To foster grant success by helping get grants started earlier
- Initiative of Director of Research School of Health Sciences with support from SHS RMC and Faculty of Health and Medicine
- Thank Dr Adam Koppers and Research and Innovation branch UON
- Thanks to Ms Hannah Brown for assistance with organisation
- Thanks to Presenters from UON and HMRI
- Weekly writing workshop MOST weeks have 30-60 minutes recorded workshop/advice then protected writing time for up to 1.5 hours
- Note location/time may vary when no rooms available
Getting ready to write the research proposal

- **The problem**: What is the issue people should care about and why?
- **Why hasn’t it been solved?** Is it too hard or too costly or no-one has thought of how to solve it before?
- **Your solution**: What are you the best person to solve this. The right solution at the right time, with the right people in the right place.
- **What this will study deliver:**
  - What *unique and important* will the study finding make?
  - Will the results be able to be *translated into practice or policy or take up broadly* within some settings or the community?
  - Or will it *create something new and unique* of commercial value?
Grant basics

- Lay summary (In 300 words, tell a friend what you plan to do and why)
- Background – justify your research
- Methods – What you will do exactly
- Study design, techniques, statistical analysis
- Ethical considerations
- Safety
- Budget and justification
- Other staff or R.A.s who can contribute time to project
- Timeline and / or milestones
- Outcomes/ Impact/ Innovation
- Checklist
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Homework

Develop a Research Question

• What is your question exactly?
• Turn it into a testable hypothesis
• Talk to colleagues and collaborators
Steps used in the scientific method of problem solving

- **Step 1** Define the problem & ask a research question (Use PICO framework)
- **Step 2** Generate the hypothesis to be tested
- **Step 3** Design the study
- **Step 4** Gather the Data
- **Step 5** Analyse and Interpret the results
- **Step 6** Report the findings
Steps used in the scientific method of problem solving

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Step 1 Define the problem and ask a research question

- What interests you? What problem do you see?
  *Is there a treatment type that you think could be improved?*

- What does the evidence base say about this area of practice?
  *Is there a systematic review on this topic? Do you need to do a literature search?*

- Who else might be interested in this?
  *Would your clinical team be interested in the evidence on this?...senior researchers, statistician, health economist?*
I wonder if ...P...I...C...O.

✓ A 4 point checklist

1. Who is the Population?
2. What is the Intervention?
3. What will you Compare it with?
4. What Outcome or improvements?
Step 2 Generate a hypothesis

- The research question (RQ) is what you wish to investigate generally
- Eg: A low fat diet reduces plasma cholesterol

- The hypothesis states RQ in terms of what you expect the findings will be
- Eg: A diet with 30% total from fat with a 1:1:1 of sat:poly:mono’s fed to humans for 3 months will decrease plasma total cholesterol by 10%
Step 3 Design the study

- The literature will guide the selection of the best study design and methods to use
- Ideally, methods are ‘validated’
- Dietary studies are strengthened by the use of biomarkers to validate intake
- Biomarkers should be appropriate to study design
- Decide on variables to measure
- Consider resources
- What is your timeline
Define the variables to be measured

Variable: a property or attribute that varies; a measured characteristic of a sample, *commonly people*. Eg. age, gender, height

Need to identify the variables to be studied

(3 main types)

1. Independent variable
2. Categorical variables
3. Dependent variables
Variables

1. **Independent or predictor** variables – those that you plan to manipulate. Eg dietary fat, intake of fruit and vegetables

2. **Categorical** variables: separates subjects into distinct groups. Eg gender, age group, control or diet intervention group, SES group, nationality, smoking status

3. **Dependent or outcome** variables – those that are expected to change as a result of the manipulation; the effect of the intervention; the outcome. Eg body weight, blood lipid levels
How do you choose a study design?

- Design is relative to time
- It depends whether time is a variable in the study, or not
NH&MRC Levels of Evidence

I  Evidence obtained from a systematic review of all relevant RCTs

II  Evidence obtained from at least one properly designed RCT

III - 1  Evidence obtained from well-designed pseudo-randomised controlled trials (alternate allocation or some other method)

III - 2  Evidence obtained from comparative studies with concurrent controls and allocation not randomised (cohort studies), case controls or interrupted time series with control

III - 3  Evidence obtained from comparative studies with historical control two or more single arm studies or interrupted time series with a parallel control group

IV  Evidence obtained from case series, either post test or pre test and post test
Study Design 101

- Cross-sectional study
- Longitudinal or Cohort study
- Time series

A A  A
Cross-sectional

A B C
Cohort study

A  A
Time

a control
a intervention

Randomised Controlled Trial or Before-After or Pre-Post study

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RCT Study designs

**Pragmatic RCT** is done in a clinical setting and tests effectiveness. Standard RCT is conducted under ‘ideal’ conditions and tests ‘efficacy’; also called an explanatory RCT.
RCT Study designs

- When the unit of randomisation (a) is a “Site” or “Setting” or “Organisation”, then the term is “Cluster” RCT

Pragmatic RCT is done in a clinical setting and tests effectiveness.

Standard RCT is conducted under ‘ideal’ conditions and tests ‘efficacy’; also called an explanatory RCT.

Randomised Controlled Trial or Before-After or Pre-Post study
Stepped Wedge Study

ABC A \_ intervention

B C \_ intervention

C \_ intervention

Time

ABC

BC

C controls

C controls
Randomisation Methods

- simple randomization
- block randomization
- stratified randomization
- covariate adaptive randomization

An overview of randomization techniques: An unbiased assessment of outcome in clinical research

KP Suresh

Abstract

Randomization as a method of experimental control has been extensively used in human clinical trials and other biological experiments. It prevents the selection bias and insures against the accidental bias. It produces the comparable groups and eliminates the source of bias in treatment assignments. Finally, it
Next Step - Gather the data

- May need to do a pilot or feasibility stage first
- Undertake the data collection
- **Be aware of bias**
- Bias can jeopardise the results
- Internal validity: Are the results of the study due to the treatment or intervention in the study or due to bias?
- External validity - Can the study results be generalised to another population outside the study group?
Identify sources of bias in research

- **Bias defined**: An effect, at any stage of the study, that distorts the results away from the truth
  - Measurement Bias
  - Selection Bias & Survivor Bias
  - Recall Bias & Detection Bias
  - Publication Bias

- **Confounder Bias defined**: A factor that distorts the size of the effect of the independent variable on the outcome. Eg A study of breakfast eating and IQ will be confounded by SES
- Adjust the study design to deal with it
Bias and confounding

- **Interference** at any stage of the investigation, which leads to systematic distortion of findings away from the true values.

- A **confounding** variable distorts the apparent magnitude of the effect of the independent (exposure) variable on the dependent (disease) variable or outcome.

- A **confounder** is likely to be unequally distributed amongst the exposed and non-exposed and needs to be measured.
Example of Confounding

Lung Cancer deaths

- Asbestos workers: $9.8 \times 10^4$
- Non-asbestos workers: $3.3 \times 10^4$

<table>
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<tr>
<th>Smoking Status</th>
<th>Asbestos Status</th>
<th>Death rate</th>
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<td>$0.6 \times 10^4$</td>
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- Confounders include age, occupation, geography and anything that could influence *exposure* to the independent (predictor) variable
To reduce bias

- If you know something affects the outcome then consider whether it could confound or influence results in your study

- Measure it to see if it is evenly distributed in all groups

- The challenge is to think of possible confounders & bias before you start
Beware of bias and limitations

- Bias can jeopardise the results

- **Internal validity** - Are the results of the study due to the treatment/intervention in the study OR baseline differences in group allocation? Eg what happens if all children with a family history of asthma are in the omega-3 group?

- **External validity** - Can the study results be generalised to another population outside the study group? Eg What happens if I only choose children of a specific culture?
Homework

Talk to team about study design

Thinking about sources of bias

- Cons potential bias related to your study
- Threats to internal validity
- Threats to external validity
- What variables need to be measured to consider this?
- Can you measure these variables?
- Talk to colleagues and collaborators
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<td>Summary</td>
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*Note: The room for the meeting with the topic marked as *has not been approved yet* has not been confirmed.*
Next week ....

SHS Grant Writing Workshop continues ....

ATC 210 9 -11.00 am 5th September

Watch this space ...

... ... emails via SHS and PRCPAN
THE WORLD NEEDS YOU

Questions?
THE WORLD NEEDS NEW
**TOP 1%**
university in the world\(^4\)

**TOP 200**
13 UON disciplines ranked in the top 200 in the world\(^2\)

**TOP 8**
in Australia for research ‘well-above world standard’\(^3\)

**OVER 90%**
of our research is ‘at or above world standard’\(^3\)

**NO. 1**
for Innovation Connections\(^4\)

**TOP 25%**
in Australia for overall education experience\(^5\)

\(\text{QS World University Rankings: Fact File 2018} \quad \text{QS World University Rankings by Subject 2017} \quad \text{Excellence in Research Australia 2015} \quad \text{League table 2016, Innovation Connections program, AusIndustry} \quad \text{Quality Indicators for Learning and Teaching 2016}\)