The research process

• Putting together a project
• Challenges of research in the wilderness
• Writing it up
• Getting it published
Inspiration
What is the goal of your study?

• Generate a specific question or hypothesis
  • Observational studies (hypothesis generating)
  • Experimental (hypothesis testing)
• Be very specific!
Hypothesis

Diamox increases appetite at altitude
Better

Diamox 125 mg bid will increase subjective appetite and caloric intake at 4200m in Himalayan trekkers compared to placebo
Study design

- Key to successful project
- Anticipates potential bias and limitations
- Ensures appropriate methodology
- A well designed study makes for an easy to write paper
Reporting guidelines for main study types

<table>
<thead>
<tr>
<th>Study Type</th>
<th>Guideline(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomized trials</td>
<td>CONSORT</td>
</tr>
<tr>
<td>Observational studies</td>
<td>STROBE</td>
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<tr>
<td>Systematic reviews</td>
<td>PRISMA</td>
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<tr>
<td>Case reports</td>
<td>CARE</td>
</tr>
<tr>
<td>Qualitative research</td>
<td>SRQR &amp; COREQ</td>
</tr>
<tr>
<td>Diagnostic / prognostic studies</td>
<td>STARD &amp; TRIPOD</td>
</tr>
<tr>
<td>Quality improvement studies</td>
<td>SQUIRE</td>
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<tr>
<td>Economic evaluations</td>
<td>CHEERS</td>
</tr>
<tr>
<td>Animal pre-clinical studies</td>
<td>ARRIVE</td>
</tr>
<tr>
<td>Study protocols</td>
<td>SPIRIT &amp; PRISMA-P</td>
</tr>
</tbody>
</table>

Available at equator-network.org
Study design

• Get help and input from others
  • Colleagues
  • Experts
  • WMS meetings
Required Actions

• IRB approval
• Clinical trial registration (ClinicalTrials.gov)
Funding

- WMS grants
  - The Charles S. Houston
  - Research-in-Training Awards
  - The Herbert N. Hultgren Award
  - The Humanitarian Aid Grant
- Local medical societies
Challenges of research in the wilderness

• Varies from project to project
• Be flexible and resourceful
• Bring lots of duct tape
What next?
Data analysis

• Don’t procrastinate

• Do get professional statistical help!

• Create tables and figures of results
Writing - Getting started

• Begin with an outline and abstract
• Identify the message
• Be prepared for hard work and numerous rewrites
• Have your paper read and critiqued by mentor, friends, colleagues
Authorship

• Authors have sufficient participation to take public responsibility for the work
  • Conception or design of project
  • Analysis and interpretation of data
  • Writing or critically revising
  • Final approval of published version
• Honorary authorship is fraud
Format of Scientific Paper

- Introduction
- **Materials and methods**
- **Results**
- **Discussion**
Format of Scientific Paper

• Introduction
  • Statement of the question
• Materials and Methods
  • Validity of evidence
• Results
  • Presentation of evidence
Format of Scientific Paper

• Discussion
  • Implications of evidence
  • Additional supporting evidence
  • Assessment of conflicting evidence
  • Conclusion – Final summary
Introduction
The Manuscript - Introduction

• Do…
  • Define problem and history briefly
  • Importance – WHY we did this study
  • Explicitly state hypothesis or specific aim of paper
  • Ideally 3 paragraphs
The Manuscript - Introduction

• Don’t…
  • Include review of all related literature
The Manuscript - Methods
The Manuscript - Methods

• Do...
  • Describe in detail HOW we did this study
  • Who – Subjects (humans, animals, cells)
  • What – procedure, intervention, measurements
  • Provide enough information to reproduce study
The Manuscript - Methods

• Do…
  • Include statement of Institutional Review Board or Human Subjects Study Committee approval
  • Specify statistical methods and software used

• Don’t…
  • Include any results
Results
The Manuscript - Results

• Do…
  • Describe WHAT the study found
  • Clearly and concisely present data
    • Figures and tables are best
    • Present actual data over summary statistics
The Manuscript - Results

<table>
<thead>
<tr>
<th></th>
<th>Before cooking</th>
<th>After cooking</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoHb (%)</td>
<td>0.35±0.04</td>
<td>1.8±0.29*</td>
</tr>
</tbody>
</table>
The Manuscript - Results

COHb before and after cooking in snow caves

Before                                 After            
COHb before and after cooking in snow caves
The Manuscript - Results

Optic Nerve Sheath Diameter at Low and High Altitude

[Graph showing distribution of Optic Nerve Sheath Diameter at different altitudes with markers for AMS (+) and AMS (-) subjects, along with mean ONSD values.]
The Manuscript – Results

• Do…
  • Present results in parallel to methods section
  • Have agreement between data in figures and text and abstract
The Manuscript - Results

• Don’t…
  • Duplicate in text data given in tables or figures
  • Include any Methods
  • Include any Discussion (i.e. interpretation)
    • Judgment words
    • Comparison to other studies
The Manuscript - Discussion

• Do…
  • Provide brief summary of important results
  • Answer your question or hypothesis
  • Put your results in context of other work in the field
    • Discuss supporting and conflicting studies
The Manuscript - Discussion

• Do…
  • Address the validity of your results
  • Include limitations of study
    • All studies have them
    • They need to be revealed and discussed
The Manuscript - Discussion

• Don’t…
  • Include any new data
  • Overstate conclusions or implications
  • Misrepresent your data
The Manuscript - Abstract

• Do…
  • Follow same format as research paper
  • Include at least one sentence for each section of the paper
  • Match the information in the full article
    • Same results
    • Same conclusions
The Manuscript - Abstract

• Don’t...
  • Differ from results or conclusions presented in paper
  • Exceed length recommended by journal
Putting it all together
Writing Summary

• State a clear hypothesis or question
• Follow the standard IMRD format
• Make sure your conclusions match your results
• Have others read your paper
• Revise, revise, revise
Getting published

• Submit to WEM!
• Submission process all online
• Read Instructions for Authors and follow them
Peer Review Process

• Goals
  • Help editor decide value for publication
  • Help authors improve paper
  • Help readers get reliable, valid evidence
Peer Review Process

- Most papers sent to 3 reviewers for feedback
- Editor makes final decision
- You receive decision letter
- Majority of papers require revision
Responding to reviewers comments

• Meant as constructive criticism

• Do…
  • Write detailed response letter
  • Address all reviewers’ comments
  • Respond by the date requested
Responding to reviewers comments

• Don’t…
  • Be argumentative or defensive
  • Feel obligated to make changes you don’t agree with
  • Give up
Research and writing in wilderness medicine - Conclusions

• Ask clear and specific questions
• Have a careful, appropriate study design
• Follow standard writing format
• Appreciate your peer reviewers
Have fun out there doing research!

Thank You