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July 31 – August 2, 2026
 Interluxury Hotel, Addis Ababa, Ethiopia

Phrasing the research question

An EBHC Methods Primer

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 University of Cape Town

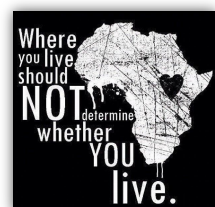




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“No-one should die of rheumatic heart disease. It is a preventable condition.”



Bongani Mayosi
Mentor, Friend, Investigator and Colleague



 Addressing Cardiovascular Diseases on the African continent...



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Session objectives

1. Introductory concepts
2. Identifying the problem
3. Types of questions
4. Study design overview





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Context:

Challenges to conducting research in your current setting?

Few introductory points

1. Various approaches to conducting basic and applied research
2. Each research study is unique (Time/Place)
3. Difficult? Not if you follow process





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Step 1: Identify the problem

A well-defined research problem will guide the research process, from setting objectives to choosing a technique.

Where do you start...?

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Step 1 of EBHC: Asking questions

Why are questions so important?

- Can't have an answer without a question!
- Some questions self-evident, many are not
- Helps clarify the problem
- Helps determine the course of action







The joy of writing a paper

Why am I doing this?

Tell us, did you enjoy writing your first scientific paper? Or, if you are an enthusiastic newcomer to science, are you looking forward to it? Science is writing. You have probably spent weeks on writing your protocol. Furthermore, it may have taken days to put your standard operating procedures, clinical record forms and analysis plan on paper. Eventually, you may have reserved the next few months to write up your paper. How can one enjoy writing a paper, meant to be read by unknown colleagues somewhere else on the globe? Who are your customers? They could be clinicians, trying to keep up to date, or biomedical scientists searching for the best work in their field of interest.

What is the best approach to writing a manuscript on a biomedical scientific study? Well, the most solid approach, obviously, is to read a textbook on scientific writing. Both of us have Mimi Zeiger on our shelves [1]. But did we actually read the book? We may see

What do I need to consider in advance?

Several issues need to be taken into account after deciding to write a paper. The best summary is given by the International Committee of Medical Journal Editors (ICMJE) [2]. The first principle is: the paper should present novel data. Duplicate publication of data is a suicidal boobytrap and must be avoided at all times [3]. Consider the following:

The data

- Are these novel or confirmative?
- What are the strengths and weaknesses of the data?

The journal

- Is my paper suitable for a specialty journal or a general medical journal?
- Am I heading for a high impact factor journal [4]?
- Is this kind of paper well cited [5]?

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The authors are Chief Editors of the European Respiratory Journals

Competing interests

None declared

Provenance



Breathe | March 2008 | Volume 4 | No 3

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The joy of writing a paper

Why am I doing this? What do I need to consider in advance?

Introduction

General background about the disease

The specific dilemma

Why is this still unresolved?

My idea to resolve it: sell it as the obvious approach

Hypothesis or question Aim

Figure 3
The construction of an Introduction.

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Phrasing questions

Questions from your research?

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Consider this Scenario

A relative diagnosed with carpal tunnel syndrome asks advice on treatment options which include surgery, splinting and anti-inflammatories. The woman tells you that she is terrified of surgery and asks you how effective the non-surgical treatments are in comparison. You promise to check the latest literature and revert to her in a few days.

Possible questions??

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Scenario: Possible questions??

- What causes carpal tunnel syndrome?
- What are the treatment options for carpal tunnel syndrome?
- Are splints effective for carpal tunnel syndrome?

How can we phrase a more focused question?

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Phrasing questions using a mnemonic

...the evidence-based approach

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Phrasing questions using a mnemonic as a tool

- **P** = Patient / person / population
- **I/E** = Intervention (action) / exposure (observation) / index test
- **C** = Comparator for the I / E
- **O** = Desired outcome
- **(T)** = Time frame
- **(S)** = Study design



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Phrasing questions using appropriate mnemonic

- Investigating the outcome of a service or policy? Try **ECLIPSE**:
Expectation, Client group, Location, Impact, Professionals, Service
- Working out prevalence or incidence? Try **CoCoPop**:
Condition, Context, Population
- Determining prognosis? Try **PFO**:
Population, Prognostic Factors, Outcome
- Investigating effectiveness of interventions? Try **PICO**:
Population, Intervention, Comparator/s, Outcomes

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Phrasing questions using appropriate mnemonic

- Structuring qualitative questions? Try **PIC** or **SPIDER**:




Population, Phenomena of Interest, Context
 Sample, Phenomenon of Interest, Design, Evaluation, Research type
- Question about aetiology or risk? Try **PEO**


Population, Exposure, Outcomes
- Evaluating an intervention, policy or service? Try **SPICE**:


Setting, Population or Perspective, Intervention, Comparison, Evaluation

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Scenario:

You wish to evaluate whether antibiotics are effective in reducing the incidence of ARF after suspected pharyngitis

Type of question?
Which mnemonic?

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Phrasing questions using appropriate mnemonic

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PROGNOSIS

TBI

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Scenario:

You wish to evaluate whether antibiotics are effective in reducing the incidence of ARF after pharyngitis

In P: _____
does I: _____
Compared with: _____
result in O: _____

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Antibiotics for reducing the incidence of ARF following GAS pharyngitis

- **Participants**
 - People with GAS pharyngitis, irrespective of age
- **Interventions or Exposures**
 - Antibiotics given by any route.
- **Comparisons**
 - No antibiotics
- **Outcome measures**
 - Rheumatic Fever Reduction

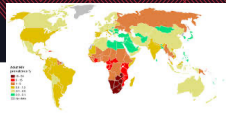


Question?

In people with suspected GAS pharyngitis, are antibiotics (any route) compared with no antibiotics, effective in reducing the incidence of ARF?

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Mnemonic examples

Prevalence or Incidence

CoCoPop

- Condition
- Context
- Population

Prevalence or Incidence

> > What is the prevalence of **Strep A** pharyngitis in **children** living in **informal settlements**?"

Condition

Context

Population

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Mnemonic examples

Aetiology and Risk

PEO

- Population
- Exposure
- Outcomes

Aetiology and Risk

> > Are **children** exposed to **Strep A** at risk of contracting **acute rheumatic fever**?"

Participants Association Outcome

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Mnemonic examples

Qualitative Reviews

➤ What is the **experience of recovering from surgery** in **adult patients** during their stay in a **cardiac unit**?"

Population Phenomena of Interest Context

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EDITORIAL COMMENTARY

Focusing on Operational Research: A Welcome Step!

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Over the last decade, India has made substantial progress in child health, particularly in terms of improvement of health services during pregnancy and delivery, widespread provision of facility-based neonatal care, and better treatment of common childhood diseases – leading to reduction in infant mortality rate (IMR) by almost 40% and under-5 mortality rate by 45% [1]. However, there is still much work to be done as regional and socioeconomic inequalities still exist, preventable conditions such as neonatal asphyxia, neonatal sepsis, pneumonia and diarrhea are still the most common causes of under-5 deaths [2], and malnutrition is the major risk factor underlying these deaths [3]. Moreover, with better survival, we must now focus on quality and productivity of life.

Medical research and innovations have played an important role in reducing the impact of greatest health problems faced by children. When interventions that are proved to be efficacious in research settings are delivered to the communities, the impact is very often diluted due to unique challenges in the health systems. Understanding the magnitude of these challenges, their possible causes, and providing customized solutions is extremely important, particularly in low- and middle-income country (LMIC) settings with high disease burden, socio-economic and

in real life settings, and not in controlled research settings; and (ii) there is an intention and plan to use the research findings to solve the problems related to implementation and improving healthcare delivery [5]. Operational research enables decision-makers to improve the performance of health programs through identification of problems that limit program outputs, quality and efficiency, finding their solutions, and trying alternative strategies by optimizing program outputs and processes for improved outcomes [6].

In India, like in most other LMICs, a large majority of the research published in peer review journals is generated by researchers from academic institutions. These publications are predominantly based on topics from basic or clinical sciences, or questions of efficacy of interventions. There is no doubt that such research has important role to play in advancement of science, but for the country's needs, there need to be supplemented by operational research through partnerships. It is heartening to see five research papers predominantly catering to operational/implementation issues in this issue of *Indian Pediatrics* [7–11]. This series of publications has emanated from research carried out through Norway-India Partnership Initiative in 13 selected districts of four of the Empowered action group (EAG) states that contribute to maximum child mortality (Bihar,

Medical research and innovations have played an important role in reducing the impact of greatest health problems faced by children. When interventions that are proved to be efficacious in research settings are delivered to the communities, the impact is very often diluted due to unique challenges in the health systems. Understanding the magnitude of these challenges, their possible causes, and providing customized solutions is extremely important, particularly in low- and middle-income country (LMIC) settings with high disease burden, socio-economic and

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Abstract

Free full text

Operational Research to Inform Programmatic Approaches to the Management of Tuberculosis in Uzbekistan.

Gadoev J, Harries AD, Korotych O, Kumar AMV, Dadu A, Kuppens L, Parpieva N, Abdusamatova B, Yedilbayev A, Dara M.
Int J Environ Res Public Health. 2021 Nov 23;18(23):12308. doi: 10.3390/ijerph182312308.
PMID: 34886030 **Free PMC article.**

Implementing operational research to scale-up access to antiretroviral therapy for HIV infection: lessons learned from the Cameroonian experience.

Boyer S, Koulla-Shiro S, Abé C, Spire B, Moatti JP.
Curr Opin HIV AIDS. 2011 Jul;6(4):239–44. doi: 10.1097/COH.0b013e328328478757.
PMID: 21537170 **Review.**

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Session 2 Systematic Reviews.ppt

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PICO question

In people with suspected GAS pharyngitis, are antibiotics (any route) compared with no antibiotics, effective in reducing the incidence of ARF?

Best study design to answer your question?

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Category	Typical question
Diagnosis & Screening	How accurate is this test?
Frequency/Prevalence/Incidence	How often does this disease occur?
Risk/Aetiology/Cause	What factors increase the risk of this disease?
Harm	Is this intervention safe?
Prognosis	What are the consequences of this disease?
Treatment/Intervention	Does treatment change the course of this disease?
Prevention/Intervention	Does early intervention keep this disease from occurring, or slows its development?
Cost-effectiveness	Are the benefits of the treatment worth the costs incurred?
Experiences & Meaning	Why patients behave in a certain way and how do they experience the disease, test or treatment?

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Question type guides study design

Question Type		Best study design
Therapy or prevention	→	Randomised controlled trial (RCT)
Aetiology & risk factors	→	Cohort or case-control study
Diagnosis	→	Cross-sectional study
Screening	→	Randomised controlled trial (RCT)
Experiences & meaning	→	Qualitative study
Prognosis & incidence	→	Cohort study

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Step 3: Study design

“Overall research approach or strategy to representing what happens in a given population in a given period of time”

What types of study designs are you familiar with?
Why important?
What guides the choice of study design?

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Best study design according to question

- For **each type of question**, there is a **study design** that is most appropriate for the specific type of question.
- So when you **search** for research for a specific type of question, you need to search for the **study design** that is best for that question.

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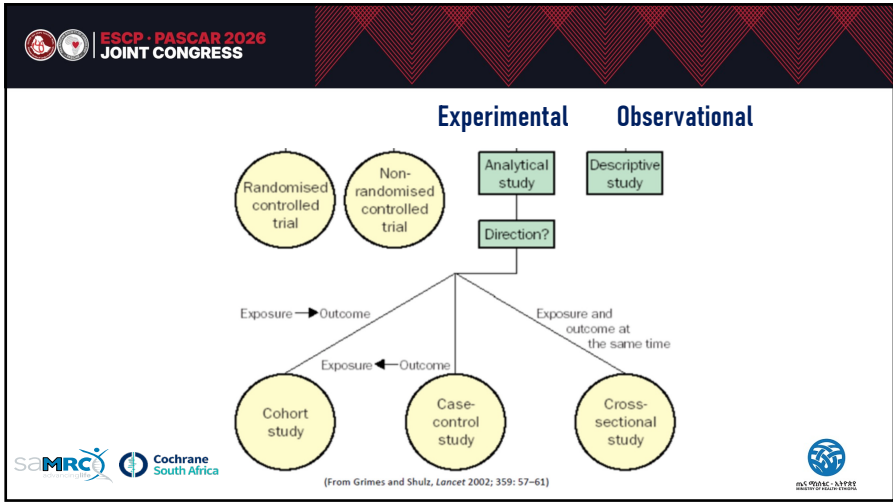
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What are Study Designs?

- **Structured approaches** to address **specific** research questions
- Overall research **strategy** that will be undertaken/implemented
- Provide **general guidelines** for thinking about specific aspects of study conduct:
 - **sampling populations**
 - **systematically collecting measurements**
 - **analysing data**
- Strengths & limitations of specific designs are well-established
- Some questions can be answered using more than one study design—other considerations

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JUST KEEP WRITING...
JUST KEEP WRITING...

Systematic review	Seeks to systematically search for, appraise and synthesis research evidence, often adhering to guidelines on the conduct of a review	Aims for exhaustive, comprehensive searching	Quality assessment may determine inclusion/exclusion	Typically narrative with tabular accompaniment	What is known; recommendations for practice. What remains unknown; uncertainty around findings, recommendations for future research
Rapid review	Assessment of what is already known about a policy or practice issue, by using systematic review methods to search and critically appraise existing research	Completeness of searching determined by time constraints	Time-limited formal quality assessment	Typically narrative and tabular	Quantities of literature and overall quality/direction of effect of literature
Scoping review	Preliminary assessment of potential size and scope of available research literature. Aims to identify nature and extent of research evidence (usually including ongoing research)	Completeness of searching determined by time/scope constraints. May include research in progress	No formal quality assessment	Typically tabular with some narrative commentary	Characterizes quantity and quality of literature, perhaps by study design and other key features. Attempts to specify a viable review

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BMC Cardiovascular Disorders 

Research article **Open Access**

Antibiotics for the primary prevention of acute rheumatic fever: a meta-analysis

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BMC Cardiovascular Disorders 2005, 5:11 doi:10.1186/1471-2261-5-11 Accepted: 31 May 2005
This article is available from: <http://www.biomedcentral.com/1471-2261/5/11>
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Robertson 2005

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The “Science” of a Systematic Review

1. Formulate review question (Mnemonic-based)
2. Define selection criteria for studies (Question, study designs)
3. Determine search strategy (sources, keywords)
4. Conduct data extraction using pre-designed form
5. Critically appraise study methodologies (bias, confounding)
6. Summarise outcomes data (RR, OR, means etc.)
7. Write a *coherent and logical* summary

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Develop a search strategy

Boolean operators

- + AND
- + OR
- + NOT

Building blocks:

- + Keywords
- + Synonyms
- + MeSH terms

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BMC Cardiovascular Disorders 2005, 5:11
<http://www.biomedcentral.com/1471-2261/5/11>

Table 1: Characteristics of included trials

Study ID	Randomisation and concealment of treatment allocation	Participants	Intervention	Effect size	% Randomised included in analysis
Bennike, 1951	Quasi-randomised; Inadequate concealment of treatment	349 admitted to hospital with ordinary acute tonsillitis, pleurmonous tonsillitis or ulcerative tonsillitis	1. Penicillin: IM, 300,000 units/day for 6 days (adults) 2. Control – symptomatic treatment	Not Estimable	88%
Brink, 1951	Quasi-randomised; No concealment of treatment	475 males, aged 17–21, admitted to U.S. military hospital with respiratory symptoms or fever with exudate on tonsils or pharyngeal mucosa	1. Procaine penicillin G: IM 300,000 units/day for 4 days 2. Aureomycin: avg. 2 g/day orally for 4 days 3. Control – no treatment	RR = 0.29 [0.06, 1.46]	Unknown
Brock, 1953	Randomised; No concealment of treatment	349 males admitted to U.S. military hospital with exudative pharyngitis and laboratory-confirmed GAS infection	1. Procaine penicillin G: IM 600,000 units/day for 3 days 2. Control: IM saline placebo, day 1 and day 5	RR = 0.11 [0.00, 2.71]	Unknown
Brumfitt, 1957	Quasi-randomised; No concealment of	121 males, aged 18–21, admitted to U.S. military	1. Combination of procaine penicillin G: IM	Not estimable	Unknown

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University of
BRISTOL

Announcement of revised tools to assess risk of bias in randomized trials and in non-randomized studies

Julian Higgins, Jonathan Sterne, Jelena Savovic

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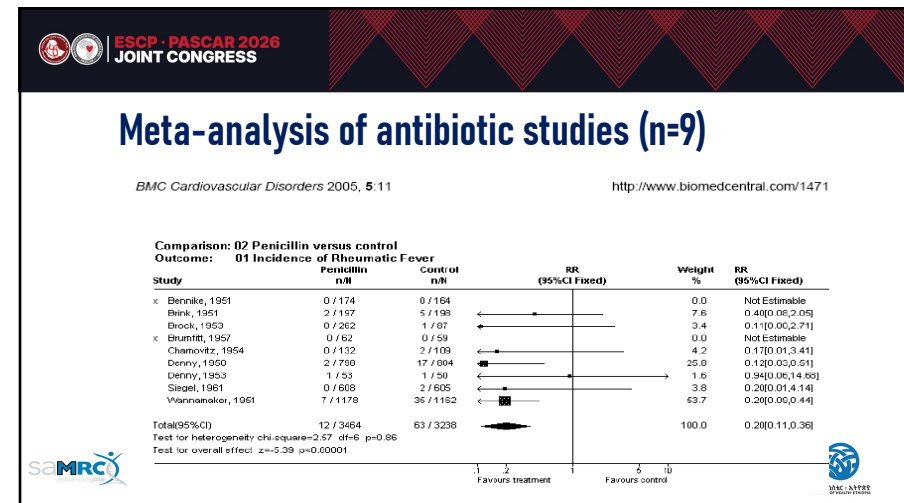
ROBINS-I tool

The ROBINS-I tool is a risk of bias tool to assess non-randomized studies of interventions. The relevant chapter in the *Cochrane Handbook for Systematic Reviews of Interventions* Chapter 25, titled 'Assessing risk of bias in a non-randomized study'. Up-to-date information from the developers on ROBINS-I is available via the Risk of Bias tools website: <https://www.riskofbias.info/>

- Process for proposing changes to methods or tools used in Cochrane
- Scientific Committee recommendations
- Clinical study reports and other regulatory documents

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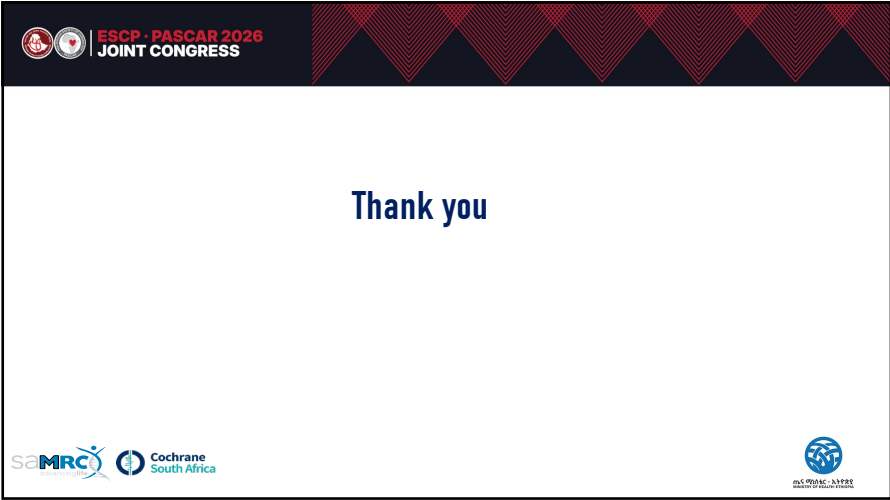
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