Systematic Reviews in Medicine

A Comprehensive Lecture on Evidence Synthesis & Critical Appraisal in Clinical Research

DEPARTMENT OF MEDICAL EDUCATION & CLINICAL EPIDEMIOLOGY

Systematic vs. Narrative Reviews

% Systematic Reviews

Focused clinical question with pre—defined PICO parameters

Comprehensive, reproducible database search strategies

Explicit inclusion, exclusion, and screening logs

Rigorous risk—of—bias evaluation of all studies

& Narrative Reviews

Broad or unspecified scope without precise questions

Informal, subjective, and unstructured literature search

No mandatory registration or documented screening flow

High vulnerability to selection and presentation biases

The Hierarchy of Medical Evidence

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CO C HRA N E LEV EL

Gold Standard of Clinical Proof

Systematic reviews and meta-analyses of randomized controlled trials (RCTs) occupy the absolute peak of the medical evidence pyramid.

They provide clinicians, professional societies, and regulatory agencies with high-precision statistical summaries. By pooling data across trials, they resolve conflicting study findings and minimize single—trial bias.

The PICO Question Framework

Patient / Population

Specify disease status, stage, demographics, comorbidities, and clinical setting.

Intervention / Comparison

Define targeted treatments, dosages, routes, compared directly against placebo or standard care.

Outcomes

Identify primary clinical endpoints like mortality, quality of life, and safety thresholds.

Protocol & PROSPERO Registration

PROSPERO Prospectus

Registering your protocol on PROSPERO prevents research duplication and safeguards against selective outcome reporting bias.

Pre-Specified Methodology

Reviewers must define analytical subsets, search strings, and plan sensitivity checks before examining any collected data.

PRISMA-P Compliance

Using the Preferred Reporting Items for Systematic Reviews and Meta—Analyses Protocols checklist ensures optimal reporting quality.

Biomedical Literature Databases

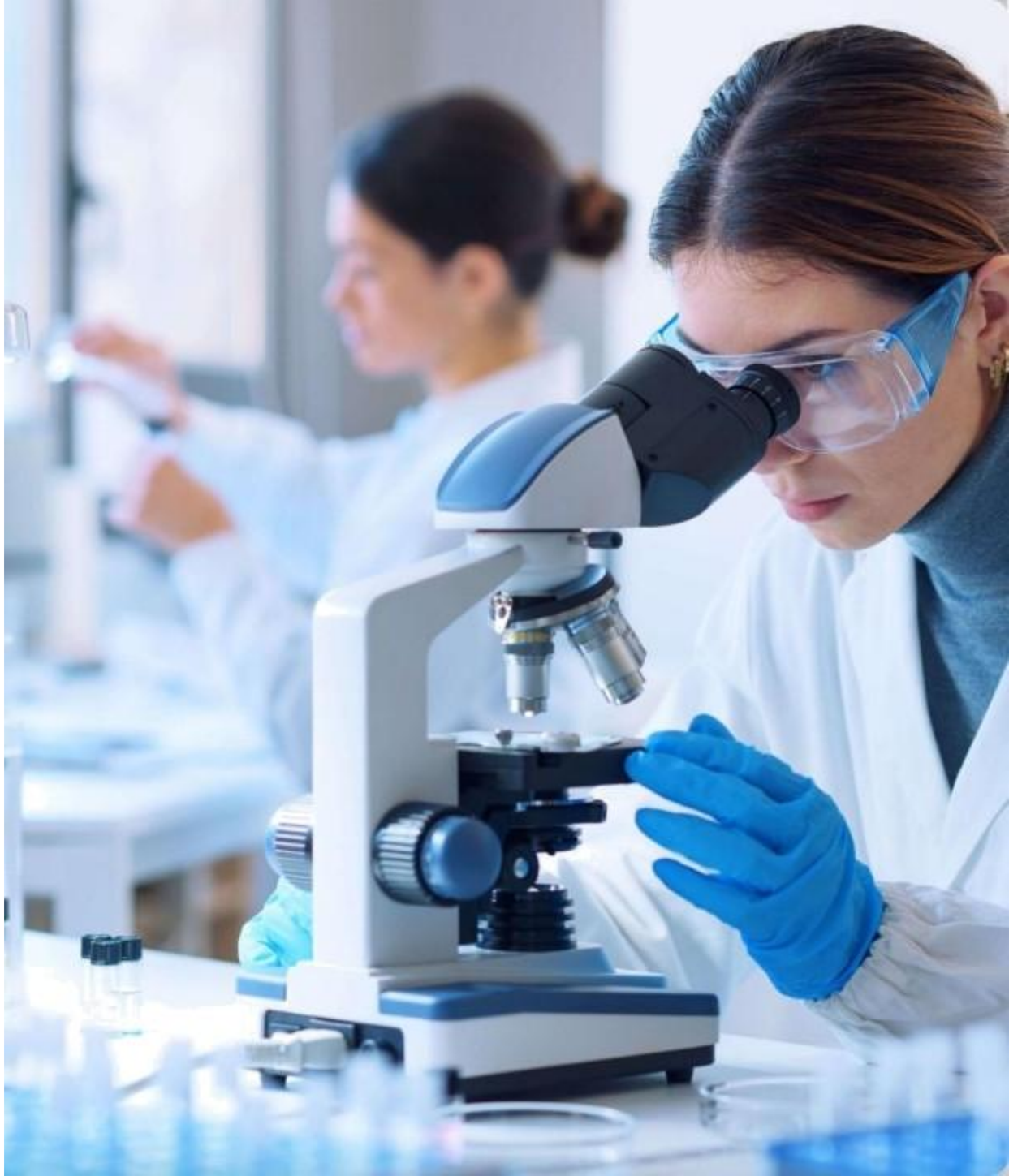
Database Engine	Medical Coverage Focus	Typical Medical Subject Headings (MeSH) Syntax
PubMed / MEDLINE	Primary global source for clinical medicine, biomedicine, and allied health	"Myocardial Infarction"[Mesh] AND "Aspirin"[Mesh]
Embase (Elsevier)	Deep pharmacological focus, drug devices, and exceptional European coverage	'heart infarction'/exp AND 'acetylsalicylic acid'/exp
Cochrane Central (CENTRAL)	Highly concentrated registry of controlled trials, avoiding observational noise	MeSH descriptor: [Myocardial Infarction] explode all trees

Formulating Search Strategies

The Art of Medical Literature Retrieval

A high-quality search strategy must prioritize absolute sensitivity over precision to ensure relevant literature is never missed.

Collaborate closely with clinical search specialists or medical librarians to build robust search matrices. This requires combinations of controlled vocabularies (MeSH terms, Emtree) alongside extensive title/abstract text words.



Typical Screening Selection Yield

N = 3,450

Initial Yield

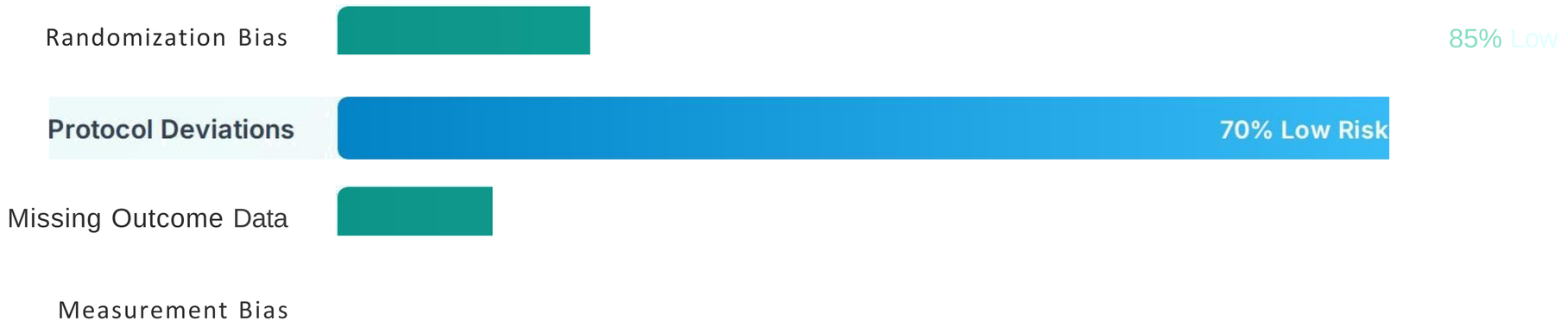
70% (2,415) Duplicates & Title Screened Out: Irrelevant target populations or off-topic methods.

20% (690) Full-Text Excluded: Missing primary clinical outcomes or non-randomized designs.

@ 10% (345) Final Selection: Studies meeting all strict PICO criteria synthesized.

PRISMA flow tracking filters thousands of initial database results down to a highly targeted subset of pristine randomized trials.

Risk of Bias Evaluation



Applying tools like Cochrane RoB 2 ensures objective grading of randomized trial transparency across standard assessment domains.

Data Synthesis & Meta-Analysis

Quantifying Clinical Outcomes

When pooled trials share clinical homogeneity, a quantitative meta-analysis can be executed.

This process mathematically combines effect sizes to calculate a weighted overall treatment effect. Reviewers must assess statistical heterogeneity (using the I* statistic) to determine whether a Fixed—Effects or Random—Effects pooling model is most appropriate.

Systematic Review Timeline

02

Months 1-2

Write PICO question, pre-register protocol on PROSPERO, and test search strings.

05

Months 3-5

Run search syntax, perform duplicate blinding screening, and draft PRISMA flow chart.

08

Months 6-8

Extract data matrices and perform dual-reviewer critical risk-of-bias evaluation.

12

Months 9-t2

Meta-analysis calculations, GRADE evidence profile formatting, and final writing.