



SDSU

HealthLINK
Center

Introduction to Different Types of Research Study Designs

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Multidisciplinary Research Council (MRC)
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SDSU HealthLINK Center

<https://healthlink.sdsu.edu/>

Community Engagement Core

Center Partnership with
Innercare

[https://healthlink.sdsu.edu
/community-partner-
organizations/](https://healthlink.sdsu.edu/community-partner-organizations/)

Funder: National Institute on
Minority Health & Health Disparities

Award Numbers: U54MD012397
(Center) & S21MD010690
(Endowment)

Network: One of 20+ Research
Centers at Minority Institutions
(RCMIs)

Proposed MRC Research Training Topics

Ideas for future trainings
welcome

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Part I – Intro to Different Types of
Research Study Designs

*What can you learn from
different types of studies?*

Part II – Implementation Science
(October 2025)

Other topics for future:
Controlling Sources of Bias

*What is it and why does it
matter?*

Interpreting Data

*What conclusions can you
draw?*

Outline

What is a health research study?

PICO(T/S) Model

Methodological Approaches - Quantitative, Qualitative, Mixed Methods

Different Types of Study Designs & Advantages/Disadvantages

Levels of Evidence

What is a health research study?

Why do we need it?

What is a health research study?

Also called “medical research” or “clinical research”

Focused activities to answer a specific scientific question, or to test a particular theory or intervention. Health research helps clinicians and researchers learn about human health and disease, and how to prevent or treat disease effectively.

Why do we need research?

Healthcare providers need valid and reliable research to **guide evidence-based practice.**

Study Designs

Studies must outline their overall **Study Design** and **Methods**

Study Design describes the overarching research plan and approach

Methods are the detailed plan (or “protocol”) to get and process data

Define what will happen - who / what will be studied? how / when / where?

If a study involves collecting information from live people (human subjects, like your patients), a group of experts called an Institutional Review Board (IRB) needs to review/approve the research plan in advance, to ensure appropriate protections are in place for those participating in the study. Additional protocols and considerations needed for different types of data.

PICO(T/S) Model

Formulate a clinical question and consider study design

P	Population (Patient, or Problem)	What are the P's characteristics? What is the disease / condition?
I	Intervention (or E=Exposure)	What do you want to do with / for P?
C	Comparison to intervention (if appropriate)	What is the alternative? Is there a benchmark or gold standard to consider?
O	Outcome (measurable)	What are you trying to achieve / improve?
T	Timeframe	When should the goal be reached? When should we measure outcomes?
S	Study Design / Setting	Descriptive? Analytic? Qualitative? Quantitative? Mixed methods? Real-world? RCT?

PICO Example

Try-It Exercise: Identify the PICO elements from the following scenario:

As a school nurse in a local high school, you notice an increase in teens who are vaping. You'd like to do some research into the possible negative health effects of vaping so that you can provide students with factual materials to help them stop or reduce their smoking.

P = Patient or Problem - How would you describe your group of patients?

I = Intervention - What main intervention are you considering?

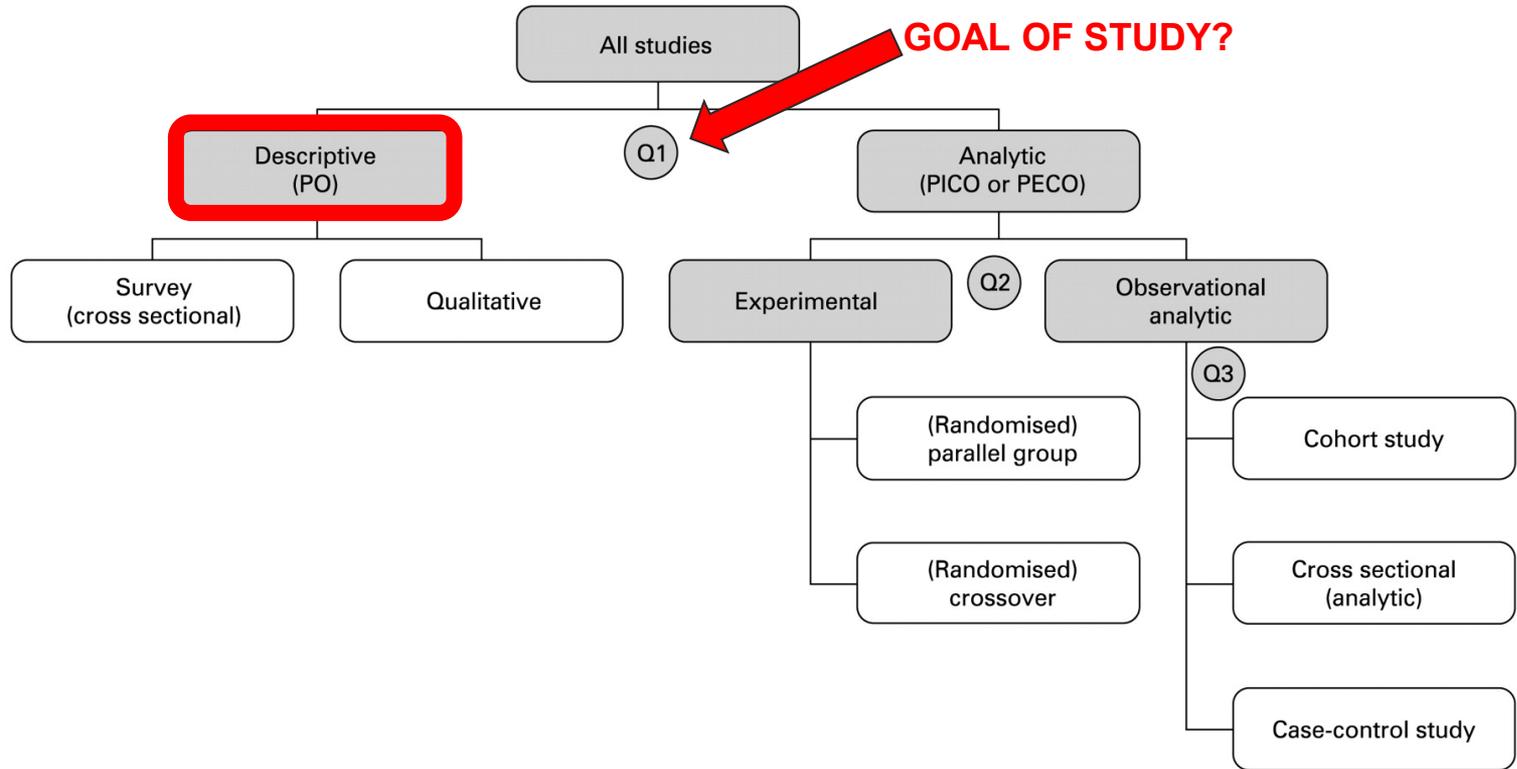
C = Comparison - What is the main alternative to compare with the intervention?

O = Outcome - What can you hope to accomplish, measure, improve or affect?

Source: NIH National Library of Medicine. https://www.nlm.nih.gov/oet/ed/pubmed/pubmed_in_ebp/02-100.html

Brief Discussion

Study Designs



Q1 - Goal of the Study?

Descriptive VS Analytic

To simply describe a population

Ask PO questions:

- Population / Patients/ Problem
- Outcome

To quantify the relationship between factors

Ask PICO/TS questions:

- Population / Patients / Problem
- Intervention / Exposure
- Comparisons
- Outcome
- Timeframe
- Study Design – *more choices here with different implications*

Goal of the Study?

Descriptive

To simply describe a population

Ask PO questions:

- **P**opulation / Patients/ Problem
- **O**utcome

- Cross-sectional survey (*Quantitative*)
- Interviews (*Qualitative*)

Advantages: Less complex;
Faster / cheaper / easier to carry-out
study;
may be good starting point for
understudied topical area (formative)

Disadvantages: Limited scope;
fewer comparisons can be made;
usually can not draw conclusions
about causality (cross-sectional)

Methodological Approaches

Quantitative

Measure and analyze numerical data

Survey (closed-ended, self-reported) or other type of observed/recorded data (E.H.R.)

Cross-sectional (data collected at one point in time = descriptive study design)

Qualitative

Focus on non-numerical data and observe or probe about subjective experiences

Gain a rich and deep understanding of complex concepts

Can be exploratory, open-ended inquiry, answer how / why types of questions

Mixed Methods

Employs both qualitative and quantitative methods and links data

Qualitative Methods

Interviews, focus groups (group interviews)

- Guided discussions by trained facilitators
- Thematic or content analysis

Examples: explore beliefs, personal motivations or meaning of cultural practices

Ethnography

-Immersive participation

Example: systematic study of a whole culture or society

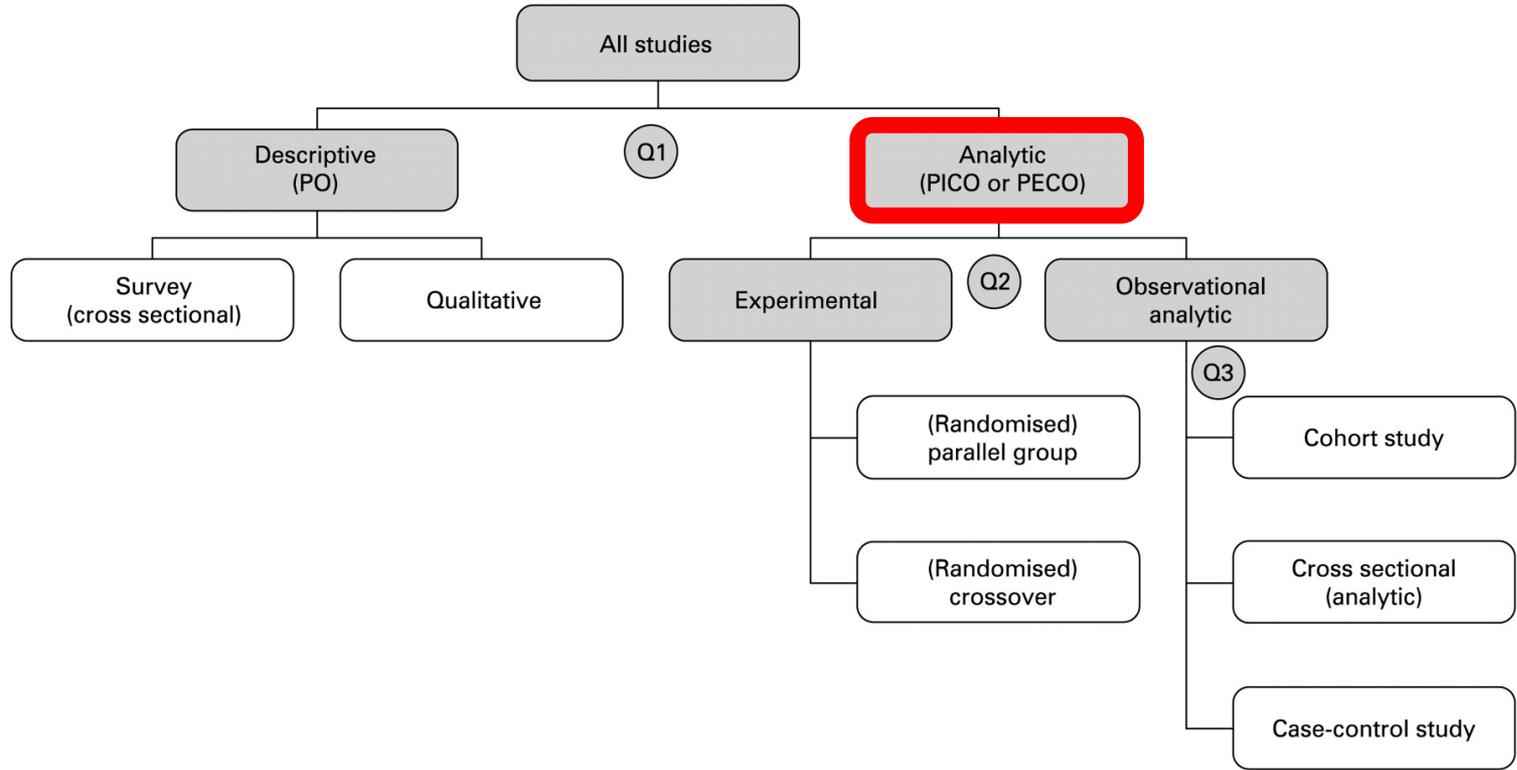
Advantages

- Usually smaller, purposive sample sizes (compared to Quantitative studies)
- Can yield new insights, uncover nuances, handle complexities
- Can be flexible

Disadvantages

- Can be more time intensive to collect and analyze qualitative data
- Subjectivity (potential influence of data collector on data quality and interpretations)
- May not be as generalizable to larger population

Study Designs



Q1 - Goal of the Study?

Analytic

To quantify the relationship between factors

Ask PICO/TS questions:

- Population / Patients / Problem
- Intervention / Exposure
- Comparisons
- Outcome
- Timeframe
- Study Design – *more choices here with different implications*

Advantages: Can account for more variables/factors/relationships; theory-driven

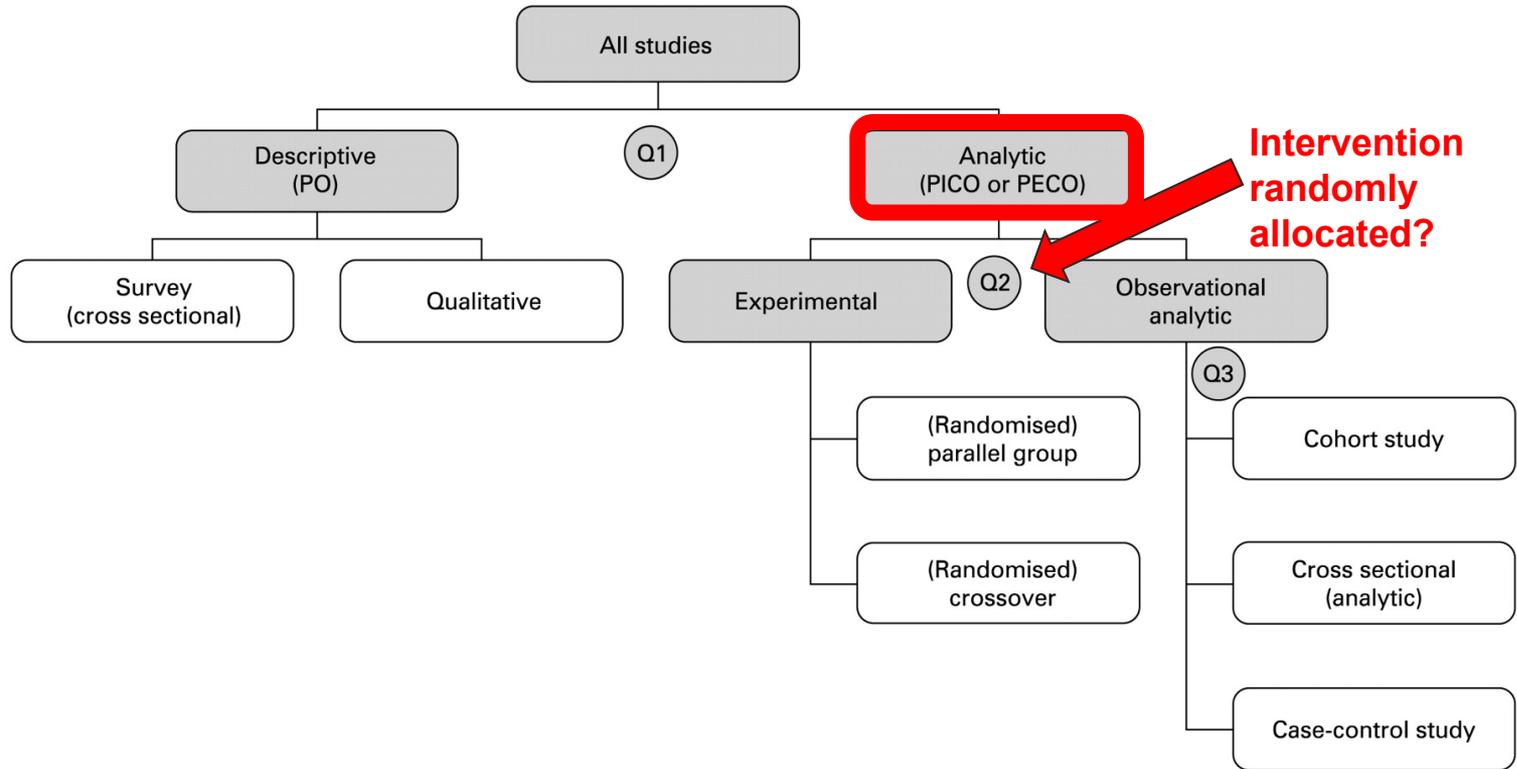
Disadvantages: Can be complex and costly and time-consuming to collect and analyze data

Analytic study designs

Experimental / Interventional

Observational
(non-experimental)

Study Designs



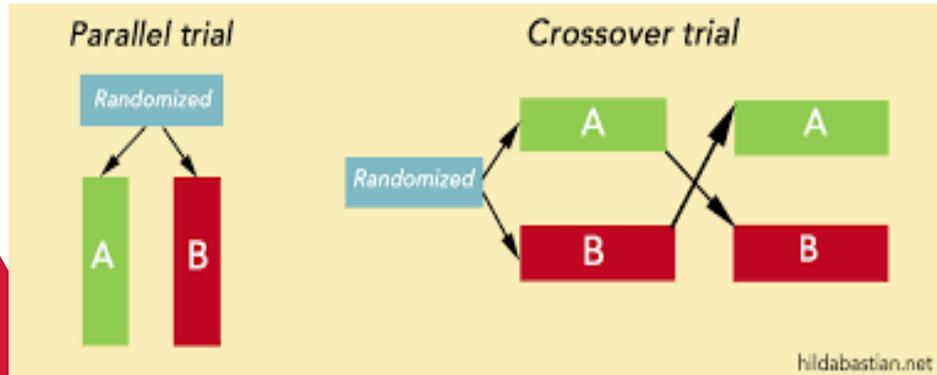
Q2 - If analytic, was the intervention randomly allocated?

YES?

Experimental study designs

Randomized Controlled Trial (RCT)

Parallel RCT vs Crossover RCT



NO?

Observational study designs

Experimental Study Design

A research method where researchers manipulate a factor/treatment to observe its effect on an outcome variable(s)

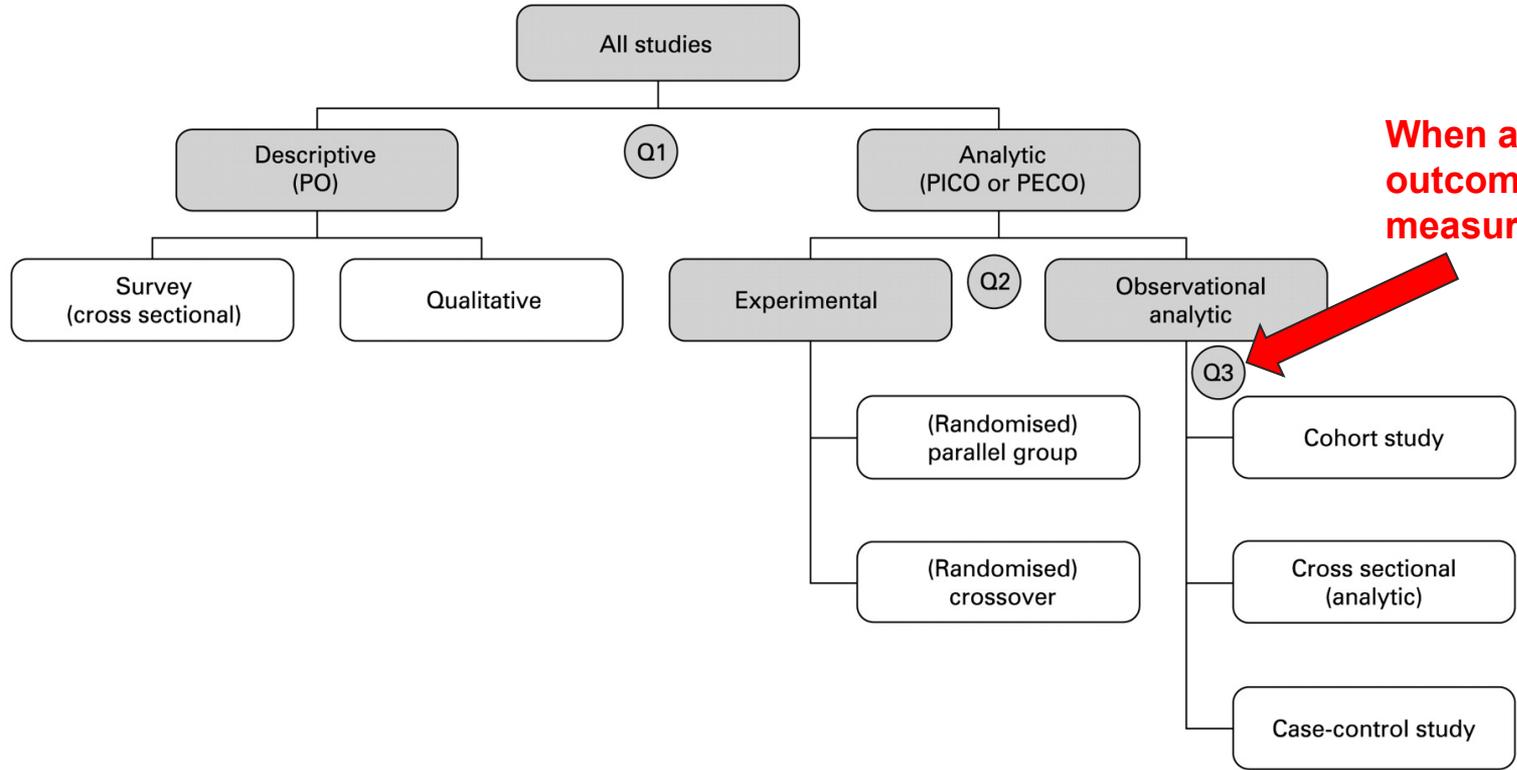
Assignments made (randomly - RCTs, or not - natural experiment conditions)

Examples: biomedical experiment, randomized controlled trials (RCTs), intervention studies, clinical trials

Advantages: Replicable; results can establish a cause-and-effect relationships

Disadvantages: ethical issues, costly, time-consuming

Study Designs



When are outcomes measured?

Q3. When were the outcomes determined?

Some time after the exposure or intervention?

cohort study ('prospective study')

At the same time as the exposure or intervention?

cross sectional study or survey

Before the exposure was determined?

case-control study ('retrospective study' based on recall of the exposure)

Observational Study Designs

A research method used to gather information about a group of subjects without manipulating any variables or conditions.

No assignment has been made.

Often used to identify patterns, correlations, or associations between variables rather than establishing cause and effect.

- Cohort study design (follow a group over time)
- Cross-sectional study design (assessment at one point in time)
- Case-control study design

Observational Study Designs

Examples: E.H.R. data, survey data, interview data

Advantages: usually large sample size (big data) so have statistical power; may be able to generate and test hypotheses

Disadvantages: unmeasured factors may not be accounted for; follow-up over time may be challenging; may still encounter ethical issues; can be costly and time-consuming

Quasi-experimental Study Designs

Assignments not made randomly and can not be controlled

Examples: natural experiment (impact of a policy change, like a change in Medicaid coverage)

Advantages: may be more feasible, may inform causal relationships

Disadvantages: costly, time-sensitive, available data may be limited

Levels of evidence

Strength of evidence and
study conclusions



Type of study	Brief description
Systematic reviews and meta-analysis	Summary of results of several studies
Experimental / Intervention studies (including different types of trials, quasi-experimental; implementation science)	Different study designs to test intervention or implementation effectiveness.
Cohort study *	Follow a group of people (cohort).
Case-control study *	Examines a group of people exposed to an adverse event and a group not exposed.
Cross-sectional survey *	Snapshot of a group of people at one timepoint.
Case series and case reports *	Examine individual/group with a disease.

* Non-experimental analytic study designs

[https://bestpractice.bmj.com/info/us/toolkit/ebm-tools/a-glossary-of-ebm-terms/;](https://bestpractice.bmj.com/info/us/toolkit/ebm-tools/a-glossary-of-ebm-terms/)

[https://libguides.sdsu.edu/pico;](https://libguides.sdsu.edu/pico) <https://guides.dml.georgetown.edu/ebm/ebmclinicalquestions>

Additional Resources

<https://clinicaltrials.gov/>

Database of clinical research studies from around the world

<https://www.cochranelibrary.com/central>

Cochrane Central Register of Controlled Trials (CENTRAL)
database of RCTs and reports. Browse by PICOs

<https://www.crd.york.ac.uk/prospero/>

International prospective systematic review registry



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Thank you! Questions?

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